IAEA

Emergency Preparedness Review

EPREV

EMERGENCY PREPAREDNESS REVIEW (EPREV) FOLLOW-UP MISSION TO CANADA

2023-06-26 to 2023-06-30

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 in 2019 to conduct, in accordance with Article III of the IAEA Statute, a peer review of Canada's radiation emergency preparedness and response (EPR) arrangements vis-à-vis the relevant IAEA standards. Subsequently, Canada requested a follow-up mission to review the implementation of actions related to the findings of the 2019 EPREV mission. This report summarizes the activities of the EPREV follow-up mission conducted in June 2023.

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

Contents

EXECUTIVE SUMMARY 5

1. INTRODUCTION 7

1.1. Objective and Scope 7
1.2. Preparatory Work and Review team 7
1.3. Reference for the Review 7

2. ACTIONS RELATED TO THE FINDINGS ON GENERAL REQUIREMENTS 8

2.1. Emergency management system 8
2.2. Roles and responsibilities in EPR 8
2.3. Hazard Assessment 8
2.4. Protection strategy for a nuclear or radiological emergency 11

3. ACTIONS RELATED TO THE FINDINGS ON FUNCTIONAL REQUIREMENTS 14

3.1. Managing operations in an emergency response 14
3.2. Identifying and notifying a nuclear or radiological emergency and activating an emergency response 15
3.3. Taking mitigatory actions 15
3.4. Taking urgent protective actions and other response actions 15
3.5. Providing instructions, warnings and relevant information to the public for emergency preparedness 16
3.6. Protecting emergency workers and helpers in an emergency 16
3.7. Managing the medical response in a nuclear or radiological emergency 17
3.8. Communicating with the public throughout a nuclear or radiological emergency 18
3.9. Taking early protective actions and other response actions 18
3.10. Managing radioactive waste in a nuclear or radiological emergency 20
3.11. Mitigating non-radiological consequences of a nuclear or radiological emergency and of an emergency response 22
3.12. Requesting, providing and receiving international assistance for EPR 22
3.13. Terminating a nuclear or radiological emergency 22
3.14. Analysing the nuclear or radiological emergency and the emergency response 25

4. ACTIONS RELATED TO THE FINDINGS REQUIREMENTS FOR INFRASTRUCTURE 26

4.1. Authorities for EPR 26
4.2. Organization and staffing for EPR 27
4.3. Coordination of EPR 29
4.4. Plans and procedures for emergency response 29
4.5. Logistical support and facilities for emergency response 29
4.6. Training, drills and exercises for EPR 29
4.7. Quality management programme for EPR 30

5. POLICY ISSUE: IMPLICATIONS OF THE PANDEMIC AND ASSOCIATED CHALLENGES ON ALL LEVELS OF EMERGENCY PREPAREDNESS AND RESPONSE 31

APPENDIX I: EPREV FOLLOW-UP MISSION TEAM COMPOSITION 32

APPENDIX II: MISSION SCHEDULE 33

APPENDIX III: ATTENDEES TO EPREV FOLLOW-UP MISSION MEETINGS 34

REFERENCES 37

ACRONYMS 38

EXECUTIVE SUMMARY

At the request of the Government of Canada, an international team of experts conducted an Emergency Preparedness Review (EPREV) follow-up mission from 26 to 30 June 2023. The purpose of the EPREV follow-up mission was to review the progress made on actions taken to address the recommendations and suggestions made during the EPREV mission fielded to Canada in 2019. The review compared Canada's emergency arrangements related to the findings of the 2019 EPREV mission against the International Atomic Energy Agency (IAEA) safety standards for preparedness and response for a nuclear or radiological emergency. The follow-up mission did not conduct a comprehensive review of the emergency arrangements in the country. This report instead focuses on observations identified during interviews and reviews of documentation provided to assess the actions taken to address the 2019 EPREV recommendations and suggestions.

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 include emergencies taking place at nuclear power plants (NPPs), irrespective of their initiating events [1].

The EPREV follow-up mission team consisted of 5 international EPR experts from 5 IAEA Member States as well as a team coordinator from the IAEA Secretariat. The EPREV follow-up mission consisted of a review of reference materials provided by Canada and interviews. During the follow-up mission, the review team interacted with government officials and representatives of response organizations at all levels, as well as with staff of New Brunswick Power and Ontario Power Generation.

The review team observed a commitment at all levels to emergency preparedness and noted that Canada has made significant progress in developing and revising emergency arrangements since the 2019 EPREV mission. The review team acknowledges the amount of work that Canada has completed since the 2019 EPREV mission even while responding to the COVID-19 pandemic.

The review team identified the following accomplishments in Canada's EPR framework:

- All the recommendations and suggestions that were formulated in 2019 are closed, either on the basis of completed actions, on the basis of progress made and confidence in effective completion, or on the basis that it is no longer relevant.
- A software tool is being developed to be used in accordance with the *National Environmental Monitoring Strategy Guidance for Radiological/Nuclear Situations*. This will enable the most effective and efficient use of available monitoring resources for the response to a nuclear or radiological emergency in Canada.
- A Recovery Management Organization will be established based on an associated guidance document which has been coordinated among relevant governmental departments.

The review team also noted areas for Canada to continue to further strengthen EPR:

- The development of the software tool mentioned above would benefit from having more stakeholders completing the supporting questionnaires.

- A reinforced distinction between the termination of each organization's emergency response and the overall termination of the emergency would benefit all response organizations and the public.

This report serves as the final record of the EPREV follow-up mission. The IAEA will continue to work with Canada to enhance its national EPR arrangements as appropriate.

1. INTRODUCTION

1.1. Objective and Scope

The purpose of this EPREV follow-up mission was to conduct a review of the actions taken to address the findings of the 2019 EPREV mission. The follow-up mission did not conduct a comprehensive review of Canada's nuclear and radiological EPR arrangements.

The EPREV follow-up mission focused on the arrangements for nuclear or radiological emergencies at EPC I facilities, 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], which is consistent with the scope of the 2019 EPREV mission. The review was carried out by comparing the revised emergency arrangements in the country against the IAEA safety standards for EPR.

The EPREV follow-up mission is expected to facilitate improvements to Canada's EPR arrangements, and those of other Member States, through the knowledge gained and experiences shared between Canada and the review team and through the evaluation of the effectiveness of Canada's arrangements, capabilities, and good practices.

1.2. Preparatory Work and Review team

At the request of the Government of Canada, the IAEA conducted an EPREV mission to Canada from 3 to 13 June 2019. Following the mission, Canada undertook the development and implementation of an Action Plan to revise and update emergency arrangements in line with the findings of the review team and to ensure that good practices were captured for sustainability.

Following the implementation of the national action plan, in November 2021, Canada requested an IAEA EPREV follow-up mission to conduct a peer review of the revised emergency arrangements. The preparatory meeting was held on 15 November 2022 via video conference. During the preparatory meeting, an agreement was reached on the arrangements for the EPREV follow-up mission and the tentative composition of the review team of experts.

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]; GSG-11, Arrangements for the Termination of a Nuclear or Radiological Emergency [4]; GSG-14, Arrangements for Public Communication in Preparedness and Response for a Nuclear or Radiological Emergency [5]; and SSG-65, Preparedness and Response for a Nuclear or Radiological Emergency Involving the Transport of Radioactive Material [6] 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. ACTIONS RELATED TO THE FINDINGS ON GENERAL REQUIREMENTS

2.1. Emergency management system

There were no findings in this area in the 2019 EPREV mission.

