



Emergency
Preparedness
Review

EPREV

**PEER APPRAISAL OF THE ARRANGEMENTS IN
CANADA REGARDING PREPAREDNESS AND
RESPONSE FOR A NUCLEAR OR
RADIOLOGICAL EMERGENCY**



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International Atomic Energy Agency

FOREWORD

Within the United Nations system, the International Atomic Energy Agency (IAEA) has the statutory functions of establishing standards of safety for the protection of health against exposure to ionizing radiation, and of providing for the application of these standards. In addition, under the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention) the IAEA has a function, if requested, to assist Member States in preparing emergency arrangements for responding to nuclear accidents and radiological emergencies.

In response to a request from the Government of Canada, the IAEA fielded an Emergency Preparedness Review (EPREV) mission to conduct, in accordance with Article III of the IAEA Statute, a peer review of Canada's radiation emergency preparedness and response arrangements vis-à-vis the relevant IAEA standards.

The number of recommendations, suggestions and good practices is in no way a measure of the status of the emergency preparedness and response system. Comparisons of such numbers between EPREV reports from different countries should not be attempted.

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Executive Summary

This report provides the results of the Emergency Preparedness Review (EPREV) mission to Canada from 3 to 13 June 2019. The mission was undertaken by the International Atomic Energy Agency (IAEA) in response to a request from the Government of Canada. EPREV missions are designed to provide a peer review of emergency preparedness and response (EPR) arrangements in a country, based on the IAEA Safety Standards. The mission focused on preparedness for emergencies originating from events at Emergency Preparedness Category I (EPC I) facilities, as defined in IAEA Safety Standards Series No. GSR Part 7, Preparedness and Response for a Nuclear or Radiological Emergency [1], which includes emergencies taking place at nuclear power plants (NPPs), irrespective of their initiating events. In addition, and as agreed with the Canadian counterparts responsible for the EPREV and those responsible for the Integrated Regulatory Review Service (IRRS) scheduled for September 2019, Module 10 (EPR) of the IRRS was included in the Canada EPREV and excluded from the Canada IRRS.

The team for the EPREV mission consisted of international EPR experts from IAEA Member States, as well as a team coordinator and deputy team coordinator from the IAEA Secretariat. The EPREV mission took place in Ottawa, the national capital of Canada, as well as in the Provinces of Ontario and New Brunswick, the only Canadian provinces that have operating commercial nuclear power plants. The EPREV consisted of a review, prior to the actual mission, of extensive reference materials provided by Canada and, during the mission, of site visits and interviews. The EPREV team interacted during the mission with government officials at the federal, provincial and municipal levels, as well as with staff of two NPPs.

This report includes recommendations and suggestions for improvements by Canada, based on the principles, requirements and recommendations of the IAEA Safety Standards; the report also mentions good practices that were observed and that are considered models for other Member States. In some cases, improvements in line with the detailed findings are already being undertaken. In other cases, the Government of Canada should adopt an action plan to implement the recommendations and suggestions.

The Government of Canada is to be commended for the well-developed and mature EPR system in place across all levels of government. This system, consistent with the Constitution and governance system in Canada, places leadership for preparedness and response for emergencies at nuclear power plants largely with authorities in Ontario and New Brunswick, the two provinces in which operating nuclear power plants are located. The federal government acts in a support role, as requested by the provinces and within areas of exclusive federal jurisdiction.

Canada is also to be commended for its implementation of the IAEA Safety Standards throughout its EPR programme, and for exceeding them in some cases. In addition, in hosting an EPREV, the Canadian government has taken a leadership role among developed countries with mature nuclear power programmes by availing itself of the IAEA EPR peer review service.

The EPREV team noted some areas where improvements could be made, most of which the Government of Canada is aware of, as indicated in its self-assessment made prior to the EPREV mission. In several cases, actions are already in progress to address the opportunities for improvement noted. Examples of recommendations in the EPREV report include provisions for justification and optimization of the individual protective actions, development of a detailed monitoring strategy and development of detailed arrangements for terminating a nuclear emergency.

The team also noted a number of specific commendable practices. These good practices refer to aspects that go beyond the expectations set in the IAEA safety standards. Among these, the EPREV team identified pre-distribution of potassium iodide, complemented with clear instructions and advice, in areas outside of the Precautionary Action Zone. Another example is the New Brunswick Warden Service, an innovative approach to using volunteers to ensure that instructions and warnings are provided to the public in a variety of emergency situations. Additionally, the clear, focused and effective preparation and support for, and the coordination of, the EPREV mission were exemplary and constitute a positive model for Member States who may consider hosting an EPREV or other IAEA peer review service.

This report serves as the final record of the EPREV mission. The IAEA will continue to work with Canada to enhance its national EPR arrangements. Canada has committed to developing an Action Plan to implement the recommendations and suggestions in this report and to inviting the IAEA for an EPREV follow-up mission to review their implementation.

1. Introduction

1.1. Objective and Scope

The purpose of this EPREV mission was to conduct a review of Canadian nuclear emergency preparedness and response arrangements and capabilities. This EPREV mission focused on the arrangements for nuclear or radiological emergencies in Emergency Preparedness Category I (EPC I), as defined in IAEA Safety Standards Series No. GSR Part 7, Preparedness and Response for a Nuclear or Radiological Emergency (hereafter: GSR Part 7) [1]. The review was carried out by comparison of existing arrangements against the IAEA safety standards for emergency preparedness and response.

It is expected that the EPREV mission will facilitate improvements in Canada's emergency preparedness and response arrangements, and those of other Member States, from the knowledge gained and experiences shared between Canada and the EPREV team and through the evaluation of the effectiveness of Canada's arrangements, capabilities and good practices.

The key objectives of this mission were to enhance preparedness and response for nuclear or radiological emergencies, including:

- Providing Canada with an opportunity for self-assessment of its activities against IAEA safety standards;
- Providing Canada with a review of its emergency preparedness and response arrangements;
- Providing Canada with an objective evaluation of its emergency preparedness and response arrangements with respect to IAEA safety standards and guidelines;
- Contributing to the harmonization of emergency preparedness and response approaches among IAEA Member States;
- Promoting the sharing of experience and the exchange of lessons learned;
- Providing reviewers from IAEA Member States and the IAEA staff with opportunities to broaden their experience and knowledge of EPR;
- Providing key staff with an opportunity to discuss their practices with reviewers who have experience with different practices in the same field;
- Providing Canada with recommendations and suggestions for improvement; and
- Providing other States with information regarding good practices identified in the course of the review.

In addition, and as agreed with the Canadian counterparts responsible for the EPREV and the IRRS scheduled to take place in September 2019, Module 10 (EPR) of this IRRS was included in the EPREV and not in the IRRS. Module 10 includes: regulations for onsite EPR (NPP), assessment and inspection of operator compliance with these regulations and resources devoted by the regulator, the Canadian Nuclear Safety Commission (CNSC), to fulfilling its duties as a response organization.

1.2. Preparatory Work and Review Team

At the request of the Government of Canada, a preparatory meeting for the EPREV was conducted from 9 to 11 May 2018. The preparatory meeting was conducted by the appointed

team leader, Mr. Michael Scott, the team coordinator, Mr. Ramon de la Vega, and counterparts from Canada.

The EPREV team discussed matters concerning EPR (and policy issues) with the National Coordinator, Mr. Brian Ahier, and key organizations in the host country. The discussions resulted in agreement on the scope of the EPREV mission.

Representatives of federal, provincial, regulatory and operating organizations made presentations on the national context, the current status of EPR in Canada and the self-assessment results to date.

IAEA staff presented the EPREV principles and its process and methodology. This was followed by an exchange on the tentative work plan for the implementation of the EPREV mission in 2019.

The proposed composition of the EPREV Review team (experts from Member States to be involved in the review) was discussed, and the size of the EPREV Review team was tentatively confirmed. Logistics regarding meeting and work spaces, the identification of counterparts and liaison officers, proposed site visits, and lodging and transportation arrangements were also addressed. All relevant aspects were included in the agreed Terms of Reference (TOR).

1.3. Reference for the Review

The primary reference for the review is GSR Part 7. In addition, IAEA Safety Guides GSG-2, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency [2], GS-G-2.1, Arrangements for Preparedness for a Nuclear or Radiological Emergency [3] and GSG-11, Arrangements for the Termination of a Nuclear or Radiological Emergency, were used as review criteria.

The terms used in this report are consistent with those found in the IAEA Safety Standards referred to in the above paragraph.

2. DETAILED FINDINGS ON GENERAL REQUIREMENTS

2.1. Emergency management system

Commercial NPPs have operated in Canada for almost 50 years. There are currently 18 commercial nuclear power reactors operating in Ontario, and one reactor operating in New Brunswick. Canada has a well-developed emergency management system whose effectiveness has been assessed and improved over time.

The emergency management system in Canada is heavily focused on and oriented around provincial and territorial governments, with support provided from the federal government as needed. Decision making in an emergency is a shared responsibility and occurs at various levels according to mandate as well as established roles and responsibilities, with the primary responsibility for off-site protective actions at the provincial level.

In the Canadian system, the provinces develop their emergency preparedness and response systems independently. The emergency management systems in Ontario and New Brunswick are different, owing in part to the differences in the populations and geography surrounding the NPPs and in part to the nature of the Canadian governance system for emergency preparedness and response. However, as the onsite regulatory framework is assigned solely to the CNSC, there is a greater consistency with regard to the emergency management systems among the nuclear power plants onsite than is the case offsite.

Nuclear or radiological emergency management in Canada is effectively integrated at the national level into an all-hazards framework, as described in the Emergency Management Act. This Act and its implementing policies and procedures focus on mitigation/prevention, preparedness, response and recovery. The National Emergency Response System (NERS) provides for the harmonization of all-hazards response. NERS provides top-level guidance for a national (as opposed to federal) all-hazards response. The all-hazards Federal Emergency Response Plan (FERP) is intended to coordinate federal response and planning, and to support the provinces and territories.

The linkage between nuclear or radiological emergency preparedness and response and the all-hazards NERS is described in the Federal Nuclear Emergency Plan (FNEP). The FNEP works within the NERS and augments the FERP for a nuclear or radiological emergency. Health Canada, through the Radiation Protection Bureau, administers the FNEP, an annex to the FERP, to coordinate federal technical response and support the provinces and local authorities in managing radiological consequences of an emergency. Partner federal agencies maintain their own all-hazards and radiological plans as applicable, integrated with the FERP and FNEP. The FNEP includes annexes for each relevant province linking the FNEP concepts to the provincial arrangements.

Ontario and New Brunswick further coordinate their respective nuclear emergency plans with the NERS all-hazards concepts through Ontario's Provincial Nuclear Emergency Response Plan (PNERP) and New Brunswick's Point Lepreau Nuclear Off-Site Emergency Plan. FNEP annexes provide the link between the FNEP and the provincial plans. Both the PNERP and the Point Lepreau Nuclear Off-Site Emergency Plan refer to the roles and responsibilities of federal organizations. Considered together, the FNEP and the provincial plans ensure that the emergency management system is generally based on the results of the hazard assessment.

Canada participates in international emergency preparedness activities under the Convention on Nuclear Safety, the Convention on Early Notification of a Nuclear Emergency and the Convention on Assistance in Case of a Nuclear Accident or Radiological Emergency (Assistance Convention). In addition, Canada maintains bilateral agreements involving the exchange of emergency preparedness expertise and information with the United States of America, the only nation with whom Canada shares a land border. Both Canada and the United States operate nuclear power plants whose emergency planning zones cross the international border between the two nations.

Canada is also a signatory to the International Health Regulations (IHR) (2005), with the Public Health Agency of Canada (PHAC) as the designated National Focal Point (NFP). Implementation of the IHR ensures that mechanisms exist for urgent communication with the World Health Organization (WHO), including notifications of potential public health emergencies of international concern. Health Canada and PHAC have a joint protocol in place for reporting nuclear or radiological emergencies to the IAEA and WHO.