2.2. Roles and responsibilities in EPR

There were no findings in this area in the 2019 EPREV mission.

2.3. Hazard Assessment

2019 EPREV Mission Recommendation 1.
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.
Basis: 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."
Recommendation: The government should ensure that the results of the nuclear security threat assessment are incorporated in a hazard assessment.

Changes since the 2019 EPREV Mission

Federal:

Health Canada and the Canadian Nuclear Safety Commission (CNSC) reviewed the IAEA safety standards and nuclear security guidance in 2020 to better understand the expectations for coordinating the safety-security interface. Based on this review, the CNSC communicated its regulatory position regarding on-site nuclear security requirements and Design Basis Threat (DBT) Assessments to Ontario and New Brunswick off-site authorities. On 25 January 2023, the CNSC, Health Canada, New Brunswick Emergency Measures Organization (NBEMO), and Emergency Management Ontario (EMO) met with the IAEA Incident and Emergency Centre through videoconference to discuss paragraph 4.22 in GSR Part 7 and the observation that led to Recommendation 1.
In addition, the CNSC conducted a review of Canada's Nuclear Security Regulations (SOR/2000-209). The CNSC verifies compliance through nuclear security inspections and through the evaluation of the licensees' performance during force-on-force exercises.

New Brunswick:

In New Brunswick, in order to improve coordination between security and off-site emergency preparedness and response agencies, linkages were established between the Point Lepreau Nuclear Generating Station (PLNGS) and Security/Intelligence & Law Enforcement agencies in February 2020 in accordance with New Brunswick's Provincial Security Event Management Plan (PSEMP). PLNGS is now represented in New Brunswick Critical Infrastructure Council meetings and on the New Brunswick Security Committee and will be represented at the Security Operations Group (SOG) during emergency response operations, if required.

Status of the finding

Recommendation 1. is closed on the basis of completed actions.

2023 follow-up mission observation

The CNSC and utilities (Ontario Power Generation and New Brunswick Power) reiterated their position that the hazard assessment for security-initiated events is based on the response to the DBT. Consequences resulting from a DBT would be unacceptable from a regulatory perspective and so the CNSC maintains the position that all such threats will be defeated before any radiological consequences can occur.

The review team explained that GSR Part 7 does not use the DBT terminology or limit the consideration of security-initiated events based on likelihood because security-initiated events could differ from safety-related initiating events in terms of the release source term, the potential progression of the accident, and/or the ability of responders to mitigate and respond to the emergency.

It was noted that due to the sensitive nature of certain security elements, not all relevant detail could be provided in the Advance Reference Material (ARM) shared by Canada with the review team. Nevertheless, robust discussion assured that the required detail was being considered in the planning basis and the hazard assessment.

The CNSC and representatives from the utilities explained that they had considered nuclear emergency scenarios, with off-site radiological consequences, that could be triggered by nuclear security events. Utilities had considered the associated accident progressions and resulting consequences and were satisfied these scenarios were bounded by those captured from the safety analysis in the hazard assessment. Furthermore, they asserted that existing emergency arrangements accommodated response to nuclear emergencies initiated by security-related events.

EMO and NBEMO confirmed that their provincial plans account for dealing with off-site radiological consequences arising from security-initiated events.

2019 EPREV Mission Suggestion 1.
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.
Basis: 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;”
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.

Changes since the 2019 EPREV Mission

PLNGS Technical Planning Basis was updated in 2021 to incorporate the Generic Criteria and Operational Intervention Levels recommended by Health Canada, resulting in changes to emergency planning zones in New Brunswick. The Point Lepreau Nuclear Off-site Emergency Plan was updated accordingly to account for these zone changes and the resulting impacts on protective action arrangements. The Federal Nuclear Emergency Plan (FNEP) New Brunswick Annex will be updated in 2023 to reflect the changes to the Point Lepreau Nuclear Off-site Emergency Plan.

Status of the finding

Suggestion 1. is closed on the basis of completed actions.

2023 follow-up mission observation

New Brunswick's hazard assessment adopts an all-hazard approach. 30 hazards were identified, and for each of them, a risk assessment score has been determined. For a given hazard, if the associated risk assessment scoring is above a certain threshold, then this hazard requires a specific emergency plan. On that basis, and out of the 30 hazards identified, 8 hazards require a specific emergency plan, which led to the development of a specific emergency plan for Point Lepreau Nuclear Generating Station (PLNGS). Low probability events are considered in the New Brunswick Emergency Measures Plan (all-hazards plan).

The hazard assessment for Point Lepreau NGS considers both external and internal hazards. Multi-unit accident scenarios are not considered as Point Lepreau NGS has only one reactor unit. Nevertheless, the hazard assessment considers concurrent hazards initiating a nuclear or radiological emergency.

In 2021, the Point Lepreau Nuclear Off-Site Emergency Plan was updated, including incorporating the Heath Canada Generic Criteria and Operational Intervention Levels, which impacted the sizes of the respective emergency planning zones. NBEMO highlighted that there is a low population density around the Point Lepreau NGS.

Health Canada clarified that, given the latest update of the Point Lepreau Nuclear Off-Site Emergency Plan, the changes in emergency planning zones will be reflected in the next revision of the New Brunswick Annex to the FNEP.

The New Brunswick all-hazard risk assessment was updated in December 2022 and served as a training exercise for recently onboarded staff; no major changes were introduced in the revision.

Climate change is a hazard that is being considered by the Point Lepreau NGS, including impacts such as increased water temperatures, changing water levels, storm surges and wind events which can have an impact on station operations.

2.4. Protection strategy for a nuclear or radiological emergency

2019 EPREV Mission Recommendation 2.
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.
Basis: 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."
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 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.

Changes since the 2019 EPREV Mission

Federal:

Health Canada conducted a review of IAEA EPR-Protection Strategy (2020), *Considerations in the Development of a Protection Strategy for a Nuclear or Radiological Emergency*, to gain insight into how best to implement Requirement 5 of GSR Part 7. This was reviewed in light of the existing Health Canada document *Generic Criteria and Operational Intervention Levels for Nuclear Emergency Planning and Response*, so that areas for improvement could be identified. With regards to including provisions for justification and optimization of the individual protective actions and the overall strategy, Appendix I, Appendix III, Chapter 5, and Annex II of the abovementioned IAEA EPR-Protection Strategy document have been identified as being especially useful for selecting appropriate reference levels and generic criteria, identifying strengths and weaknesses of protective actions, and applying overall justification and optimization considerations. Health Canada additionally reviewed GSR Part 7 Appendix II and plans to adopt additional generic criteria as appropriate during its planned revision of *Generic Criteria and Operational Intervention Levels for Nuclear Emergency Planning and Response* in 2023.

Health Canada also engaged Canadian Nuclear Laboratories (CNL) to validate that the IAEA Operational Intervention Levels (OILs) for light-water reactors are appropriate for Canada Deuterium Uranium (CANDU) reactors. It was found that the IAEA-recommended OILs for light water reactors are generally appropriate for CANDU reactors as well.

In addition, Health Canada is collaborating with federal and provincial partners (Ontario and New Brunswick) to update and expand the federal guidance document *Generic Criteria and Operational Intervention Levels for Nuclear Emergency Planning and Response*, with public consultation planned for the Fall of 2023 and publication planned for early 2024.

In order to take into account non-radiological impacts of the emergency, and in support of the development of provisions for justification and optimization of protection strategies, Health Canada, in collaboration with the CNSC, Natural Resources Canada, Department of National Defence, and Public Safety Canada, conducted a research study from July 2020 to March 2022 to quantify the psychosocial impacts resulting from nuclear emergencies and the implementation of certain protective actions. The study was completed in March 2022 and led to the development of a proof-of-concept tool to compare the radiological and non-radiological impacts when evacuating a population.

New Brunswick:

The Point Lepreau Nuclear Off-Site Emergency Plan was updated in 2021. It describes the requirement for justification and optimization of protective actions, and of the overall protection strategy.

Ontario:

EMO has initiated a revision of the Provincial Emergency Operations Centre (PEOC) procedures for protective action decision-making, which will include the development of protective action decision-making tools and guidance for the early and intermediate response phase.

Status of the finding

Recommendation 2. is closed on the basis of progress made and confidence in effective completion.

2023 follow-up mission observation

Following the 2019 EPREV mission, Health Canada decided to adopt the IAEA reference levels as provided in GSR Part 3, generic criteria as provided in GSR Part 7, as well as all OILs as provided in IAEA technical guidance (except for OIL 8 that is to be used to identify individuals warranting registration and medical follow-up due to the intake of radioiodine). A research study undertaken through the Federal Nuclear Science and Technology (FNST) initiative confirmed that the OIL 7 value (used to confirm and adjust initial restrictions on food, milk and drinking water) suggested by the IAEA for light water reactors could be applied to CANDU reactors.

These changes will be reflected in a 2023 revision to Health Canada document *Generic Criteria and Operational Intervention Levels for Nuclear Emergency Planning and Response* which will be published in 2024 following a public consultation. Both Ontario and New Brunswick will adopt the guidance in this revised document. New Brunswick will adopt the changes as soon as they are available, and Ontario will adopt them as part of the project initiated in 2023 to enhance the PEOC procedures for protective action decision-making which will be completed in 2025.

Emergency Action Levels (EALs) have been in place at all NPPs in Canada for many years, and they are updated as needed to take into consideration NPP upgrades or revised guidance. Utilities confirmed that EALs are consistent among Canadian utilities but vary slightly due to specific on-site features. Any revisions implemented by NPPs are reflected in their on-site emergency plans and subject to CNSC regulatory review. Once the Health Canada document *Generic Criteria and Operational Intervention Levels for Nuclear Emergency Planning and*

Response is published, utilities will review the revised generic criteria and OILs and make any changes to EALs as necessary.

3. ACTIONS RELATED TO THE FINDINGS ON FUNCTIONAL REQUIREMENTS

3.1. Managing operations in an emergency response

2019 EPREV Mission 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: 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: The government should consider revising arrangements for nuclear or radiological emergencies initiated by nuclear security events, including conducting exercises to test the arrangements.

Changes since the 2019 EPREV Mission

Federal:

The CNSC and other Federal Government organizations:

- clarified the GSR Part 7 expectations for the safety-security interface, as they relate to the hazard assessment;
- considered the on-site security threat assessments (DBT) and communicated to off-site authorities that the DBT does not lead to off-site impacts; and
- participated in exercises to test existing safety-security interface arrangements.

New Brunswick:

In New Brunswick, regular updates to the PLNGS Security and Emergency Contingency Plans and the Point Lepreau Nuclear Off-Site Emergency Plan were conducted to ensure alignment on security classification and notification procedures.

In addition, New Brunswick Power hosted the full-scale nuclear emergency exercise "Synergy Challenge" in October 2021. This exercise tested a nuclear emergency event initiated by, and coincident with, a nuclear cyber security event to test arrangements for the safety-security interface. Synergy Challenge 2021 provided an opportunity to test the plans and procedures that are in place to address the safety-security interface.

Status of the finding

Suggestion 2. is closed on the basis of completed actions.

2023 follow-up mission observation

Across the federal and provincial organizations and operating organizations there was an acknowledgement of the cyber security and physical security environment becoming more important to be considered in EPR and for nuclear or radiological emergencies initiated by nuclear security events to be recognised and included in a broader exercise programme.

It was noted that, due to the sensitive nature of certain security elements, not all relevant detail could be provided in the ARM, but robust discussion assured the required detail was being considered in the planning basis and adequately tested as part of the exercise programme.

The CNSC, through the licensing process, requires compliance with its regulatory document REGDOC-2.10.1, *Nuclear Emergency Preparedness and Response*, whereby a licensee must develop and implement a drill and exercise programme that tests all elements of that programme over a 5-year period with a full-scale exercise being held once every 3 years. There already exists a broad range of exercises being conducted at the operator, municipal, provincial and federal levels.

The 2-day Exercise Synergy Challenge 2021 was identified in the ARM as a recent example of an emergency exercise scenario initiated by a nuclear security event. This exercise included a Site Area Emergency on the second day with evaluation of radiological consequences. The exercise planning allowed the various groups and stakeholders to come together and improve their understanding of roles and responsibilities under these unique circumstances and enhance various elements of the emergency preparedness arrangements through the process of planning and executing the exercise. Other exercises such as Exercise Unified Command at Darlington NGS and GridEx exercises were also highlighted as further evidence.

Building upon the exercise conduct, it was noted that stakeholders at all levels demonstrate a commitment to continuous improvement through the after-action review process to capture observations and lessons identified. The sharing of these lessons is facilitated through formal mechanisms such as the various governance committees, including the Director General Emergency Management Committee (DG EMC) and the Federal, Provincial and Territorial (FPT) Nuclear Emergency Management Committee, but also informally through working groups and other stakeholder engagement activities.

Overall, security is increasingly considered in the exercise programme at all levels with respect to EPC I nuclear facilities and the lessons learned are shared, used to improve the EPR arrangements and to inform the ongoing exercise programme.

3.2. Identifying and notifying a nuclear or radiological emergency and activating an emergency response

There were no findings in this area in the 2019 EPREV mission.

3.3. Taking mitigatory actions

There were no findings in this area in the 2019 EPREV mission.

3.4. Taking urgent protective actions and other response actions

There was a good practice, but no recommendations or suggestions, made in this area in the 2019 EPREV mission.

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

There was a good practice, but no recommendations or suggestions, made in this area in the 2019 EPREV mission.

3.6. Protecting emergency workers and helpers in an emergency

2019 EPREV Mission Recommendation 3.
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.
Basis: 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."
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

Changes since the 2019 EPREV Mission

Federal:

Following the June 2019 EPREV Mission to Canada, Health Canada undertook a review of its guidance values for emergency workers and helpers to ensure consistency with GSR Part 7. Health Canada identified that a guidance level is incorrectly indicated as a generic criterion in the current Canadian guidelines for emergency workers.