2.2. Roles and responsibilities

General

In general, the emergency response system in Canada is managed in a bottom up approach. However, in the case of a nuclear emergency, the provinces assume responsibility from the beginning for coordinating offsite nuclear emergency response. The federal government gets involved if requested to provide support or deal with areas of federal authority. The provincial governments assume the primary responsibility for the protection of life and property within their borders. Each province has an Emergency Management Act that clearly articulates the responsibility for establishing plans and arrangements at the preparedness stage. This includes requirements for municipalities and regions to establish plans, as appropriate.

Nuclear liability is covered in Canada by the federal Nuclear Liability and Compensation Act, which includes a requirement for NPP operators to hold C\$850 million in securities—an amount that is set to increase to C\$1 billion in 2020. Ontario Power Generation (OPG) and New Brunswick Power are Provincial Crown Corporations; the Bruce Nuclear Power Plant is a Public-Private Partnership (PPP) between Bruce Power and the Province of Ontario. The fact that the NPP operating organizations in Canada are all either Crown Corporations or PPPs substantially reduces the risks that an operating organization would declare bankruptcy in order to avoid compensation obligations in excess of those stipulated in the Nuclear Liability and Compensation Act. Insurers and operators have developed an online claims processing arrangement that is ready to be implemented immediately during an emergency. Further to these arrangements, the Canadian Minister of Natural Resources has legislated authority to table a report in Parliament to handle additional compensation claims should the above provisions prove inadequate. This report may, among other things, propose alternative means of managing claims in the event of an incident, including the establishment of a Tribunal, as provided by the Nuclear Liability and Compensation Act.

Canada is also a party to the Convention on Supplementary Compensation for Nuclear Damage, which provides an additional layer of compensation through access to international funds.

Good Practice 1.
Observation: Natural Resources Canada has worked with the Nuclear Insurance Association of Canada (NIAC), other insurers and operating organizations to ensure the prompt implementation of the Nuclear Liability and Compensation Act, including pre-developed electronic claims processes for the public.
Basis for Good Practice: GSR Part 7, paragraph 4.6, states: “The government shall ensure that arrangements are in place for effectively governing the provision of prompt and adequate compensation of victims for damage due to a nuclear or radiological emergency.”
Good Practice: The government and NIAC have implemented a streamlined process for timely submission and processing of claims after a nuclear or radiological emergency, including a fully accessible web platform.

Coordination mechanism

The national coordination mechanism is built on governance established under the all-hazards response framework. Committees are set up to ensure that the requirements of the emergency management acts are met at all levels. There are two main committees to coordinate the development of plans and arrangements for nuclear or radiological emergencies: The Federal Nuclear Emergency Management Committee provides governance in nuclear emergency preparedness at the federal level; and the Federal-Provincial-Territorial Nuclear Emergency Management Committee provides collaborative planning and issue resolution involving discussions among the provinces/territories and the federal government. These committees also establish working groups as needed to address issues that cut across areas that no single organization can address on its own.

At the federal level, the FNEP outlines the 10 Nuclear Emergency Functions (NEF) that map to most of the requirements in GSR Part 7 and assigns lead and supporting responsibilities to appropriate federal departments.

The roles and responsibilities in the PNERP go through a process of consultation with the relevant provincial ministries and other stakeholders. The PNERP is approved by the Lieutenant Governor in Council, the highest authority in Ontario, ensuring that it is enforceable and that appropriate resources are devoted to support the responsible organizations in carrying out their assigned functions.

The Point Lepreau Nuclear Off-Site Emergency Plan is approved by the Director of the New Brunswick Emergency Measures Organization. To ensure coordination in emergency planning and in developing relevant arrangements, a standing working group has been established with representation of all organizations having a role in the preparedness stage.

Regulatory body

Regulation of nuclear facilities is the responsibility of the CNSC, an independent body that drafts and enforces a set of regulatory policies, requirements and guidelines that set out the expectations of operating organizations. CNSC REGDOC 2.10.1: Nuclear Emergency Preparedness and Response, Version 2 (REGDOC 2.10.1) establishes requirements for emergency preparedness and response and ensures that the operating organization is given sufficient authority to promptly take the necessary protective actions on the site in response to

a nuclear or radiological emergency that could result in off-site consequences. The CNSC verifies compliance with REGDOC 2.10.1 through a documented inspection programme.

Operating organizations

The operating organizations have coordinated their arrangements with the provincial emergency management organizations, and consistent identification and notification criteria are used to activate the emergency response within a notification time objective of 15 minutes. A number of plans and procedures relating to on-site preparedness for and response to a nuclear or radiological emergency have been developed by OPG, Bruce Power and New Brunswick Power. These have been prepared in accordance with the regulatory requirements of the CNSC and the Canadian Standard N1600-14 “General Requirements for Nuclear Emergency Management Programs”, which is aligned with GSR Part 7.

All EPC I operating organizations have submitted their emergency plans to the CNSC for review and acceptance. These submissions were followed up by a comprehensive compliance inspection. It includes a thorough documentation review and the observation of emergency drills and exercises to verify that the licensee is in compliance with the requirements of REGDOC 2.10.1 and the criteria elaborated in the respective license condition handbooks (LCH).

2.3. Hazard assessment

Licensees are required to establish a planning basis which considers the hazards that have, or could have, an adverse impact on the environment and the health and safety of onsite personnel or the public. They are required to use the results of the planning basis to determine the scope and level of their emergency preparedness and response programme. The hazard assessment for OPG identifies internal and external events, multi-unit accident scenarios and extended loss of power, as included in the Emergency Planning Basis. Non-radiation related hazards, e.g. fires, seismic and floods, that could impact offsite response are included in the facility planning basis. The Point Lepreau Nuclear Generating Station has a detailed Emergency Plan, which defines all hazards (radiological, fire, HAZMAT, security, severe weather, seismic, tsunami, severe accidents). It serves as the basis for all associated emergency procedures. The Point Lepreau Nuclear Generating Station Technical Planning Basis document looks specifically at the radiological events based on different types of postulated accidents.

The Ontario PNERP includes a hazard assessment based on the licensee’s design basis, beyond design basis and severe accident assessments, the latter as detailed in their probabilistic safety assessment. These accident assessments are used to determine off-site consequences. The Ontario PNERP includes in Annex L a summary of the principles, assessments and conclusions from a discussion paper, “Provincial Nuclear Emergency Response Plan, Planning Basis Review and Recommendations”, released by the Office of the Fire Marshal and Emergency Management (OFMEM) of Ontario in May 2017. The PNERP and planning basis are required to be reviewed at least every five years, and appropriate consultations with stakeholders and the public are to be held.

In New Brunswick, the licensee technical planning basis is adopted directly as the provincial hazard assessment. The Point Lepreau Nuclear Off-Site Emergency Plan refers to the Point Lepreau Nuclear Generating Station Technical Planning Basis document IR-78600 (2004).

The Point Lepreau Nuclear Off-Site Emergency Plan is reviewed and updated annually, whereas the the Point Lepreau Nuclear Generating Station Technical Planning Basis is not.

Suggestion 1.
<p>Observation: New Brunswick has an all-hazards risk assessment and the results of the probabilistic safety assessment (PSA) from Point Lepreau Nuclear Generating Station but does not have a complete hazard assessment in the provincial emergency response plan in order to be able to apply a graded approach that considers impacts on the provincial emergency plans of other facilities and on activities in the province, e.g., hospitals.</p>
<p>Basis for suggestion: GSR Part 7, paragraph 4.20, states: “The government shall ensure that for facilities and activities, a hazard assessment on the basis of a graded approach is performed. The hazard assessment shall include consideration of: [...] (c) Events that could affect several facilities and activities concurrently, as well as consideration of the interactions between the facilities and activities affected;”</p>
<p>Suggestion: New Brunswick should consider conducting a comprehensive hazard assessment to ensure that emergency arrangements are fully in line with the hazards identified and potential consequences, including other facilities and activities concurrently with Point Lepreau Nuclear Generating Station.</p>

A nuclear security event triggering a nuclear emergency is not explicitly included in the operating organization planning basis; however, such a potential event is included in the facility response and coordination procedures and arrangements with the police and the province.

Recommendation 1.
<p>Observation: The hazard assessments in (or referenced in) the provincial emergency plans do not explicitly include the results of the nuclear security threat assessment and the impact on off-site emergency preparedness and response.</p>
<p>Basis for recommendation: GSR Part 7, paragraph 4.22, states: “The government shall ensure that the hazard assessment includes consideration of the results of threat assessments made for nuclear security purposes.”</p>
<p>Recommendation: The government should ensure that the results of the nuclear security threat assessment are incorporated in a hazard assessment.</p>

The emergency preparedness categories for Canada are defined in the FNEP and include:

- Category A: An emergency at a nuclear power plant in Canada;
- Category B: An emergency at a nuclear power plant in the United States or Mexico;
- Category C: An emergency involving a nuclear powered vessel in Canada;
- Category D: Other serious nuclear emergencies or potential threats in North America that require a multi-departmental or multi-jurisdictional response;
- Category E: A nuclear emergency occurring outside of North America.

The categorization takes into account the existing nuclear facilities, the uses of radioactive materials, unshielded radiation sources, the transport of radioactive and nuclear materials, and nuclear accidents abroad. The categories provide a basis for a graded approach with commensurate arrangements established to respond to a nuclear or radiological emergency.

2.4. Protection strategy for an emergency

The protection strategy for nuclear or radiological emergencies in Canada is defined in the provincial emergency plans and arrangements. Some aspects are based on technical work developed by the federal government (e.g., operational intervention levels, OILs) as well as technical information provided by the operating organizations.

Licensees of Class I nuclear facilities are required to classify emergencies in order to apply the graded approach. The classification systems are defined in the provincial emergency plans. Ontario uses a categorization system that includes: General Emergency, On-Site Emergency, Abnormal Incident and Reportable Event. New Brunswick defines different classification levels: General Radiation Emergency, Site Area Radiation Emergency, Radiation Alert and Non-Radiation Emergency.

The off-site protective actions for each NPP are specified by the provinces. This has resulted in emergency planning zones and emergency planning distances for NPPs that are different in Ontario and New Brunswick. While the differing zone and distance sizes and the associated protective actions have been individually studied, there has been no comprehensive justification and optimization of the actions or the overall protection strategy.

Guidance on generic criteria and OILs were developed at the federal level in consultation with the provinces. The guidance values were adopted by both Ontario and New Brunswick in the provincial emergency arrangements. In line with the standard practice for provincial plans, the plans incorporating the OILs were available for public comment before being finalized. The OIL values for the urgent response phase are consistent with the default values provided by the IAEA. The protection strategies defined in Ontario and New Brunswick include guidance for protective actions related to urgent protective actions and some early protective actions. However, there is no guidance for restricting the use of equipment or other commodities, and, furthermore, in New Brunswick no guidance for restricting the use of vehicles.

Emergency Action Levels (EALs) are used by operating organizations to initiate emergency response actions and are referenced in the provincial emergency arrangements. However, the EALs predate the recent adoption of the generic criteria in provincial emergency plans and, as such, need to be reviewed to assess their consistency.

Recommendation 2.
<p>Observation: The protection strategy does not include provisions for justification and optimization of the specified protective actions, e.g., a comparison of the benefits of sheltering vs. evacuation under specific circumstances and also the optimization of decontamination measures. This is especially important for maintaining trust in the different emergency planning zones and emergency planning distances used in Ontario and New Brunswick.</p>
<p>Basis for recommendation: GSR Part 7, paragraph 4.27, states: “The government shall ensure that, on the basis of the hazards identified and the potential consequences of a nuclear or radiological emergency, protection strategies are developed, justified and optimized at the preparedness stage for taking protective actions and other response actions effectively in a nuclear or radiological emergency to achieve the goals of emergency response.”</p>
<p>Recommendation: The government should ensure that the protection strategy includes provisions for justification and optimization of the individual protective actions and the overall strategy. Once completed, the existing set of generic</p>

Recommendation 2.

criteria should be expanded to cover the full set of protective actions (including the early response phase and transition phase as defined in the IAEA safety standards), and operating organizations should review the existing EALs to ensure consistency.