New Brunswick:

The 2021 Point Lepreau Nuclear Off-Site Emergency Plan includes updated guidance value for restricting exposure for emergency workers and helpers in New Brunswick, including permissible emergency response activities and updated definitions in line with Canadian Standards Association (CSA) Standard N1600, *General requirements for nuclear emergency management programs,* and IAEA Safety Standards.

Ontario:

Ontario has initiated a review of the Provincial Nuclear Emergency Response Plan (PNERP) which is to be revised in 2024, as well as enhancements to the Nuclear Emergency Management Program (NEMP) which is expected to be completed in 2025.

Status of the finding

Recommendation 3. is closed on the basis of progress made and confidence in effective completion.

2023 follow-up mission observation

The federal and provincial organizations distinguish 3 types of emergency workers and helpers:

- on-site emergency workers who are requested by a licensee to participate in the control of an emergency, and for whom specific individual protection arrangements are required;
- off-site emergency workers who are recognised as such in the preparedness phase; and
- helpers who are registered as such by off-site emergency response organizations in the emergency response phase.

Overall, Ontario and New Brunswick both adopt IAEA definitions for "emergency worker" and "helper". In addition, they both provided assurance that helpers are not permitted to receive effective doses in excess of 50 mSv. New Brunswick's Point Lepreau Nuclear Off-site Emergency Plan is up to date; Ontario's PNERP will be revised in 2023/2024. Health Canada indicated that the 2024 revision of *Generic Criteria and Operational Intervention Levels for Nuclear Emergency Planning and Response* will include a guidance value for restricting exposure for helpers in an emergency to 50 mSv (effective dose).

3.7. Managing the medical response in a nuclear or radiological emergency

2019 EPREV Mission Suggestion 3.
Observation: Ontario has not designated medical personnel trained in the management of radiation injuries.
Basis: 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.

Changes since the 2019 EPREV Mission

Ontario:

Ontario has designated treatment hospitals for radiological casualties from nuclear facilities. Training for medical personnel to treat radiation injuries is provided via Health Canada's Medical Emergency Treatment for Exposures to Radiation (METER) course. METER is Canada's standardized training for enhancing practices and knowledge in the medical community related to radiation exposure. Ontario also provides training related to treatment of radiation injuries through the province's Emergency Medical Assistance Team (EMAT), when requested by hospitals or paramedic services.

Status of the finding

Suggestion 3. is closed on the basis that it is no longer relevant.

2023 follow-up mission observation

Ontario was able to clarify the details of the EMAT training course which provides a 3-4 day "Operations" and "Specialist" course based on the province's previous Chemical, Biological, Radiological, Nuclear, Explosive (CBRNE) programme. The course includes Personal Protective Equipment (PPE) and their levels of protection and limitations, practical application of detection equipment, as well as wet and dry decontamination techniques on both ambulatory and non-ambulatory patients.

Health Canada also provided details on the 2 components of the METER training course that is offered to the provincial health departments and other partners nationally. This course has an online component that covers radiation basics and can be self-enrolled and accessed through a central government website with content on radiation awareness, health effects and forms the basis of the first day of an in-person training course. The second day provides practical exercises including radiation detection equipment familiarisation and treatment of a simulated contaminated casualty. The online module alone is not designed to deliver the full competencies of the METER course.

A list of dates where the EMAT or METER training courses had been delivered in Ontario was provided and demonstrates where staff that work at the designated hospitals were able to receive the relevant training. These staff are then considered to have been designated as being trained in the clinical management of radiation injuries.

At each of the designated hospitals, specialists trained in the clinical management of radiation injuries are on staff, and if the relevant specialists are not on shift at the time of an emergency, then the hospital paging and recall mechanism would promptly recall them to duty. In addition, the utility has a designated health physicist on-call to support the designated hospital. This is in addition to the on-site health physics staff.

The review team's interview clarified that all the arrangements described above were already in place at the time of the 2019 EPREV mission.

3.8. Communicating with the public throughout a nuclear or radiological emergency

There was a good practice, but no recommendations or suggestions, made in this area in the 2019 EPREV mission.

3.9. Taking early protective actions and other response actions

2019 EPREV Mission 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: 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."

2019 EPREV Mission Recommendation 4.
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.

Changes since the 2019 EPREV Mission

Federal:

A National Environmental Monitoring Strategy Working Group (NEMS WG) was established in December 2020. The NEMS WG reports to the FPT Nuclear Emergency Management Committee (FPT NEMC), and its core members include Health Canada, NBEMO, New Brunswick Power, Nova Scotia Emergency Management Office, Department of National Defence, Natural Resources Canada, EMO, Ontario Power Generation, Bruce Power Limited and Canadian Nuclear Laboratories.

From April 2021 to April 2022, the NEMS WG, in collaboration with industry partners, developed a *National Environmental Monitoring Strategy Guidance Document for Radiological/Nuclear Situations* and a Monitoring Strategy Tool (MST) to assist decision makers in developing an environmental monitoring strategy and prioritizing monitoring resources. The National Environmental Monitoring Strategy Guidance document and the MST allow the organizations to optimise their planned response considering the resources available and the specificity of the emergency. The guidance document and tool help the organizations to better link their plans with their concept of operations by establishing an Environmental Monitoring Strategy Action Plan that provides answers to the questions: who, what, when, what and why. The document and its tool support the prioritization of the monitoring activities based on the characteristics of the emergency, the monitoring objectives, and the resources available (capabilities, capacities and timeframe).

New Brunswick:

New Brunswick has already agreed on adopting the National Environmental Monitoring Strategy guidance and MST once approved to inform their provincial environmental monitoring strategy.

Ontario:

As part of Ontario's enhancements to the Nuclear Emergency Management Program (NEMP), the province has initiated the development of a Survey and Sampling Strategy for Ontario.

Status of the finding

Recommendation 4. is closed on the basis of progress made and confidence in effective completion.

2023 follow-up mission observation

The NEMS WG brought together representatives from organizations that had responsibility for undertaking environmental monitoring in the event of a nuclear or radiological emergency. The Working Group had been successful in its preparation of the *National Emergency Monitoring Strategy Guidance for Radiological/Nuclear Situations*, which provides advice on the

development of monitoring strategies. The guidance provides a useful, practical summary of the types of modelling and radiological monitoring techniques that will provide information to inform decisions on both urgent and early protective actions.

An MST was introduced, which allows the identification of environmental monitoring strategies which maximize the effectiveness of the monitoring organizations' capabilities and capacities for the pre-release phase, release phase and post-release phase, while minimizing the impact on the local population, the environment, and infrastructure. The principal organizations that provide monitoring capability to support the provinces have completed a capabilities and capacities questionnaire which has been used to populate the tool and allow prompt identification of monitoring strategies based on the prevailing conditions. The review team noted that not all stakeholders have responded to the questionnaires yet. The MST would benefit from the completion of these questionnaires to maximise its effectiveness. It can be used as a tool for preparedness (supporting the development of planning bases and exercises) or for defining a strategy during a response. The MST will be approved for use in an emergency in the near future.

The provincial emergency management organizations are responsible for the development of monitoring strategies, the analysis of the information that the monitoring activities provide, and decisions on associated protective actions. NBEMO provided a summary of its training programme, which includes training on the MST in 2023, and the tool and the guidance will be used to improve preparedness thereafter. Ontario will be developing a Survey and Sampling Strategy as a part of the NEMP project and will look to incorporate elements from the NEMS Guidance Document and MST into the Ontario strategy, with a completion date in 2025.

2023 Follow-up Mission Good Practice 1.
Observation: Health Canada has engaged effectively with counterparts to develop its *National Environmental Monitoring Strategy Guidance for Radiological/Nuclear Situations*. This involved capturing the capabilities and capacities of the various organizations that would support the response to a range of nuclear or radiological emergencies.
Basis: 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."
Good Practice: Health Canada has prepared a tool which facilitates the development of a monitoring strategy during preparedness and response that can be adapted to a range of circumstances with the aim of making the most effective and efficient use of available monitoring resources.

3.10. Managing radioactive waste in a nuclear or radiological emergency

2019 EPREV Mission 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: 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

2019 EPREV Mission Recommendation 5.
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.

Changes since the 2019 EPREV Mission

Federal:

Health Canada, with contributions from the CNSC, Natural Resources Canada, Public Safety Canada and the Department of National Defence, published the *Guidance on Planning for Recovery Following a Nuclear or Radiological Emergency* in December 2020. This document provides guidance for the planning and execution of off-site recovery operations following a nuclear or radiological emergency and provides recommendations on best practices for recovery operations including the characterization, classification and management of off-site radioactive waste arising from nuclear emergencies. This guidance document is intended to be the starting point for developing and documenting roles, responsibilities and arrangements for recovery activities, including waste management.

In addition, a radioactive waste working group (RWWG) was established in 2021. It reports to the FPT NEMC. The Working Group received the mandate to review the current roles and responsibilities for managing radioactive waste generated from a nuclear emergency at Emergency Preparedness Category (EPC) I nuclear facilities. From this mandate, the RWWG established a work plan and identified actions to address the EPREV mission findings, including:

- Conduct/revisit national and international benchmarking on post-emergency off-site radioactive waste management. The benchmarking report was completed in June 2022 and collates domestic and international guidance from available resources.
- Document and identify existing roles, responsibilities, arrangements, policies, and regulations of governments at the Provincial and Federal levels, as well as nuclear facility operators, for the safe management of off-site radioactive waste arising from a nuclear or radiological emergency.

The modernized Federal Policy for Radioactive Waste Management and Decommissioning (Policy) was released on 31 March 2023. Canada’s Policy applies to all radioactive waste, including those created during a nuclear emergency.

Health Canada hosted a national recovery workshop in January 2023, with participation from federal, provincial, and municipal nuclear emergency management stakeholders, as well as industry partners. The workshop familiarized participants with the key recovery elements described in Health Canada’s recovery guidance document and other international guidance, and advanced efforts to identify roles, responsibilities, and expertise among Canadian organizations for post-termination/recovery activities, including waste management.

Status of the finding

Recommendation 5. is closed on the basis of progress made and confidence in effective completion.

2023 follow-up mission observation

The FPT RWWG produced a report on the national and international benchmarking on post-emergency off-site radioactive waste management. Canada suggested that this study would help inform the development of New Brunswick's and Ontario's off-site recovery plans in the coming years. The Working Group also produced a report entitled *Consolidated Roles and Responsibilities for Off-Site Management of Radioactive Waste Arising from a Category 1 Nuclear or Radiological Emergency*. By reference to this document, the review team clarified that the nuclear power plant operators are ultimately responsible for the radioactive waste that would be generated on- and off-site following a nuclear or radiological emergency at their facilities. The CNSC would regulate the management of all radioactive waste, whilst decisions on waste management would be coordinated by EMO and NBEMO, as appropriate.

The review team acknowledged Health Canada's *Guidance on Planning for Recovery Following a Nuclear or Radiological Emergency*, which included information on the characterization, classification and management of off-site radioactive waste arising from nuclear emergencies. This guidance document is intended to be the starting point for developing and documenting roles, responsibilities and arrangements for recovery activities, including waste management. Ontario will be using the guidance document as the basis for developing its own recovery plan, which will begin development in 2024.

3.11. Mitigating non-radiological consequences of a nuclear or radiological emergency and of an emergency response

There were no findings in this area in the 2019 EPREV mission.

3.12. Requesting, providing and receiving international assistance for EPR

There were no findings in this area in the 2019 EPREV mission.

3.13. Terminating a nuclear or radiological emergency

2019 EPREV Mission 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: 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.

Changes since the 2019 EPREV Mission

Federal:

Health Canada and the CNSC hosted an IAEA Regional Workshop on Arrangements for the Termination of a Nuclear or Radiological Emergency in January 2020. This workshop

introduced participants from federal, provincial and municipal organizations to the arrangements contained in IAEA safety standards No. GSG-11 through a series of lectures and working sessions based on several case studies of past nuclear and radiological emergencies.

Health Canada, with contributions from the CNSC, Natural Resources Canada, Public Safety Canada and the Department of National Defence, published the *Guidance on Planning for Recovery Following a Nuclear or Radiological Emergency* in December 2020. This document provides guidance for the planning and execution of off-site recovery operations following a nuclear or radiological emergency.

In addition, Health Canada hosted a national recovery workshop in January 2023, with participation from federal, provincial, and municipal nuclear emergency management stakeholders, as well as industry partners and international organizations (IAEA, Organisation for Economic Co-operation and Development (OECD) Nuclear Energy Agency, United States Environmental Protection Agency, United Kingdom Department for Business, Energy, and Industrial Strategy). This workshop built upon the outcomes of the IAEA Regional Workshop on Arrangements for the Termination of a Nuclear or Radiological Emergency, hosted by Canada in January 2020.

Moreover, Public Safety Canada developed a position paper in 2022 on roles and responsibilities for termination and transition to recovery for nuclear emergencies, based on a review of existing federal and provincial emergency plans and documents. The position paper states that while provinces/territories and municipalities have the legislated authority to declare and terminate emergencies within their jurisdictions, the response to a national-scale nuclear event is a shared responsibility; no single government body has authority over other levels of government for termination and the transition to recovery.

Public Safety Canada's Government Operations Centre has developed generic termination criteria (GOC CONOPS) that align with the Federal Emergency Response Plan (FERP) and apply specifically to GOC emergency management activities. Specific termination criteria have also been developed to characterize the specificity of terminating a nuclear emergency response and the transition to recovery at the Federal Level.

Status of the finding

Recommendation 6. is closed on the basis of progress made and confidence in effective completion.

2023 follow-up mission observation

Canada established its criteria for transitioning from an emergency exposure situation to an existing exposure situation in Health Canada's *Guidance on Planning for Recovery Following a Nuclear or Radiological Emergency*.

Public Safety Canada prepared a position paper on roles and responsibilities for termination and transition to recovery for nuclear emergencies. The review team discussed this document with NBEMO and EMO and addressed the question of who has the authority to declare the termination of an off-site nuclear or radiological emergency. The interview clarified that those decisions on the termination of a nuclear or radiological emergency rest solely with the provinces: the Commander of the PEOC for Ontario, and the Director of NBEMO for New

Brunswick. The review team also noted that the PNERP would benefit from enhanced clarity on this point when it is revised in 2023/2024.

The above-mentioned declarations are distinct from the declaration of an emergency under an act, this brings with it certain additional powers or authorities and these are generally time limited to deal with an unusual or significant event.