3. DETAILED FINDINGS ON FUNCTIONAL REQUIREMENTS

3.1. Managing emergency response operations

The unified command and control systems for managing emergency response operations are defined in provincial emergency arrangements. In New Brunswick, this is defined in the Incident Command System (ICS), while in Ontario this is defined as the Incident Management System (IMS). Both systems establish common frameworks for organizational structure, functions, processes and terminology. In practical terms, there are few differences between the two systems. At the federal level, the emergency response is generally based on the ICS.

The CNSC requires Class I facilities to have an emergency response programme, including a command structure that is clearly specified and integrated with the off-site emergency arrangements. REGDOC 2.10.1 requires operating organizations to provide resources as needed, and as specified during the preparedness stage, to support off-site response organizations.

The FNEP defines radiological assessment capabilities and describes federal assets that can be made available to the provinces. Federal assets (personnel and equipment) that would deploy and operate in the field when requested by the provincial authorities — such as those for monitoring and sampling — are responsible for integrating themselves into the respective provincial command and control systems, while, at the same time, maintaining their own responsibility for some actions, such as health and safety. The FNEP Technical Assessment Group (TAG) is coordinated with the all-hazards federal response and with the provincial systems for New Brunswick and Ontario. The notification, mobilization and deployment concepts of operations and duties are specified in established procedures.

Decision making for off-site protective actions takes place at the Provincial Emergency Operations Centre level. The decision maker receives technical assessments and information from a variety of sources—including federal, provincial and operating organization officials—and is responsible for making the final determination of protective actions.

The CNSC’s nuclear security regulations require operating organizations to have in place a nuclear security system that will be functional during a nuclear or radiological emergency. Response organizations have not fully recognized the unique implications of emergencies initiated by nuclear security events for the on-site and the off-site response.

Suggestion 2.

Observation: The government has not addressed or assigned responsibility for some aspects of the implications of nuclear security events for the coordination of the on-site and off-site emergency response. For example, impacts of nuclear security measures on the ability to take protective actions on- and off-site have not been addressed in a comprehensive manner. Exercises to train responders on the unique challenges of an ongoing nuclear security event coincident with a release of radionuclides have not occurred.

Basis for suggestion: GSR Part 7, paragraph 6.3, states: “Conflicting or potentially conflicting and overlapping roles and responsibilities shall be identified and conflicts shall be resolved at the preparedness stage through the national coordinating mechanism.”

Suggestion 2.

Suggestion: The government should consider revising arrangements for nuclear or radiological emergencies initiated by nuclear security events, including conducting exercises to test the arrangements.

Bilateral agreements have been established with the United States for nuclear emergencies having transboundary consequences. Provincial and federal agencies are required to inform the Government of Canada of consultations with their United States counterparts during a nuclear emergency.

3.2. Identifying, notifying and activating

New Brunswick, Ontario and federal organizations all have operation centres for receiving and sharing notifications from the operating organization on a 24/7 basis. The centres have well defined notification procedures for nuclear or radiological emergencies, as well as drills and exercises. The procedures also cover activating the respective emergency response organizations.

The provincial emergency centres, as well as the CNSC, have redundant and effective communications channels with the operating organizations, including direct telemetry of plant data that would be relevant to the notification and activation of the emergency response. The notification procedures are based on established classification systems and notification timelines.

In the event of emergencies that could have a trans-regional impact, the provinces have the ability to inform each other. At the federal level, Public Safety Canada and Health Canada would issue notifications to federal partners on ongoing or emerging emergencies involving nuclear power plants.

Canada is a signatory of the Convention on Early Notification of a Nuclear Accident and follows the IAEA arrangements for notification and official information exchange. Health Canada, as the National Competent Authority to the IAEA for the Emergency Conventions, and the PHAC as the National Focal Point to the Pan American Health Organization for the International Health Regulations, have developed a close collaboration, which ensures that notifications to the IAEA and to the WHO in the event of a nuclear or radiological emergency are timely, coordinated and fully aligned.

3.3. Taking mitigatory actions

Class I nuclear facilities are required to have in place measures to prevent or mitigate the effects of accidental releases of nuclear and hazardous substances on the environment, and the health and safety of persons and to maintain national security. Class I facilities are also required to implement a severe accident management programme focused on preventing the progression of an accident into a severe accident or mitigating a severe accident when the preventive means have failed.

The mitigatory actions are addressed in the on-site emergency response plans and are described in the operating organization's Emergency Operating Procedures and Severe Accident Management Guidelines.

Off-site emergency services are available in case of an on-site request, and these are documented in site specific implementing plans and memorandums of understanding. The operating organizations have developed contracts and memorandums of understanding with private companies and providers to support the planned mitigatory actions. Finally, there is an agreement for mutual support between all the Class 1 operating organizations to ensure that resources can be shared in a timely manner during an emergency.

3.4. Taking urgent protective actions and other response actions

Urgent protective actions are taken on the basis of arrangements in the provincial emergency plans and are based on defined protective actions and planning distances. The emergency planning zones and emergency planning distances are specified at the provincial level. In Ontario, four emergency planning zones are used: The Automatic Action Zone (AAZ) of 3 km; the Detailed Planning Zone of 10 km; the Contingency Planning Zone of 20 km; and the Ingestion Planning Zone (IPZ) of 50 km. In New Brunswick, the emergency planning zones are: The Precautionary Action Zone of 4 km; the Urgent Protective Action Zone of 12 km; the Extended Planning Distance of 20 km; and the Ingestion and Commodities Planning Distance of 80 km.

In both provinces, the off-site response is initiated and implemented based on the established plans and the classification of the event by the operating organization. This can include partial or full activation, depending on the plant conditions and the expected prognosis of the event. The FNEP TAG can be activated at either of these activation levels to provide assessments to the provincial authorities in support of situational awareness and protective action decision making. In a General Emergency / General Radiation Emergency, all off-site resources are fully activated.

Urgent response phase protective action decisions are based on plant conditions, represented through the classification system. In Ontario, the initial categorization of General Emergency triggers automatic actions. For example, evacuation of the AAZ and consumption of potassium iodide (KI) as directed by the Chief Medical Officer of Health together with the Commander of the Provincial Emergency Operations Centre (PEOC) and the local Medical Officer of Health. In New Brunswick, a General Radiation Emergency will trigger an automatic action to evacuate the entire 20 km Extended Planning Distance starting closest to the NPP.

In Ontario, iodine tablets have been pre-distributed to all residents, businesses and institutions at a distance of up to 10 km from Darlington and Pickering NGSs and stockpiled up to 50 km. For Bruce NGS, iodine tablets have been pre-distributed to all residents, businesses and institutions within the 10 km area, to institutions within 50 km as well as being stockpiled to 50 km. In New Brunswick, iodine tablets have been distributed to all households within the 20 km zone. Beyond the 20 km zone, iodine tablets are stockpiled in 13 locations, such as hospitals, to be distributed to members of the public, such as pregnant women and children.

Operating organizations have on-line radiation monitors, which are available to the province and CNSC in an emergency. Field teams from the operating organizations are initially dispatched, dependent on meteorological data, to perform surveys out to 10 km. Once the provincial emergency operations centres are activated, the operating organizations' field teams can be directed by the provincial technical groups.

The CNSC established an Advisory Committee to receive feedback from the public with respect to the distribution of KI pills in the IPZ around the Pickering NGS. The purpose is to ensure more focused public engagement.

Good Practice 2.
Observation: The implementation of pre-distribution of KI pills includes extensive public information campaigns, contracts with Canada Post and measures to ensure that new residents who move to the area are given KI.
Basis for Good Practice: GSR Part 7, paragraph 5.38, states: “For facilities in category I or II, arrangements shall be made for effectively making decisions on and taking urgent protective actions, early protective actions and other response actions off the site in order to achieve the goals of emergency response, on the basis of a graded approach and in accordance with the protection strategy. The arrangements shall be made with account taken of the uncertainties in and limitations of the information available when protective actions and other response actions have to be taken to be effective.”
Good Practice: The implementation of the arrangements for pre-distribution of KI pills maximizes the public awareness and the effectiveness of the protective action.

3.5. Providing instructions, warnings and relevant information to the public

The provinces have arrangements in place to provide the public who work or live near nuclear power plants with instructions, warnings and relevant information for emergency preparedness. Special population groups are identified in advance, and arrangements are in place to provide instructions and warnings to transient people in English and French. Ontario and New Brunswick use a combination of the National Alert Aggregation & Dissemination System (NAADS) and the National Public Alerting System (NPAS). NAADS is a partnership between federal, provincial and territorial governments and a private company.

Ontario has a public alerting system called Alert Ready that provides information during an emergency. Alert Ready in Ontario is part of a national service designed to deliver critical and potentially life-saving emergency alert messages. Emergency alerts are distributed on radio, TV and compatible wireless devices to help ensure that Ontarians have the critical information they need in emergencies to take necessary precautions to protect themselves and their families. Furthermore, Ontario provides regular updates, alerts and information to the public about current emergencies through Ontario.ca/alert.

The provinces also provide the public with emergency preparedness information year-round, in both English and French, through social media, web text and news releases/statements issued via Newsroom (e.g. emergency preparedness week).

New Brunswick has three methods of alerting the public, the Everbridge Notification System, the National Public Alerting System, and the Point Lepreau Warden Service. The Warden Service consists of a group of members of the public drawn from the local community. The Wardens’ tasks include assisting in notification, delivery of iodide thyroid blocking tablets (KI pills), delivery and completion of the Demographic Public Safety Survey, identifying people requiring help with evacuation, staffing check points and providing radio communications. The Warden Service provides valuable local knowledge to assist in emergency preparedness and response.

Good Practice 3.
<p>Observation: The New Brunswick Warden Service utilizes members of the public effectively during the preparedness stage for services including the gathering of demographic surveys, distributing KI and informing the public on the potential for an emergency and the nature of the hazards.</p>
<p>Basis for Good Practice: GSR Part 7, paragraph 5.45, states: “For facilities in category I or II and areas in category V, arrangements shall be made to provide the permanent population, transient population groups and special population groups or those responsible for them and special facilities within the emergency planning zones and emergency planning distances [...], before operation and throughout the lifetime of the facility, with information on the response to a nuclear or radiological emergency.”</p>
<p>Good Practice: The Warden Service in New Brunswick is an innovative approach to help ensure that relevant information is provided to the public during the preparedness stage.</p>

3.6. Protecting emergency workers and helpers in an emergency

The CNSC’s Radiation Protection Regulations specify requirements for the protection of licensee emergency workers. The Regulations specify dose restrictions for on-site emergency workers as well as any people (e.g. firefighters, police officers) requested to participate in the control of an on-site emergency by the licensee.

The document describing the Deployment Concept of Operations for the Field Response Team of Health Canada’s Radiation Protection Bureau (RPB) provides specific information on the field team tasks and products. It also gives guidance on how to optimize tasks and protect RPB field team members.

In Ontario, the PNERP provides an overall Emergency Worker Protection Action Strategy. Ontario has plans and procedures to establish Emergency Worker Centres (EWCs), where emergency workers can be registered, receive training and receive proper equipment for their assigned tasks. This includes provisions for the protection of emergency workers not designated in advance and the protection of helpers in an emergency. The draft Environmental Radiation and Assurance Monitoring Group (ERAMG) Plan describes the roles and responsibilities of member organizations for monitoring and sampling and includes guidance for the protection of the ERAMG field teams. The Ontario Government, along with the NPPs and stakeholders, is developing guidance for consistency regarding the protection of emergency workers.

Recommendation 3.
<p>Observation: The arrangements for the protection of emergency workers and helpers in Ontario do not provide clear guidance and assurance for the protection of emergency workers and helpers. The Ontario Provincial Nuclear Emergency Response Plan (PNERP), Annex H, Appendix 3 allows for helpers in an emergency to receive a dose up to 100 mSv. The protection of workers in Ontario is covered under the Occupational Health and Safety Act (OHSA) and stipulates the duties of the employer. Employers are responsible for protection of the health and safety of workers, including providing instruction, training and information.</p>

Recommendation 3.
<p>Basis for recommendation: GSR Part 7, paragraph 5.52, states: “The operating organization and response organizations shall ensure that arrangements are in place for the protection of emergency workers and protection of helpers in an emergency for the range of anticipated hazardous conditions in which they might have to perform response functions.”</p>
<p>Recommendation: The government should revise and further develop its arrangements for the protection of emergency workers and helpers and clarify how helpers in an emergency would be utilized.</p>

Emergency workers in New Brunswick are covered under the Point Lepreau Nuclear Generating Station Radiation Protection Program. The arrangements rely heavily on pre-designated emergency workers and do not provide detailed guidance on the protection of emergency workers not designated in advance or on the protection of helpers. The off-site Emergency Plan includes a provision for the use of helpers in an emergency. Helpers would be used in all phases of an emergency but would not be deployed to any contaminated areas or conduct decontamination activities. Helpers that could be used for such activities would be designated as emergency workers following the provision of training.

3.7. Medical response

The primary responsibility for managing the medical response to a radiation emergency lies with the provincial authorities, with support from the federal government.

The New Brunswick Provincial Health Nuclear Emergency Plan for the Point Lepreau Nuclear Generating Station and the Ontario Radiation Health Response Plan describe arrangements for the provision of appropriate medical screening and triage, medical treatment and longer-term medical actions for those people who could be affected in a nuclear or radiological emergency.

In New Brunswick, the Saint John Regional Hospital (SJRH) is the designated medical facility for a radiation emergency. The SJRH is the only Level 1 trauma centre in New Brunswick that has access to 24/7 coverage of medical personnel and facilities needed to manage radiation injuries and has radiation medicine and nuclear medicine specialists. For the purposes of long-term follow-up and epidemiological study, a registry of evacuees will be maintained by the Department of Health.

In Ontario, a network of Local Health Integration Networks (LHINs), Emergency Medical Services (EMS), Hospitals, Cancer Centres, and Public Health Units establish the capability for providing medical care. Ontario’s Ministry of Health and Long-Term Care (MOHLTC) will coordinate a medical registry of victims (public and workers) and evacuees, medical follow-up of the population affected and epidemiological studies as needed.

The PHAC maintains the National Emergency Strategic Stockpile (NESS) to provide medication for treating internal contamination (e.g., Prussian Blue, Ca-DTPA, Zn-DTPA). Health Canada provides training and guidelines for medical management of radiation injuries and a comprehensive training programme on “Medical Emergency Treatment for Exposures to Radiation” (METER) for medical staff on a regular basis. METER training is not a mandatory training for the medical staff of the designated hospitals, but it is part of continuing education for the profession. Part of the course is also delivered online to make it available to as many first receivers as possible.

Suggestion 3.
Observation: Ontario has not designated medical personnel trained in the management of radiation injuries.
Basis for suggestion: GSR Part 7, paragraph 5.67, states: "... These arrangements shall include: [...] (b) Designation of medical personnel trained in clinical management of radiation injuries;"
Suggestion: Ontario should consider designating medical personnel trained in the clinical management of radiation injuries.

3.8. Communicating with the public throughout an emergency

Canada has a well-developed all-hazards crisis communications system that is used for all emergencies such as flooding, forest fires and tornadoes. The different authorities routinely coordinate information between each other and the public. For a nuclear or radiological emergency, working groups and plans have been established to ensure that communication is coordinated across all organizations and levels within the system.

Canada has incorporated specific messaging related to nuclear or radiological emergencies in its crisis management system and takes advantage of the knowledge from other hazards. Some information and messages are prepared in advance to speed up the communication to the public during an emergency.

At the provincial level, Ontario and New Brunswick also have preapproved messaging and web text prepared to communicate to the public as quickly as possible for a number of nuclear emergency scenarios, including: an incident at a nuclear facility; shelter-in-place orders; evacuation orders; and KI pill ingestion orders. However, there are no preapproved sets of questions and answers at the provincial level.

Long standing efforts have been made to enhance communication with the public via social media, including exercises using social media simulators to test the ability of multiple response organizations to effectively respond to misinformation on social media.

Good Practice 4.
Observation: Canada has exercised extensively with social media simulators, including in both official languages, to identify social media trends and coordinate among all levels of government and operating organizations to gather evidence, e.g., photographs, to refute misinformation.
Basis for Good Practice: GSR Part 7, paragraph 5.74, states: "Arrangements shall be made to identify and address, to the extent practicable, misconceptions, rumours and incorrect and misleading information that might be circulating widely in a nuclear or radiological emergency, in particular those that might result in actions being taken beyond those emergency response actions that are warranted."
Good Practice: The use of social media simulators in exercises has enhanced the ability of response organizations in Canada to effectively respond to misinformation on social media.

3.9. Taking early protective actions

Protective actions during the early response phase (as defined in the IAEA safety standards) of an emergency, which corresponds to the intermediate response phase in the Canadian arrangements, are outlined in the PNERP and the Point Lepreau Nuclear Off-Site Emergency Plan. The actions in Ontario include control of food, decontamination and temporary relocation. The actions in New Brunswick include temporary relocation, restrictions on food and the food chain, restriction on commodities other than food, contamination control and decontamination. In both provinces, decision making on early protective actions is based on measurements using OILs.

In both provinces, the plans provide descriptions of the need for monitoring and multiple resources that could be used for monitoring. The FNEP Provincial Annexes further describe the types of federal resources that could be made available to support the provinces. However, there is no detailed monitoring strategy that would ensure efficient and effective use of resources from the operating organization and the provincial and federal levels during the early response phase. It is also not clear which resources would be available to conduct monitoring in contaminated areas.

Following the Exercise Synergy Challenge 2018, New Brunswick has developed a sampling matrix which identifies priority areas to be monitored, the type and approximate number of samples to be collected, the equipment to be used and the sequence of implementation of early protective actions. The matrix will be inserted in the Point Lepreau Nuclear Off-Site Emergency Plan in 2019.

Recommendation 4.
Observation: There are no detailed monitoring strategies to ensure efficient use of measurement capabilities and means, and for providing adequate information for protection of members of the public, functions of society and protection of property.
Basis for recommendation: GSR Part 7, paragraph 5.82, states: “Monitoring in response to a nuclear or radiological emergency shall be carried out on the basis of a strategy to be developed at the preparedness stage as part of the protection strategy. Arrangements shall be made to adjust the monitoring in the emergency response on the basis of prevailing conditions.”
Recommendation: The government should ensure that there is a detailed monitoring strategy or strategies in place for emergency response and that sufficient resources are available in a suitable time to implement the strategy throughout the emergency response.

3.10. Managing radioactive waste in an emergency

The Government of Canada has a policy in place for radioactive waste that states, among other things, that the waste owners are responsible for the funding and management of their radioactive waste. However, the policy does not explicitly address off-site waste arising from an emergency or emergency response actions, such as decontamination of off-site areas.

Radioactive waste arising from a nuclear or radiological emergency is characterized and classified under the same regulatory framework as other radioactive waste. Arrangements for the management of radioactive waste are contained in the CSA N292 suite of standards, with

the exception of determining options for pre-disposal and storage of radioactive waste resulting from a nuclear or radiological emergency.

In addition to the policy framework on radioactive waste, the Nuclear Liability and Compensation Act (NLCA) ensures that funding is in place for off-site cleanup.

Canada has a draft publication on the framework for recovery after a nuclear emergency, which documents recovery management principles, including the transition phase. It is intended to serve as the foundation for the development of detailed arrangements, including the management of off-site radioactive waste in a nuclear or radiological emergency.

The Government of Canada and the Canadian nuclear industry have considered different approaches for managing the off-site radioactive waste after an emergency. The federal government, provincial governments, Crown Corporations and operating organizations would have roles and responsibilities. Discussions have begun to document roles and responsibilities for management of large volumes of off-site radioactive waste after a nuclear or radiological emergency, including the question of who has the primary responsibility for managing off-site radioactive waste in a nuclear or radiological emergency.

Recommendation 5.
Observation: There is no consolidated documentation of the roles and responsibilities and arrangements for managing offsite radioactive waste in a nuclear or radiological emergency. Canada is developing a framework for recovery after a nuclear or radiological emergency, including aspects of the transition phase.
Basis for recommendation: GSR Part 7, paragraph 5.86, states: “Radioactive waste arising in a nuclear or radiological emergency, including radioactive waste arising from associated protective actions and other response actions taken, shall be identified, characterized and categorized in due time and shall be managed in a manner that does not compromise the protection strategy, with account taken of prevailing conditions as these evolve.”
Recommendation: The government should document and fully develop roles and responsibilities and arrangements for the safe management of off-site radioactive waste arising from an emergency.

3.11. Mitigating non-radiological consequences

The provincial emergency plans have provisions in place for some aspects of mitigating non-radiological consequences of an emergency. This includes the need to respond to public concern regarding the health hazards and to provide medical and psychological counselling and adequate social work. Ontario and New Brunswick both have arrangements with the Canadian Red Cross and New Brunswick has arrangements with the Department of Social Development to provide social services during and after an emergency. At the federal level, the emergency support functions described in the FERP would be used to manage non-radiological consequences. Other areas are addressed in less detail, including arrangements to mitigate the impacts on international trade and the designation of an organization responsible for identifying and responding to actions beyond the recommended protective actions.

3.12. Requesting, providing and receiving international assistance

Global Affairs Canada has the primary responsibility for all-hazards international cooperation as specified in the Federal Emergency Response Plan—Emergency Support Function 9.

In the case of a nuclear or radiological emergency, Global Affairs Canada is responsible for requesting assistance through international arrangements, including the Assistance Convention, as well as through bilateral agreements. Health Canada and the CNSC are designated as the National Competent Authorities (Domestic) for the Convention on Early Notification of a Nuclear Accident. The Global Affairs Canada–Health Canada protocol guiding notifications and requests for assistance for domestic nuclear accidents and radiological emergencies specifies that all requests for international assistance regarding nuclear or radiological emergencies will be coordinated through Health Canada, which is designated as the National Competent Authority for the Assistance Convention, with support from Global Affairs Canada.

Canada has registered capabilities in the IAEA’s Response and Assistance Network (RANET) for external based support in Dose Assessment and Nuclear Installation Assessment and Advice.

3.13. Terminating an emergency

The decision making process for terminating a nuclear or radiological emergency in the provinces is not clearly specified. The process will include not only the involvement of emergency planners, decision makers and experts but will also involve consultation with the public and interested parties. The PNERP in Ontario includes high level guidance on the authorities for termination; however, the provincial plans in Ontario and New Brunswick both lack guidance on the process and criteria for termination of a nuclear or radiological emergency, which should be developed during the preparedness stage. Because of the different characteristics of the provinces, the arrangements for terminating an emergency, and their implementation, could be different. As mentioned in Section 3.10, Canada has a draft publication on the framework for recovery after a nuclear emergency, which documents recovery management principles, including the transition phase.

Recommendation 6.
Observation: There are no detailed arrangements in place at the federal or provincial level for the termination of a nuclear or radiological emergency and the transition to recovery.
Basis for suggestion: GSR Part 7, paragraph 5.100, states: “The government shall ensure that, as part of its emergency preparedness, arrangements are in place for the termination of a nuclear or radiological emergency.”
Recommendation: The government should develop detailed arrangements to terminate a nuclear or radiological emergency, including criteria and procedures for making a formal decision.

3.14. Analysing the emergency and emergency response

There are arrangements in place to document information that might be important for an analysis of a nuclear emergency and the emergency response. The Emergency Management Framework for Canada includes a requirement to identify lessons learned and best practices

from the emergency and the emergency response. The Point Lepreau Nuclear Off-Site Emergency Plan includes guidance for After Action Reviews and the process to develop them. The Ontario PNERP does not include a requirement to perform an After-Action Review, although it is routinely conducted as a matter of practice.