From a federal perspective, the FNEP suggests that a Deputy Minister (DM) or Assistant Deputy Minister (ADM) Emergency Management Committee, in consultation with the Privy Council Office, would approve the transition to recovery and termination of the emergency. Health Canada recognised that this text is out of date and would be addressed in the update of the FNEP. Health Canada also confirmed that the authority to terminate a nuclear or radiological emergency rests with the provinces. The review team emphasised that, to avoid public confusion, there should be a distinction between the termination of each organization's emergency response and the termination of the emergency.

The review team noted the positive findings of Canada's *National Workshop on Recovery Planning for a Nuclear or Radiological Emergency*, which took place in January 2023. A draft of the report of the workshop was provided and it clearly explored a range of issues that will help Canada to refine its arrangements on the transition to recovery. Health Canada provided assurance that this learning had been captured and would be used to inform future guidance and emergency plans.

2023 Follow-up Mission Good Practice 2.
Observation: Canada has engaged effectively with all of the emergency response stakeholders through a National Recovery Workshop to identify the roles and responsibilities for the governance and management of recovery arrangements following a nuclear or radiological emergency. In the Canadian context, where emergency management is a shared responsibility between operators, municipal, provincial and federal governments, this workshop highlighted the approach to establish a Recovery Management Organization to coordinate the recovery management. This approach has been documented in the *Guidance on Planning for Recovery in a Nuclear or Radiological Emergency* published by Health Canada in response to Recommendation 6 from the 2019 EPREV mission. Additionally, the creation of the Recovery Management Organization has been included in the new revision of the 2023 NB Point Lepreau nuclear off-site emergency plan and as a functional area in Ontario's NEMP enhancement project to be concluded in 2025.
Basis: 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. The arrangements shall take into account that the termination of an emergency might be at different times in different geographical areas. The planning process shall include as appropriate: (a) The roles and functions of organizations; (b) Methods of transferring information; (c) Means for assessing radiological consequences and non-radiological consequences; […] (e) A review of the hazard assessment and of the emergency arrangements; […] (g) Arrangements for continued communication with the public, and for monitoring of public opinion and the reaction in the news media; (h) Arrangements for consultation of interested parties."
Good Practice: Health Canada has published a guidance document and organized a National Recovery Workshop with national and international partners. Together, the workshop and guidance document create a framework for recovery planning and governance in a complex

2023 Follow-up Mission Good Practice 2.
jurisdictional setting, with a focus on the establishment of a Recovery Management Organization.

3.14. Analysing the nuclear or radiological emergency and the emergency response

There were no findings in this area in the 2019 EPREV mission.

4. ACTIONS RELATED TO THE FINDINGS REQUIREMENTS FOR INFRASTRUCTURE

4.1. Authorities for EPR

2019 EPREV Mission Suggestion 4.
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.
Basis: 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: 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.

Changes since the 2019 EPREV Mission

Federal:

Public Safety Canada has undertaken a modernization of the federal emergency response doctrine through various emergency management instruments, including the FERP. The FERP renewal process is supported by a multi-departmental working group focused on addressing systemic gaps in federal emergency response structures, especially for complex, multi-institutional events. The recent creation of a Minister of Emergency Preparedness has reinforced the importance of this work, and FERP renewal is now situated in a broader process of Emergency Management transformation, including a planned review of federal policies, authorities and capabilities. Concurrently, Health Canada has initiated the update of the FNEP to reflect changes in governance, recently published Canadian guidance in nuclear emergency management (e.g., *Guidance on planning for recovery following a nuclear or radiological emergency*), as well as lessons learned from exercises and real events. An initial draft is expected to be completed by Spring 2024.

The Public Health Agency of Canada (PHAC) has completed the review and update of the *Health Portfolio Emergency Response Plan* (HPERP), which describes the Health Portfolio (Health Canada and PHAC) response to all-hazards emergencies with public health consequences, in support of Provincial/Territorial authorities.

Status of the finding

Suggestion 4. is closed on the basis of progress made and confidence in effective completion.

2023 follow-up mission observation

The review team noted that Canada's federal level continued the initiative to review the governance with the aim to ensure that clear, unambiguous roles and governance exist and are clearly communicated to partners.

Canada's governance system for emergency preparedness and response is complex. The decision-making rests with the provincial authorities. Numerous federal agencies cooperate to

support the province affected in an emergency via two mechanisms: (i) pre-defined arrangements in provincial Annexes to the FNEP, or (ii) based on their request for assistance. The review team noted that there is currently an update of the FERP in progress which will clarify and harmonize the terms used, without any changes in the governance. After finalization of the FERP, the FNEP will also be revised.

At the provincial level:

- In New Brunswick, the PLNGS Nuclear Off-Site Emergency Plan is updated every second year and will consider any changes to nuclear emergency planning in New Brunswick resulting from the FNEP update;
- In Ontario, the PNERP follows a review programme based on a 5-year cycle. The future revision of the FNEP will be reflected in the subsequent revision of the PNERP.

4.2. Organization and staffing for EPR

2019 EPREV Mission Suggestion 5.
Observation: There is only limited documentation of minimum staffing and resource levels or training requirements for emergency response positions.
Basis: 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.

Changes since the 2019 EPREV Mission

Federal:

Public Safety Canada is leading a multi-departmental initiative labelled "Federal Emergency Management Modernization Project", with the objective of establishing an integrated, whole-of-government approach to federal emergency management practices. This is a long-term initiative being addressed with a phased approach including reinforcing federal workforce capacity and capability and improved information management technology. There are currently a number of working groups that are meeting regularly to address various programme areas, including harmonized training programs and standardized competencies, as well as developing mechanisms to enable whole-of-government surge capacity to manage large, long-duration emergencies.

Additionally, a number of specific resource and capabilities analyses have been conducted since 2019. For instance, Public Safety Canada's GOC commissioned a project to analyse Incident Command Structures (ICS) in federal Emergency Operations Centres (EOCs). Specifically, the project focused on the training, technology, and operational structure of federal level emergency response. This project was completed and the report was published in 2022 and shared with federal and provincial partners.

Health Canada partnered with CNL to initiate a resource and capabilities assessment project. The goal of the project was to determine whether sufficient resources and capabilities exist to

ensure that Canada is prepared to respond to a nuclear emergency. The first phase of a staffing adequacy assessment involving feedback from subject matter experts was completed for the Federal Nuclear Emergency Plan Technical Assessment Group (FNEP TAG), NBEMO and the Health Portfolio Operations Centre (HPOC).

CNL also conducted a separate EOC resource analysis project for the CNSC, with interviews held in October 2020. The results from these interviews were considered as part of the CNL resource analysis project described above.

In 2022, Health Canada submitted a funding request as part of the Government of Canada's Budget 2022 cycle to address resource constraints impacting the delivery of Federal Nuclear Emergency Plan (FNEP) programmes carried out by Health Canada's Radiation Protection Bureau. Funding for Strengthening Nuclear Emergency Preparedness was approved as part of the Government's Fall Economic Statement in November 2022.

As part of efforts to address training qualifications for nuclear emergency preparedness and response organizations, Health Canada developed a FNEP training programme and course catalogue in 2020.

New Brunswick:

NBEMO has initiated an organizational review, including a capacity and capability analysis, with an expected completion date of February 2025.

Status of the finding

Suggestion 5. is closed on the basis of progress made and confidence in effective completion.

2023 follow-up mission observation

At the federal level, a common training curriculum is being developed with the aim to increase the interoperability of emergency responders across organizations.

One of the main improvements introduced at the FNEP TAG level is the development and implementation of a competency matrix and training programme, which is used to identify responders with the necessary skills to serve in the FNEP TAG.

Public Health Agency of Canada (PHAC) has made basic training on Incident Management Structure (IMS) and emergency management competencies mandatory for all staff to enable surge capacity and assistance in an emergency requiring a Health Portfolio response, including emergency situations under the FNEP. This was implemented as a lesson learned from the response to COVID-19 pandemic.

New Brunswick provided information on the established minimum level of staffing, based on its 3 levels of activation. For each 3 levels, New Brunswick can confidently staff the first 3 shifts of 8 hours; however, the availability of staff and training requirements would complicate the staffing effort on the longer term. Since 2019, NBEMO has established new key positions within the emergency response organization.

Ontario has provided information regarding minimum staffing to support the four levels of PEOC Operation (i.e., routine monitoring, enhanced monitoring, partial activation and full

activation), to support a nuclear emergency response. Furthermore, Ontario will conduct a Mission Function Task Analysis (MFTA) as part of a human resources and organizational structure review process, in the enhancement project of the nuclear emergency management program. In addition, EMO highlighted that their number of staff has increased by 150% since August 2022.

4.3. Coordination of EPR

There were no findings in this area in the 2019 EPREV mission.

4.4. Plans and procedures for emergency response

There were no findings in this area in the 2019 EPREV mission.

4.5. Logistical support and facilities for emergency response

There were no findings in this area in the 2019 EPREV mission.

4.6. Training, drills and exercises for EPR

2019 EPREV Mission Suggestion 6.
Observation: There has been limited and inconsistent participation of senior officials with responsibilities for strategic decision making in drills and exercises.
Basis: 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.

Changes since the 2019 EPREV Mission

In 2021, New Brunswick Power hosted Exercise Synergy Challenge 2021, which was the first full-scale priority exercise in accordance with the FPT nuclear and radiological exercise strategy. This exercise tested the response to a cyber security event at PLNGS, as well as a nuclear event at the plant, and involved all levels of government (regional, provincial, federal). Federal senior management participation in Synergy Challenge 2021 included a DG Emergency Response Committee and an ADM Crisis Cell to coordinate the whole-of-government off-site response. There was also fulsome participation from senior management at the provincial level during exercise Synergy Challenge 2021. Incorporating nuclear emergency exercises as part of the National Priority Exercise series was identified as a best practice to ensure participation from senior management in the FPT nuclear and radiological exercise strategy's full-scale priority exercises.

In New Brunswick, the provincial nuclear exercise and training programme framework and the provincial exercise strategy take into consideration the FPT NEMC exercise strategy calendar for the next 7±1 year cycle. This exercise strategy aims to align with the FPT NEMC nuclear

exercise strategy. Ontario has initiated the development of a nuclear-specific annex to the *Provincial Exercise Program*, as part of the NEMP. This annex will include recommendations for involving Senior Officials in nuclear exercises and a training programme designed to train and prepare emergency response positions at all levels.

Status of the finding

Suggestion 6. is closed on the basis of progress made and confidence in effective completion.

2023 follow-up mission observation

It was clarified by the review team that periodic government exercises at both the federal and provincial levels are, and will continue to be, conducted to evaluate major portions of emergency response capabilities. These periodic drills are conducted to develop and maintain key skills, and deficiencies identified as a result of exercises or drills are corrected.

Full-scale NPP exercises involving provincial senior officials are conducted, observed and evaluated in alignment with the requirements of REGDOC 2.10.1 at least once every three years. These exercises are designed to enable the senior government officials, as well as response organizations, to demonstrate the essential skills and capabilities necessary to adequately implement emergency response plans. These skills include, but are not limited to, response to factors involving the possibility of rapid event escalation, resource integration, and communication amongst and between emergency response organizations at the facility, provincial, and federal levels.

Furthermore, it was clarified by the review team that an adequate process was described to evaluate exercises and drills within the EPREV Canada self-assessment and a process is in place to track findings and associated corrective actions identified by drill and exercise evaluations, including their assignment and completion.

4.7. Quality management programme for EPR

There was a good practice, but no recommendations or suggestions, made in this area in the 2019 EPREV mission.

5. POLICY ISSUE: IMPLICATIONS OF THE PANDEMIC AND ASSOCIATED CHALLENGES ON ALL LEVELS OF EMERGENCY PREPAREDNESS AND RESPONSE

A policy discussion took place during the mission and provided an opportunity for the members of the EPREV follow-up mission team and staff of Canada's regulatory body and response organizations to discuss experiences, challenges, and lessons learned in the area of EPR arising from the COVID-19 pandemic to ensure that the impact of COVID-19 on EPR arrangements is properly managed.

Participants spoke about the response to COVID-19 while maintaining an appropriate level of preparedness for other emergencies, including nuclear or radiological emergencies. In Canada, all emergency response organizations were impacted by the COVID-19 pandemic; some more than others due to their respective mandates.

The discussions focussed on actions taken during, and lessons learned from, the response to COVID-19.

At the provincial level, authorities implemented various response actions, and noted that there were some challenges with compliance. As a result, they have initiated actions to enhance public education on risks and emergency response. Additionally, they will test making more effective use of social media, including confirming or denying information circulating in the public domain during an emergency.

At the federal level, several lessons learned from the response to Covid-19 were proactively considered and applied to preparedness for nuclear or radiological emergencies. Health Canada highlighted its initial work on how to balance the risk of radiation exposure for the public vs. evacuating and sheltering in closed facilities without proper social distance, should a nuclear emergency be concomitant with a pandemic.

Appendix I: EPREV Follow-Up Mission Team Composition

No.	Name	Position	Organization
1.	Mr Anthony ULSES	Team Leader	U.S. Nuclear Regulatory Commission, United States of America
2.	Mr Frederic STEPHANI	Team Coordinator	International Atomic Energy Agency
3.	Mr Scott MUSTON	Reviewer	Australian Radiation Protection and Nuclear Safety Agency, Australia
4.	Mr Petre MIN	Reviewer	National Commission for Nuclear Activities Control, Romania
5.	Mr Maxime KLEIN	Reviewer	Institute for Radiological Protection and Nuclear Safety, France
6.	Mr Grant INGHAM	Reviewer	Office for Nuclear Regulation, United Kingdom
7.	Mr Edward ROBINSON	Observer	U.S. Nuclear Regulatory Commission, United States of America