At the federal level, the Health Portfolio Emergency Response Plan and its Nuclear Emergency Response Annex stipulate that, as part of a nuclear emergency response process, an After Incident Review (AIR) must be conducted, i.e. after involving all relevant stakeholders (interviews, questionnaires), a report has to be developed. As part of the AIR, an After-Action Report (AAR) should identify how emergency plans and procedures were implemented, what went well, what should be sustained and what can be improved. This information should include questionnaires and post-incident interviews with relevant stakeholders. Similarly, the Government of Canada has in place a process to collect best practice and lessons learned from all-hazards emergencies. It is working on developing a new approach to systematically capture strategic level recommendations from all-hazards emergencies.

The CNSC published an Integrated Action Plan on Lessons Learned from the Fukushima Daiichi Accident (CNSC Action Plan). It contained 36 Fukushima Action Points for Class 1 licensees and required results and timetables for their completion, as well as ways for the CNSC to "improve elements of the regulatory framework". All the actions from the CNSC Action Plan have been completed.

4. DETAILED FINDINGS ON REQUIREMENTS FOR INFRASTRUCTURE

4.1. Authorities for emergency preparedness and response

In alignment with its constitutional framework, Canada has implemented an emergency framework that assigns much of the authority to prepare for and respond to nuclear or radiological emergencies to each province and local community. The emergency framework also involves numerous federal agencies which must cooperate effectively to support the affected provinces, address areas of exclusive federal jurisdiction and achieve a successful, well-coordinated outcome. At the federal level, the Emergency Management Act designates the Minister of Public Safety (Public Safety Canada) to ensure coordination across all federal departments and agencies responsible for national security and public safety, and for each Minister to prepare emergency management plans for areas within their responsibility. The authority to coordinate preparedness and response for off-site nuclear and radiological emergencies is assigned to the Minister of Health.

The EPREV team noted the focus of emergency response on the two provinces hosting nuclear power plants. In Ontario, the Emergency Management and Civil Protection Act (EMCPA) governs emergency preparedness and response and defines the authorities and emergency powers for the provincial government and all municipalities in the province. The Lieutenant Governor in Council delegates responsibilities for specific aspects to various ministries. The EMCPA also authorizes the province to designate municipalities that must plan for nuclear emergencies. The OFMEM administers the PNERP, coordinates nuclear emergency preparedness and operates the PEOC, which coordinates emergency response in Ontario.

In New Brunswick, the Emergency Measures Act assigns to the New Brunswick Emergency Measures Organization the responsibility to develop provincial emergency arrangements and coordinate emergency responses. The New Brunswick Emergency Measures Plan defines the lead responsibilities of the New Brunswick Department of Public Safety and the roles of supporting agencies.

The federal Nuclear Safety and Control Act (NSCA) assigns to the CNSC exclusive authority to regulate the Canadian nuclear industry in order to prevent unreasonable risk to the environment, the health and safety of persons and national security.

National coordination is achieved through coordinating mechanisms at and among the federal, provincial and local levels. There are also coordinating mechanisms through which federal and provincial agencies involved in nuclear or radiological emergency preparedness and response collaborate to develop and maintain support arrangements for the provinces as requested. The team evaluated this situation in detail and concluded that, while complex and distributed, the mechanisms in place are sufficient to address Requirements 2 and 20 of GSR Part 7. This conclusion is consistent with discussions the EPREV team had with various persons and organizations with key roles in emergency planning and response, and it is consistent with the general governance system in Canada.

The complexity of the governance system for emergency preparedness and response creates challenges for response organizations in maintaining up-to-date and consistent arrangements across the large group of stakeholders in Canada and has led to some inconsistencies in plans and procedures. For example, the NERS document graphically depicts the governance of emergency planning at the national level as a function of ministers, but adjacent text describes

federal governance as a function of committees. These appear to be contradictory but are apparently the result of the subtle distinction between national response (involving all levels of government) and federal response (involving only the federal level). The NERS does not clearly explain this distinction. Similarly, the Point Lepreau Nuclear Off-Site Emergency Plan refers to “National—Government of Canada resources managed by Public Safety Canada.” This suggests a meaning of “national” different from that in the NERS. Another section of the same New Brunswick document discusses “federal” and “national” interchangeably.

As another example, there is conflicting guidance and understanding regarding whether the FNEP TAG provides recommendations to decision makers. The FNEP TAG Manual states: “For emergencies in Canada, the FNEP TAG will work jointly with provincial/territorial scientific groups to assist them in providing provincial/territorial decision makers with the best situational awareness and scientific based recommendations.” The FNEP states: “FNEP TAG gathers data, conducts assessments and recommends and/or implements appropriate actions for the management of off-site radiological consequences.” However, during the mission, counterparts stated that the FNEP TAG provides assessments to inform situational awareness but does not make recommendations on provincial protective actions unless requested. It may, however, make recommendations related to its assessments or in areas of federal jurisdiction. The distinction between these should be clarified for the various categories of FNEP emergencies.

The government is currently reviewing the FERP, which has not been updated since 2011, and is considering going to a task force governance model. While GSR Part 7 does not endorse a particular governance model, the team believes the government is prudent to review a model that is eight years old, and also suggests that the review consider whether adjustments could be made to reduce the complexity of the current system and to ensure that all roles and authorities are clear.

Suggestion 4.
<p>Observation: The governance system for emergency preparedness and response is complex. The currently initiated federal governance review would benefit from including a goal to ensure that clear, unambiguous roles and governance exist and are clearly communicated to stakeholders.</p>
<p>Basis for suggestion: GSR Part 7 paragraph 6.3 states: “Conflicting or potentially conflicting and overlapping roles and responsibilities shall be identified and conflicts shall be resolved at the preparedness stage through the national coordinating mechanism.”</p>
<p>Suggestion: The government should consider continuing the current initiative to review the federal governance system for emergency preparedness and response and should consider any implications for national (federal-provincial-territorial) governance.</p>

4.2. Organization and staffing for emergency preparedness and response

Operating organizations are able to meet the CNSC requirement to maintain a minimum staffing contingent on-site of suitably qualified personnel at all times and are also to conduct emergency exercises as set out in Regulatory Guide G-323 Ensuring the Presence of Sufficient Qualified Staff at Class I Nuclear Facilities – Minimum Staff Complement. The review team, through its site visit to Darlington NGS, was able to see this requirement being practically applied by the operator through the use of notice boards displaying minimum and actual shift staff at the

check-in points on site, which was linked to the staff members' identification and a training competencies matrix. The CNSC has verified that the staff can perform emergency response functions satisfactorily with this minimum shift complement through the assessment of emergency exercises. The operator has factored into its minimum staffing complement the resources required to respond to multiple nuclear emergencies affecting its site simultaneously.

Many response organizations expressed a belief that there may be insufficient staffing levels for extended emergency responses. The organizations have taken some actions to mitigate this, such as establishing mechanisms to receive surge capacity from other provinces through mutual aid agreements, which are regularly tested through all-hazards emergency response operations. This effort to meet the need for surge resources has been further strengthened through the use of documented arrangements between the operator and off-site organizations with Memoranda of Understanding established to ensure that appropriate resources will be made available during an emergency.

While this surge capacity does not pose a problem for most emergencies and addresses the staffing needs on an ad-hoc or as-needed basis, all organizations with a role in emergency preparedness and response should regularly analyse and review the minimum resource and training requirements, similar to what is expected of the operator. This will ensure that the resourcing and staffing is adequately captured and incorporated in the emergency arrangements and could be used as the basis for staffing, recruitment and capability resourcing into the future.

Suggestion 5.
Observation: There is only limited documentation of minimum staffing and resource levels or training requirements for emergency response positions.
Basis for suggestion: GSR Part 7, paragraph 6.10, states: "Appropriate numbers of suitably qualified personnel shall be available at all times (including during 24 hour a day operations) so that appropriate positions can be promptly staffed as necessary following the declaration and notification of a nuclear or radiological emergency. Appropriate numbers of suitably qualified personnel shall be available for the long term to staff the various positions necessary to take mitigatory actions, protective actions and other response actions."
Suggestion: The government should consider conducting an analysis of minimum resource requirements and training qualification for response organizations at all levels.

The CNSC has adequate staffing and resources for its emergency operations centre to fulfill its assigned responsibilities in emergency response.

4.3. Coordination of emergency preparedness and response

The overall nuclear emergency response is coordinated by the provinces and their own emergency response organizations and nuclear response plans. They describe the specific arrangements at the local level and the coordination and links between the federal and provincial structures. The province is supported by the federal government.

Coordination of federal support rests with the Minister of Public Safety, through the implementation of the FERP and the FNEP, which is coordinated under the authority of the Minister of Health of Canada. It is implemented in the frame of the Federal Emergency

Response Management System, the NERS and its associated Nuclear Emergency Functions, which address all the radiological response aspects of a nuclear or radiological emergency.

4.4. Plans and procedures for emergency response

In accordance with REGDOC 2.10.1, all Class I operating organizations have emergency response plans and procedures in place.

The responsibilities of the Province of Ontario with respect to nuclear emergencies are specified in the PNERP, which is approved by the Ontario Cabinet. The PNERP is reviewed every five years and involves the Provincial Nuclear Emergency Management Coordinating Committee, which consists of provincial ministries, federal organizations, designated/host municipalities and representatives of reactor facilities.

New Brunswick's responsibilities in case of a nuclear emergency at the Point Lepreau Nuclear Generating Station are described in the Point Lepreau Nuclear Off-Site Emergency Plan. The plan is approved by the Director of the New Brunswick Emergency Measures Organization (NB EMO). The plan is updated annually. There are monthly meetings of an emergency planning working group of the province, with the participation of provincial departments and the utility. The mandate of the working group is to ensure the consistent development of emergency arrangements in the province.

The FNEP describes the Government of Canada's arrangements for managing a nuclear emergency and is reviewed annually. FNEP Annexes establish the link between federal and provincial nuclear emergency response organizations and capabilities.

A suite of modelling codes is used for estimating radiation source terms and for dispersion and dose assessments, which are regularly tested during exercises. Any discrepancies between the outputs are resolved, to the extent possible, before submitting a recommendation to decision makers. There has been benchmarking between the codes in order to identify restrictions and uncertainties that may affect the output during emergency response.

4.5. Logistical support and facilities

The Class I facilities in Canada maintain sufficient tools, equipment, instrument and supplies based on the requirements in REGDOC 2.10.1. The facilities include appropriate emergency response facilities and alternate locations for emergency response.

On-site and off-site communications systems are in place and tested for emergency response. There are multiple systems for communication between different response organizations, operating organizations and different levels of government, which can create challenges for maintaining situational awareness between the different organizations. This includes real time plant data provided to PEOCs to support decision making, as well as to the regulator for situational awareness.

Ontario, New Brunswick and federal organizations maintain dedicated emergency operations centers ready to respond in the event of an emergency, including the full suite of necessary IT and communications equipment. Ontario maintains an alternate emergency operations center in case the primary location is disabled.

The provincial emergency plans establish arrangements for the creation of additional facilities during emergency response, either at pre-designated locations or ad hoc locations. These include reception centres, evacuation centres, emergency worker centres, assurance monitoring sites and monitoring and decontamination centres.

The equipment, tools and supplies for radiological characterization and field response teams in an emergency response, including fixed and deployed assets, are available but not based on a defined resource analysis in line with the assigned roles and responsibilities. The primary method of sample analysis involves sending samples to fixed laboratories for analysis. There are limited in situ analysis capabilities, which could be used in some cases.

4.6. Training, drills and exercises

New Brunswick and Ontario maintain five-year training programmes for emergency responders that are reviewed and updated annually. Training programmes include support from other response organizations, including the operating organization and the federal government, as needed.

Nuclear or radiological emergency response exercises have typically been conducted on the basis of regulatory requirements for the operating organizations and exercise programmes specified by the provinces. CNSC requires licensees to develop five-year exercise programmes, which include annual emergency exercises and drills to ensure that all emergency objectives are addressed during the cycle. A full-scale exercise is organized at each Class 1 facility every three years. CNSC evaluates the exercises to ensure that the operating organizations are managing and responding to emergencies in accordance with the conditions of the LCH.

Health Canada maintains a five-year nuclear training and exercise calendar that is shared with Public Safety Canada’s Federal Exercise Working Group. In February 2019, a new strategy was accepted by the Federal-Provincial-Territorial Nuclear Emergency Management Committee which establishes a joint framework and multijurisdictional nuclear exercise programme. One example of this strategy is the new agreement to hold a national level exercise every seven years, with the participation of all levels of government, including senior management, to exercise decision making.

Suggestion 6.
Observation: There has been limited and inconsistent participation of senior officials with responsibilities for strategic decision making in drills and exercises.
Basis for suggestion: GSR Part 7, paragraph 6.32, states: “Officials off the site who are responsible for making decisions on protective actions and other response actions shall be trained and shall regularly participate in exercises. Officials off the site who are responsible for communication with the public in a nuclear or radiological emergency shall regularly participate in exercises.”
Suggestion: The government should consider continuing the implementation of the strategy to ensure regular participation of senior officials with strategic decision making authority in drills and exercises.

Canada has participated in exercises organized by the United States, and vice versa, in order to promote cross-border cooperation. Canada has also participated in international exercises organized by the IAEA and OECD/NEA.

The emergency response exercises conducted thus far at Class 1 facilities have not included a scenario involving a nuclear or radiological emergency initiated by a nuclear security event as discussed in Section 3.1.

4.7. Quality management

The federal Emergency Management Act and equivalent provincial emergency management acts set out broad policies and directions for quality management programmes. Each response organization is required to develop and implement its quality assurance programme. Quality management is also part of the review of plans and procedures, both at the federal and provincial levels.

The PNERP is formally reviewed every five years. This includes a public consultation. The FNEP and Point Lepreau Nuclear Off-Site Emergency Plan are reviewed annually. Additionally, every exercise or emergency has an After-Action Review that identifies any lessons learned and associated corrective action plans.

Operating organizations have in place a quality management programme for emergency preparedness and response that covers the interface with off-site emergency preparedness and response, in line with the CNSC requirements for the management system.

Canada has hosted a number of international peer review missions, including IAEA IRRS missions, IAEA Operational Safety Review Team (OSART) missions and a World Health Organization Joint External Evaluation mission, which include reviews of select emergency arrangements for the regulatory framework and operating organizations, respectively.

Good Practice 5.
<p>Observation: Canada conducted a detailed self-assessment involving all response organizations well in advance of the EPREV mission ensuring that the EPREV team had sufficient information to review the emergency arrangements in Canada. The self-assessment was considered to be of high quality. The Advance Reference Material included a unique cross-reference between each GSR Part 7 associated requirement and the relevant national document(s).</p>
<p>Basis for Good Practice: GSR Part 7, paragraph 6.35, states: “The [quality management] programme shall also include periodic and independent appraisals against functions [...], including participation in international appraisals.”</p>
<p>Good Practice: Canada completed a detailed self-assessment prior to the EPREV mission and published its national self-assessment for all users of the Emergency Preparedness and Response Information Management System (EPRIMS). This allows other States to benefit from the experience of Canada in preparing for and hosting an international peer review.</p>

Appendix I: EPREV Team Composition

No.	Name and LAST NAME	Position	Organization
1.	Mr Michael Scott	Team Leader	U.S. Nuclear Regulatory Commission, United States of America
2.	Mr Scott Muston	Deputy Team Leader	Australian Radiation Protection and Nuclear Safety Agency, Australia
3.	Mr Ramon de la Vega	Team Coordinator	IAEA IEC
4.	Mr Mark Breitingner	Deputy Team Coordinator	IAEA IEC
5.	Mr Petre Min	Reviewer	National Commission for Nuclear Activities Control, Romania
6.	Mr Jean-Francois Dodeman	Reviewer	Autorité de Sûreté Nucléaire, France
7.	Ms Hannele Aaltonen	Reviewer	Radiation and Nuclear Safety Authority, Finland
8.	Ms Mi-hyun Yang	Reviewer	Korea Institute of Radiological & Medical Sciences, Republic of Korea
9.	Mr Alan Muller	Reviewer	National Nuclear Regulator, South Africa
10.	Mr Pelle Postgård	Reviewer	Swedish Civil Contingencies Agency, Sweden
11.	Mr Johannes Kuhlen	Reviewer	Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (retired), Germany
12.	Ms Kazuko Goto	Observer	Cabinet Office, Japan

Appendix II: Mission Schedule

IAEA EPREV MISSION TO CANADA PROGRAMME

June 1	Arrival in Ottawa					
June 2	9:00 EPREV Review Team meeting					
June 3	9:00-13:00	<p>ENTRANCE MEETING in Ottawa CNSC Headquarters</p> <p>9:00-9:05: Welcome & Safety Instructions (5 min) – Christopher Cole (CNSC) 9:05-9:20: Opening Remarks (15 min) – Peter Elder (CNSC) and Tim Singer (HC) 9:20-9:30: Introductions (10 min) - All 9:30-10:00: Presentation by IAEA (30 min) – Ramon de la Vega (IAEA) / Michael Scott (U.S. NRC) 10:00-10:55: Canada Overview (15 min) – Brian Ahier (HC / National Coordinator) 10:55-10:30: Presentation by CNSC (15 min) – Christopher Cole 10:30-11:00: Health/Coffee Break (30 min) 11:00-11:55: Presentation by OFMEM (15 min) – Jon Pegg / Dave Nodwell 11:15-11:30: Presentation by NB EMO (15 min) – Roger Shepard 11:30-11:45: Presentation by PS (15 min) - Dennis Giguère 11:45-12:00: Presentation by HC (15 min) – Dominique Nsengiyumva 12:00-12:15: EPREV Logistics (15 min) – Brian Ahier (HC / National Coordinator) 12:15-12:45: Q/A & Discussion (30 min) 12:45-13:00: Closing (15 min) – Brian Ahier (HC / National Coordinator)</p> <p>13:00-14:00 Lunch</p>				
June 3	14:00–16:30	<p>Site visit & Interview Location: CNSC Headquarters</p> <ul style="list-style-type: none"> - Emergency Planning Division - Nuclear Safety Division - Other (TBD) 	16:45	Travel to Fredericton - Departure from Ottawa Airport at 16:45	16:00	Travel to Toronto - Departure from Ottawa Airport at 16:00
			21:40	Arrival in Fredericton	17:09	Arrival in Toronto
June 4	9:00-12:00	Site visit & Interview at CNSC	9:00-9:45	Briefing by Director NB EMO (Greg MacCallum)	8:30-9:00	Arrival at PEOC

		<ul style="list-style-type: none"> - Emergency Planning Division - Nuclear Safety Division - Other (TBD) 	9:45-10:00	Coffee	9:00-9:30	Ontario Emergency Management Overview presentation
	12:00-13:30	Lunch	10:00-11:00	Interview: Provincial Emergency Action Committee (PEAC)	9:30-10:00	IMS, Hazard Identification and Risk Assessment Overview
	13:30-16:30	Free time	11:00-12:00	Interview: Nuclear Preparedness Team	10:00-10:45	Tour of PEOC and Operations Discussion
			12:00-13:00	Lunch	10:45-12:00	Interview: Planning and Exercise Unit, Public Education Unit, Sol Gen Communications Branch. In particular: <ul style="list-style-type: none"> - PNERP and Darlington Nuclear Generating Station Implementing Plan - Nuclear training and exercises - KI distribution - Cross-border arrangements - Communicating with the public
			13:00-14:30	Site visit & Interview: Provincial Emergency Operations Centre (PEOC Communications Room, Command Post, Joint Information Centre and Everbridge Notification System) In particular: <ul style="list-style-type: none"> - New Brunswick Technical Advisory Group (TAG) (Interview) - New Brunswick Nuclear Control Group (Interview) 	12:00-12:45	Lunch
			14:30-16:00	Interview: Health EOC In particular: <ul style="list-style-type: none"> - New Brunswick Department of Health Emergency Preparedness and Response Branch 	12:45-14:00	Interview with Scientific Section Senior Scientist: <ul style="list-style-type: none"> - Nuclear Incident Group (NIG) - Environmental Radiation and Assurance Monitoring Group (ERAMG)
			16:00-17:30	Review with Nuclear Preparedness Team and EPREV Review Team / EPREV Review Team report writing	14:00-15:00	Demonstration of Unified Rascal Interface (URI) with OPG and CNSC

	16:30-17:30	Debrief teleconference with EPREV Review Teams	17:30-18:30	Debrief teleconference with EPREV Review Teams	15:00-15:30	Interview with PEOC Command (possible discussion on protective action decision making)
	19:00-21:00	Report Writing at Dare Corporate Centre	19:30-21:30	Report Writing at PEOC	15:30-16:00	Ontario Planning Committee teleconference debrief
		Participants: HC, CNSC, EPREV Review Team Location: CNSC		Participants: NB EMO, HC, EPREV Review Team Location: PEOC	16:30-17:30	Participants: All Planning Committee members
						Debrief teleconference with EPREV Review Teams
						Participants: OFMEM, HC, EPREV Review Team Location: PEOC/Hotel
					19:00-21:00	Report writing at the Holiday Inn Toronto Yorkdale
June 5	9:00-11:30	Site visit & Interview at the Public Health Agency of Canada (PHAC) and the Health Portfolio Operations Centre (HPOC) Questions as IHR National Focal Point and spokespersons during Nuclear emergency	8:00-9:00	Follow-up interviews from June 4 th	9:00-9:30	Introductions from Ontario Ministries
	11:30-12:30	Lunch	9:00-10:00	Interview: Nuclear Preparedness Team	9:30-12:00	Interview and discussions with Subject Matter Experts at the PEOC Participants: All ministry SMEs, OPG, Bruce Power, Durham, HC
			10:00-12:00	Site Visit & Interview: Situation Room, NB Technical Advisory Group (TAG), Critical Infrastructure, Security and NB Power Health Lab (Fredericton)		In particular: - Ministry of the Solicitor General

13:00-16:30	<p>Interview at Health Canada, Radiation Protection Bureau</p> <ul style="list-style-type: none"> - Director of RPB - RPB Management Team - FNEP Technical Assessment Group (On-Site Conditions and Release Characterization, Risk Assessment & Situational Awareness, Environmental Monitoring and Surveillance, Human Monitoring, Support to Communications) 	12:00-13:00	Lunch		<ul style="list-style-type: none"> - Ministry of Health and Long-Term Care (Iodine thyroid blocking (ITB) procedures) - PEOC Scientific Section's Environmental Radiation and Assurance Monitoring Group (ERAMG) - Ministry of Municipal Affairs and Housing (nuclear compensation) - Transportation/traffic control - Non-radiological consequence management - Protecting emergency workers
13:00-14:30		13:00-14:30	Site Visit & Interview (TBC): NB Power Management and Corporate Emergency Response staff		
14:30-15:00		14:30-15:00	Interview: Department of Public Safety (DPS), Fire Marshal		
15:00-16:00		15:00-16:00	Interview: RCMP, Extra Mural / Ambulance New Brunswick (EM/ANB)		
16:00-17:30		16:00-17:30	Review with Nuclear Preparedness Team and EPREV Review Team		
			EPREV Review Team report writing		Lunch
12:00-13:00				12:00-13:00	
13:00-15:30				13:00-15:30	Interview and discussions with Subject Matter Experts at the PEOC (continued)
16:00-16:30				16:00-16:30	Ontario Planning Committee teleconference debrief
16:30-17:30				16:30-17:30	Debrief teleconference with EPREV Review Teams
19:00-21:00				19:00-21:00	Report writing at the Holiday Inn Toronto Yorkdale
16:30-17:30	<p>Debrief teleconference with EPREV Review Teams</p> <p>Participants: HC, CNSC, EPREV Review Team</p>	17:30-18:30	<p>Debrief teleconference with EPREV Review Teams</p> <p>Participants: NB EMO, HC, EPREV Review Team</p>		

	19:00-21:00	Location: RPB Report Writing at Dare Corporate Centre	19:30-21:30	Location: PEOC Report Writing at PEOC		
June 6	9:00-11:30	Site visit at Health Canada, Radiation Protection Bureau <ul style="list-style-type: none"> - Director of RPB - RPB Management Team - FNEP Technical Assessment Group (On-Site Conditions and Release Characterization, Risk Assessment & Situational Awareness, Environmental Monitoring and Surveillance, Human Monitoring, Support to Communications) 	6:45-8:15	Travel to Point Lepreau Nuclear generating Station (PLNGS)	6:45-8:00	Travel to Ontario Power Generation (OPG)
			8:30-8:40	Welcome / Introductions PLNGS Emergency Preparedness Staff	8:00-8:30	Site documentation and pre-job brief
			8:40-8:50	Opening Remarks	8:30-9:00	OPG welcoming remarks
			8:50-11:30	PLNGS Presentation / Discussion / Interviews with PLNGS Emergency Response Organization (ERO) & Emergency Preparedness Staff	9:00-9:45	Interview ERO Emergency Recovery Director
	11:30-13:00	Lunch	11:30-12:00	Tour of ERO Facilities / Interviews In particular:	9:45-10:00	Break
	13:00-16:00	Interviews Meetings at CNSC <ul style="list-style-type: none"> - Canadian Food Inspection Agency (13:00-14:30) - Environment and Climate Change Canada (14:30-16:00) 		<ul style="list-style-type: none"> - Nuclear Power Station on-site and off-site emergency centers and security centers (site visit and interview) - NB Power Management and Corporate Emergency Response staff (site visit and interview) - Public safety organization facilities (e.g., fire stations, police stations, ambulance services) participating in off-site response and also providing support to the on-site response (site visit and interview) 	10:00-11:00	Interview with ERO Emergency Response Manager, Darlington Security Director and Site Visit of Darlington control room, emergency operations centre
					11:00-11:30	Lunch
					11:30-12:00	Travel to Durham Region EOC
					12:00-13:40	Site visit & Interviews at Durham Region EOC

				Lunch		Participants: OPG, Durham, OFMEM, HC
			12:00-12:45	Travel to Off-Site Emergency Operations Centre (OEOC) St George		In particular: Public safety organization facilities (e.g., fire stations, police stations, ambulance services) participating in off-site response and also providing support to the on-site response
			12:45-13:15	Interview: OEOC Staff		
			13:15-14:00	Interview: OEOC Staff, RCMP, Warden Service, Amateur Radio	13:40-14:00	Travel to Lakeridge Health (Ajax)
			14:00-15:00	In particular: - Point Lepreau Warden Service (Interview and site visit)	14:00-15:00	Site visit & Interviews/Discussion at Lakeridge Health Hospital (Ajax)
			15:00-16:00	Interview: Monitoring and Decontamination Centre	15:00-16:30	Travel to Toronto
			16:00-17:30	Travel to Fredericton	16:00-16:30	Ontario Planning Committee teleconference debrief
	16:30-17:30	Debrief teleconference with EPREV Review Teams	17:30-18:30	Debrief teleconference with EPREV Review Teams	16:30-17:30	Debrief teleconference with EPREV Review Teams
	19:00-21:00	Report Writing at Dare Corporate Centre	19:30-21:30	Report writing at the PEOC	19:00-21:00	Report writing at the Holiday Inn Toronto Yorkdale
June 7	9:00-12:00	Interview Meetings at CNSC - Department of National Defence/Canadian Armed Forces (9:00-10:00)	8:00-9:00	Travel to Saint John	9:00-12:00	Follow-up meeting at PEOC or report writing at the Holiday Inn Toronto Yorkdale
			9:00-10:00	Interview: Regional Emergency Management Coordinators (REMC) Region 9 and 10	12:00-13:00	Lunch

	12:00-13:30	- Global Affairs Canada (10:00-11:00) - Natural Resources Canada (11:00-12:00) Lunch	10:00-11:00	Interview: Horizon Health Saint John Regional Hospital	13:00-13:30	Travel to Pearson Airport
	13:30-16:30	Site visit & Interview at PS/GOC Government Operations Centre + questions related to i) Federal Public Communications Coordination Group, ii) Senior Officials Responsible for Emergency Management (SOREM)	11:00-12:00	Interview: Social Development, Red Cross	15:10	Departure from Pearson Airport
	19:00-21:00	EPREV Review Team working dinner in Ottawa (Location TBC)	12:00-13:00	Lunch	16:12	Arrival at Ottawa Airport
			13:00-14:00	Travel to Fredericton		
			14:30-15:00	Travel to Fredericton Airport		
			16:00	Departure from Airport		
			17:36	Arrival at Ottawa Airport		
			19:00-21:00	EPREV Review Team working dinner in Ottawa (Location TBC)	19:00-21:00	EPREV Review Team working dinner in Ottawa (Location TBC)
June 8	9:00-17:00	EPREV Review Team drafting Report				
June 9	9:00-17:00	EPREV Review Team drafting Report				
June 10		Canada		EPREV Review Team		
	9:00-13:00	Canadian organizations receive and review the Draft Report		9:00-12:00	EPREV Review Team Cultural visit	
	13:00-16:00	Canadian organizations consolidate their comments on the draft report		12:00-13:00	Lunch	
					IAEA drafts executive summary of report and press release	

	16:00	National Coordinator sends the draft press release to Communications Working Group	9:00-16:00 (UTC+2)	EPREV Team Leader sends the draft press release to National Coordinator
	16:00-17:00	Communications Working Group reviews the draft press release and sends comments to National Coordinator	16:00	
	21:00	National Coordinator receives Draft Report with consolidated comments		
		National Coordinator sends the draft press release to EPREV Review Team Leader		
June 11	Canada		EPREV Review Team	
	9:00	Canadian organizations receive the Draft Report with consolidated comments	9:00-12:00	EPREV Review Team finalizes draft executive summary and press release
	9:00-12:00	Canadian organizations review the consolidated comments on the draft report Location: CNSC Headquarters	12:00-13:00	Lunch
	12:00-14:00	HC, CNSC, OFMEM, NBEMO review the final comments	14:00	EPREV Review Team receives Canada's comments on the draft report
	14:00	National Coordinator sends the commented Draft Report to EPREV Review Team Leader	14:00-21:00	EPREV Review Team finalizes the draft report at Dare Corporate Centre
			21:00	EPREV Review Team Leader sends the Draft Report to National Coordinator
June 12	9:00-12:00	EPREV Review Team and Canada EPREV Steering Committee meeting to discuss and finalize the report		
	12:00-13:00	Lunch		

	13:00-14:30	Finalize executive summary and press release based on agreed-upon report Participants: EPREV Review Team Leaders, Communications Working Group
	14:30-15:30	Approval of the press release Participants: EPREV Review Team Leader, HC, CNSC, OFMEM, NBEMO
June 13	10:00-12:00	EXIT MEETING in Ottawa Location: CNSC Headquarters & WebEx Participants: <ul style="list-style-type: none"> - EPREV Review Team - Canada EPREV Steering Committee - Canada EPREV Planning Committees via WebEx
	12:00-13:00	Lunch
	13:00	END OF MISSION
	14:00	Press release posted online on IAEA Website

Appendix III: List of Attendees to EPREV Mission Meetings

No.	Name	Position	Organization
1.	Arlette Alcazar-Biljan	Policy Analyst, IHR National Focal Point	Public Health Agency of Canada
2.	Nadia Alonzi	Emergency Management and Security Coordinator	Ministry of the Environment, Conservation and Parks
3.	Brian Ahier	Director, Radiation Protection Bureau and EPREV National Coordinator	Health Canada
4.	Laura Anderson	Team Leader, Strategic and Regulatory Communications	Canadian Nuclear Safety Commission
5.	Lynn Arsenualt	Vice-President Human Resources	New Brunswick Power Corporation
6.	Sydney Atkinson	Project Lead for the Emergency Department	Lakeridge Health
7.	Ryan Baker	Director, Public Affairs	Public Safety Canada / Government Operations Centre
8.	Alex Bardsley	Engineer, Emergency Preparedness	Point Lepreau Nuclear Generating Station
9.	Tristan Barr	Head, Training, Regional Operations and Outreach Section, Radiation Protection Bureau	Health Canada
10.	Andrea Bellingham	Emergency Management Programs Officer	Canadian Nuclear Safety Commission
11.	Marc Belliveau	Provincial Manager, Disaster Management	Canadian Red Cross
12.	Bernie Beaudin	Emergency Management Programs Officer	Canadian Nuclear Safety Commission
13.	Dov Bensimon	Senior Meteorologist	Environment and Climate Change Canada
14.	Lauren Bergman	Radiation Coordination Specialist, Radiation Protection Bureau	Health Canada
15.	Mark Bett	Senior Manager, Emergency Management Unit	Ministry of Children, Community and Social Services
16.	Kathy Bleyer	Nuclear Emergency Planning and Exercise Officer	Office of the Fire Marshal and Emergency Management
17.	Bill Boletis	Ministry Emergency Management Coordinator	Ministry of Municipal Affairs and Housing
18.	Patrick Boyle	Acting Sargent	Region of Durham

No.	Name	Position	Organization
19.	Buster Bowes	Section Manager, Emergency Management	Bruce Power
20.	Russel Bowmaster	Emergency Preparedness Specialist	Point Lepreau Nuclear Generating Station
21.	Jackie Braden	Assistant Director, Communications	Ministry of the Solicitor General, Communications Branch
22.	Claude Bouchard	Head, Coordination and Operations Preparedness Section, Radiation Protection Bureau	Health Canada
23.	John Byard	Specialist- Emergency Management	Ministry of Labour
24.	Kevin Buchanan	Head, Technical Assessment Coordination Section, Radiation Protection Bureau	Health Canada
25.	John Buckle	Head, Nuclear Emergency Response, Canadian Hazards Information Service	Natural Resources Canada
26.	Kirby Burgess	Training Officer Nuclear Preparedness	Department of Public Safety - New Brunswick Emergency Measures Organisation
27.	Scott Burns	Vice President Security & Emergency Services	Ontario Power Generation
28.	Denis Carrière	Chief, Emergency Management	Natural Resources Canada
29.	Christine Campbell	Team Leader, Drinking Water Emergency Planning	Ministry of the Environment, Conservation and Parks
30.	Diane Cameron	Director, Nuclear Energy Division	Natural Resources Canada
31.	Richard Campbell	Senior Radiation Technologist, Radiation Protection Bureau	Health Canada
32.	Jeff Catterall	Consultant	Ministry of Health and Long-Term Care
33.	Clare Cattrysse	Director, Policy, Aboriginal and International Relations Division	Canadian Nuclear Safety Commission
34.	Laura Chaloner	Radiation Coordination Specialist, Radiation Protection Bureau	Health Canada
35.	Calvin Christiansen	Director General, Government Operations Centre	Public Safety Canada / Government Operations Centre
36.	Sharf Chowdhury	Emergency Management Coordinator, Saint John Regional Hospital	Horizon Health Saint John Regional Hospital

No.	Name	Position	Organization
37.	Lori Clark	Senior Vice-President Operations	New Brunswick Power Corporation
38.	Stacey Cooling	Chief Operations	Department of Public Safety - New Brunswick Emergency Measures Organisation
39.	Christopher Cole	Director, Emergency Management Programs Division	Canadian Nuclear Safety Commission
40.	Scott Corcoran	Deputy Director, Emergency Planning, Training and Exercise Division	Global Affairs Canada
41.	Mike Correy	Environment Emergency Management Specialist	Environment and Local Government
42.	Caitlin Cowan	Planning Officer – Human Induced Events	Public Safety Canada / Government Operations Centre
43.	James Culligan	Executive Director Financial Services (Unit)	Service New Brunswick
44.	Jim Delaney	Director, Uranium and Radioactive Waste Division	Natural Resources Canada
45.	Laura De Curtis	Manager, Communications	Public Safety Canada / Government Operations Centre
46.	Daniel Dekleva	Regional Emergency Management Coordinator – St Stephen – Region 10	Department of Public Safety - New Brunswick Emergency Measures Organisation
47.	Diane de Kerckhove	Deputy Director, Nuclear Security and Bilateral Relations	Natural Resources Canada
48.	Jacqueline Daniel	Senior Policy Analyst, GOC Modernization	Public Safety Canada / Government Operations Centre
49.	Denis Deveau,	Consultant, Policing Standards & Contract Management (Section)	Department of Public Safety – Policing Services
50.	Marc Desrosiers	Head, National Internal Radiation Assessment, Radiation Protection Bureau	Health Canada
51.	Dennis Doherty	Chief Emergency Management Officer	Horizon Health Fredericton
52.	Geoffrey Downey	NBEMO Communications Officer	Department of Public Safety - New Brunswick Emergency Measures Organisation
53.	Wendy Ellis	Emergency Management Coordinator	Region of Durham
54.	Ali El-Jaby	Lead Technical Advisor, Directorate of Security and Safeguards	Canadian Nuclear Safety Commission

No.	Name	Position	Organization
55.	Madelaine Fedorowich	Manager, Radiation Protection Services	Ministry of Labour
56.	Jean-François Duperré	Director, Office of Emergency Response Services, Centre for Emergency Preparedness and Response	Public Health Agency of Canada
57.	Andrew Easton	Executive Director Emergency Services Division	Department of Public Safety
58.	Peter Elder	Vice-President and Chief Science Officer	Canadian Nuclear Safety Commission
59.	Diego Estan	Radiation Protection Officer	Canadian Nuclear Safety Commission
60.	Jamie Fairchild	Policy Analyst, Nuclear Liability	Natural Resources Canada
61.	Melody Favretto	Senior Communications Advisor, Communications and Public Affairs Branch	Health Canada
62.	Graham Fleming	Manager, Corporate Planning and Projects Unit	Ministry of Agriculture Food and Rural Affairs
63.	Lisa Filippis	Communications Manager, Risk and Emergency Communications, Communications and Public Affairs Branch	Health Canada
64.	Bryce Firlotte	Logistics	Department of Public Safety - New Brunswick Emergency Measures Organisation
65.	Tim Flemming	National Operations Specialist, Food Processing Operational Guidance and Expertise	Canadian Food Inspection Agency
66.	JoAnne Ford	Emergency Coordinator, Ontario Area	Canadian Food Inspection Agency
67.	Rita Foulds	Nuclear Emergency Planning and Exercise Officer	Office of the Fire Marshal and Emergency Management
68.	Emma Fuchs	Nuclear Emergency Planning and Exercise Officer	Office of the Fire Marshal and Emergency Management
69.	LCdr Peter Gallant	Liaison Officer (LO) Joint Task Force Atlantic (military)	Department of National Defence/Canadian Armed Forces
70.	Tracy Gibbons	Manager, Stakeholder Engagement & Secretariat	Public Health Agency of Canada
71.	Dennis Giguère	Senior Planner – Human Induced Events	Public Safety Canada / Government Operations Centre

No.	Name	Position	Organization
72.	Karine Glenn	Director, Waste and Decommissioning Division	Canadian Nuclear Safety Commission
73.	Ryan Goddard	Section Manager Fire Protection Support	Ontario Power Generation
74.	David Gotlieb	A/Director (Communications), Communications and Public Affairs Branch	Health Canada
75.	Bruce Grandy	Director of Communications (radio communications - TMR)	Transportation and Infrastructure (Communications Trunk Mobile Radio)
76.	Samuel Gyepi-Garbrah	Technical Specialist	Canadian Nuclear Safety Commission
77.	Lisa Fortuna	Health Department	Region of Durham
78.	Richard Hadden	Manager Projects, Emergency Management & Fire Protection	Ontario Power Generation
79.	Tony Hall	Manager Service New Brunswick	Service New Brunswick
80.	Jim Harris	Director General, Centre for Emergency Preparedness and Response	Public Health Agency of Canada
81.	Keith Henderson	Chief, National Dosimetry Services, Radiation Protection Bureau	Health Canada
82.	Kathleen Heppell-Masys	Director General, Directorate of Security and Safeguards	Canadian Nuclear Safety Commission
83.	Benoit Hermant	A/Chief, Health Portfolio Operations Centre	Public Health Agency of Canada
84.	Hapsatou Mamady	Radiation Officer, Radiation Protection Bureau	Health Canada
85.	Wendy Hodgkinson	Clinical Practice Leader for the Emergency Department	Lakeridge Health
86.	Pauline Hopley	Social Services Department	Region of Durham
87.	Roger Hugron	Senior Nuclear Specialist, Head of Nuclear Safety Studies and Analysis Section	Department of National Defence/Canadian Armed Forces
88.	Robert Ianiro	Assistant Deputy Minister, Healthy Environments and Consumer Safety Branch	Health Canada
89.	Gaétan Latouche	Environmental Program Officer	Canadian Nuclear Safety Commission
90.	Carlos Lorencez	Director Nuclear Safety	Ontario Power Generation

No.	Name	Position	Organization
91.	Ramzi Jammal	Vice-President and Chief Regulatory Operations Officer	Canadian Nuclear Safety Commission
92.	Maepea Jill	ECCC New Brunswick Office	Environment and Climate Change Canada
93.	Ksenia Kalinina	Emergency Preparedness and Business Continuity Specialist	Lakeridge Health
94.	Zar Khansaheb	Director of Operations and Maintenance	Ontario Power Generation
95.	Aman Kainth	Executive Assistant	Office of the Fire Marshal and Emergency Management
96.	Rebecca Kelly	Director, Nuclear Emergency Preparedness & Pickering Site Security, Security and Emergency Services	Ontario Power Generation
97.	Robert (Bob) Kipp	Critical Infrastructure Analyst	Department of Public Safety - Office of Provincial Security Advisor
98.	Jude Kelly	Public Education Program Officer	Office of the Fire Marshal and Emergency Management
99.	Pamela Khan	Health Department	Region of Durham
100.	Mosin Khan	Emergency Preparedness, Technical Officer Dose Projection	Ontario Power Generation
101.	James Kilgour	Director, Durham Emergency Management Office	Region of Durham
102.	Wilson Lam	Senior Advisor, Nuclear Technologies	Ministry of Energy, Northern Development and Mines
103.	Pascal Landry	Technical Services Manager	Education and Early Childhood Development
104.	Michael Lewis	Provincial Fire Marshal	Department of Public Safety - Fire Marshal
105.	Greg MacCallum	Director	Department of Public Safety - New Brunswick Emergency Measures Organisation
106.	Daniel MacDonald	Emergency Management Programs Officer	Canadian Nuclear Safety Commission
107.	Lesa Maxam	Consultant	Social Development
108.	Jeff McCarthy	Acting Provincial Security Advisor	Department of Public Safety
109.	David McCormack	Director, Canadian Hazards Information Service	Natural Resources Canada

No.	Name	Position	Organization
110.	Stephen McIsaac	Sergeant, Motor Vehicle Safety Enforcement Section (MVSES)	Department of Public Safety - Inspection and Enforcement Branch
111.	Jason MacIntyre,	Sergeant, Motor Vehicle Safety Enforcement Section (MVSES)	Department of Public Safety - Inspection and Enforcement Branch
112.	Eric McLellan	Specialist - Department Natural Resources	Energy and Resource Development
113.	Anna McKeen	Operations Assistant	Department of Public Safety - New Brunswick Emergency Measures Organisation
114.	Kate McKeen	Administrative Assistant	Department of Public Safety - New Brunswick Emergency Measures Organisation
115.	Dominic Mendoza	Emergency Management Programs Officer	Canadian Nuclear Safety Commission
116.	Sunny Mustafa	Manager Human Performance	Ontario Power Generation
117.	Terry Johnson	Manager Central Region	Social Development
118.	Mike Johnstone	National Manager Office of Emergency Management	Canadian Food Inspection Agency
119.	Jeffery Jordison	Paramedic	Region of Durham
120.	Ray Lazarus	Deputy Chief, Planning and Program Development	Office of the Fire Marshal and Emergency Management
121.	Bill Lawlor	Director, Provincial Red Cross	Canadian Red Cross
122.	Sheri MacDonald	Radiation Protection Specialist	Canadian Nuclear Safety Commission
123.	Rick MacMillan	Manager, Emergency Management Communication Group	(EMCG) Amateur Radio
124.	Martin MacKinnon	GIS Analyst	Department of Public Safety – Geographic Information Systems
125.	Joe McCulley	NB Power Health Physicist	New Brunswick Power Corporation
126.	Rory McCutcheon-Wickham	Radiation Officer, Radiation Protection Bureau	Health Canada
127.	Tim McCluskey	Project Officer, Educational facilities and Pupil Transportation	Education and Early Childhood Development

No.	Name	Position	Organization
128.	Stuart McGetrick	Director, Communications	Ministry of the Solicitor General, Communications Branch
129.	Robin McNeill	Senior Emergency Management Planner	Public Health Agency of Canada
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No.	Name	Position	Organization
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190.	Peter Wright	Radiation Coordination Specialist, Radiation Protection Bureau	Health Canada
191.	Pete Yerxa	Logistics / Maintenance Nuclear Preparedness	Department of Public Safety - New Brunswick Emergency Measures Organisation
192.	Marie Zancola	Regional Program Coordinator - Ontario	Public Safety Canada / Government Operations Centre

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Acronyms

	After-Action Report
AAZ	Automatic Action Zone
AIR	After Incident Review
CNSC	Canadian Nuclear Safety Commission
EALs	Emergency Action Levels
EMO	Emergency Measures Organization
EMCPA	Emergency Management and Civil Protection Act
EMS	Emergency Medical Services
EPC I	Emergency Preparedness Category I
EPR	Emergency Preparedness and Response
EPREV	Emergency Preparedness Review
EPRIMS	Emergency Preparedness and Response Information Management System
ERAMG	Environmental Radiation and Assurance Monitoring Group
EWC	Emergency Worker Centre
FERP	Federal Emergency Response Plan
FNEP	Federal Nuclear Emergency Plan
HAZMAT	Hazardous Materials
IAEA	International Atomic Energy Agency
IEC	Incident and Emergency Centre (IAEA)
IHR	International Health Regulations

IPZ	Ingestion Planning Zone
IRRS	Integrated Regulatory Review Service (IAEA)
KI	potassium iodide
LCH	license condition handbook
LHINs	Local Health Integration Networks
METER	Medical Emergency Treatment for Exposures to Radiation
MOHLTC	Ministry of Health and Long-Term Care
NEF	Nuclear Emergency Functions
NERS	National Emergency Response System
NESS	National Emergency Strategic Stockpile System
NFP	National Focal Point
NGS	Nuclear Generating Station
NIAC	Nuclear Insurance Association of Canada
NLCA	Nuclear Liability and Compensation Act
NPP(s)	nuclear power plant(s)
NSCA	Nuclear Safety and Control Act
OECD/NEA	Nuclear Energy Agency of the Organisation for Economic Co-operation and Development
OFMEM	Office of the Fire Marshal and Emergency Management
OHSA	Occupational Health and Safety Act
OIL(s)	operational intervention level(s)
OPG	Ontario Power Generation

OSART	Operational Safety Review Team (IAEA)
PAHO	Pan American Health Organization
PEOC	Provincial Emergency Operations Centre
PHAC	Public Health Agency of Canada
PNERP	Provincial Nuclear Emergency Response Plan
PPP	Public-Private Partnership
RANET	Response and Assistance Network (IAEA)
SJRH	Saint John Regional Hospital
TAG	Technical Assessment Group
TOR	Terms of Reference
WHO	World Health Organization