Appendix II: Mission Schedule

Time/Date	Monday 26 June	Key Organizations	Tuesday 27 June	Key Organizations	Wednesday 28 June	Key Organizations	Time/Date	Thursday 29 June	Key Organizations	Friday 30 June	Key Organizations
09:00 - 09:15	**Entrance Meeting**	**EPREV SC**	Medical Response - S3	EMO/MOH	Report Writing	EPREV team	09:00 - 09:15	Canada Report Review	EPREV SC EPREV PC		
09:15 - 09:30	Canada Opening Remarks EPREV Team Leader Remarks IAEA Team Coordinator	EPREV SC					09:15 - 09:30				
09:30 - 09:45							09:30 - 09:45			**Exit Meeting**	**EPREV SC**
09:45 - 10:00							09:45 - 10:00			Presentation on EPREV Findings (EPREV Team Leader) Closing Remarks from IAEA Closing Remarks from Canada	EPREV SC
10:00 - 10:15	*Break (15 min)*		*Break (15 min)*		*Break (15 min)*		10:00 - 10:15	*Break (15 min)*			
10:15 - 10:30	Overview Presentations by Federal/Provincial Partners	HC/CNSC/PS/NRCan/ NB EMO/EMO	Taking Early Protective Actions (monitoring strategy) - R4	HC/EMO/NB EMO	Report Writing	EPREV team	10:15 - 10:30	Draft Canada's Response	EPREV SC		
10:30 - 10:45							10:30 - 10:45				
10:45 - 11:00							10:45 - 11:00				
11:00 - 11:15			Managing Radioactive Waste - R5	NRCan/CNSC/HC/ NB EMO/EMO			11:00 - 11:15				
11:15 - 11:30							11:15 - 11:30				
11:30 - 11:45							11:30 - 11:45				
11:45 - 12:00							11:45 - 12:00				
12:00 - 12:15	*Lunch (1.0 hr)*		*Lunch (1.0 hr)*		*Lunch (1.0 hr)*		12:00 - 12:15	Submit Response	EPREV SC	*End of Mission*	
12:15 - 12:30							12:15 - 12:30	*Lunch (0.75 hr)*			
12:30 - 12:45							12:30 - 12:45				
12:45 - 13:00							12:45 - 13:00				
13:00 - 13:15	Hazard Assessment - S1	NB EMO/PLNGS	Terminating an Emergency - R6	PS/HC/EMO/ NB EMO	Report Writing	EPREV team	13:00 - 13:15	EPREV team reviews Canada's Response and Prepare Executive Summary	EPREV team		
13:15 - 13:30							13:15 - 13:30				
13:30 - 13:45							13:30 - 13:45				
13:45 - 14:00							13:45 - 14:00				
14:00 - 14:15	Hazard Assessment - R1	CNSC/NB EMO/PLNGS/ EMO	Authorities for Emergency Preparedness (federal governance) - S4	PS/HC/CNSC	Report Writing	EPREV team	14:00 - 14:15				
14:15 - 14:30							14:15 - 14:30				
14:30 - 14:45							14:30 - 14:45				
14:45 - 15:00							14:45 - 15:00				
15:00 - 15:15	*Break (15 min)*		*Break (15 min)*		*Break (15 min)*		15:00 - 15:15	*Break (15 min)*			
15:15 - 15:30	Managing Emergency Response Operations (nuclear security) - S2	CNSC/NB EMO/PLNGS/EMO	Organization and Staffing - S5	PS/HC/CNSC/EMO/ NB EMO	Report Writing	EPREV team	15:15 - 15:30	EPREV team/Canada meeting to Discuss Report	EPREV SC		
15:30 - 15:45							15:30 - 15:45				
15:45 - 16:00							15:45 - 16:00				
16:00 - 16:15							16:00 - 16:15				
16:15 - 16:30	Protection Strategy - R2	HC/EMO/NB EMO	Training, Drills and Exercises - S6	HC/EMO/NB EMO/CNSC			16:15 - 16:30	EPREV team/Canada Policy Discussion	EPREV SC		
16:30 - 16:45							16:30 - 16:45				
16:45 - 17:00							16:45 - 17:00				
17:00 - 17:15							17:00 - 17:15				
17:15 - 17:30	Protecting Emergency Workers and Helpers - R3	NB EMO/EMO	*End of day team meeting with National Coordinator*				17:15 - 17:30	*End of day*			
17:30 - 17:45							17:30 - 17:45				
17:45 - 18:00							17:45 - 18:00				
18:00 - 18:15					Submit Report to Canada	EPREV team	18:00 - 18:15				
18:15 - 18:30	*End of day team meeting with National Coordinator*						18:15 - 18:30				
							18:30 - 18:45				
							18:45 - 19:00				
							19:00 - 21:00	Dinner	EPREV team, EPREV SC (HC/CNSC/NRCan/PS/ GAC/EMO/NBEMO/ OPG)		

Appendix III: Attendees to EPREV Follow-Up Mission Meetings

No.	Name	Organization
1.	Mr Anthony ULSES	U.S. Nuclear Regulatory Commission, United States of America
2.	Mr Frederic STEPHANI	International Atomic Energy Agency
3.	Mr Scott MUSTON	Australian Radiation Protection and Nuclear Safety Agency, Australia
4.	Mr Petre MIN	National Commission for Nuclear Activities Control, Romania
5.	Mr Maxime KLEIN	Institute for Radiological Protection and Nuclear Safety, France
6.	Mr Grant INGHAM	Office for Nuclear Regulation, United Kingdom
7.	Mr Edward ROBINSON	U.S. Nuclear Regulatory Commission, United States of America
8.	Mr Peter ELDER	Canadian Nuclear Safety Commission
9.	Ms Pascale BOURASSA	Canadian Nuclear Safety Commission
10.	Mr Richard TENNANT	Canadian Nuclear Safety Commission
11.	Mr Ross OBUCHI	Canadian Nuclear Safety Commission
12.	Ms Shona THOMPSON	Canadian Nuclear Safety Commission
13.	Ms Courtney MACDONALD	Canadian Nuclear Safety Commission
14.	Ms Tanya KIDD	Canadian Nuclear Safety Commission
15.	Mr Matthew JONES	Health Canada
16.	Mr Tim SINGER	Health Canada
17.	Mr Brian AHIER	Health Canada
18.	Mr Keith HENDERSON	Health Canada
19.	Mr Dominique NSENGIYUMVA	Health Canada

No.	Name	Organization
20.	Mr Tristan BARR	Health Canada
21.	Ms Deepti BIJLANI	Health Canada
22.	Mr Peter WRIGHT	Health Canada
23.	Ms Debora QUAYLE	Health Canada
24.	Ms Laura CLOSE	Health Canada
25.	Mr Claude BOUCHARD	Health Canada
26.	Mr Eric PELLERIN	Health Canada
27.	Mr Jean François DUPPERRÉ	Public Safety Canada
28.	Mr Deryck TREHEARNE	Public Safety Canada
29.	Ms Jacqueline WILSON	Public Safety Canada
30.	Ms Pui Wai YUEN	Natural Resources Canada
31.	Ms Julie MECKE	Natural Resources Canada
32.	Ms Laura HIGGINS	Natural Resources Canada
33.	Mr Antoine DE LA CHEVROTIERE	Natural Resources Canada
34.	Ms Ronny GIURGIUS	Natural Resources Canada
35.	Ms Emma ANDERSON	Natural Resources Canada
36.	Mr Jamie FAIRCHILD	Natural Resources Canada
37.	Mr Randy REID	Emergency Management Ontario
38.	Mr Michael MUNRO	Emergency Management Ontario
39.	Ms Lisa PRIEST	Emergency Management Ontario
40.	Ms Lorie WHITCOMBE	Emergency Management Ontario

No.	Name	Organization
41.	Mr Devin DUNCAN	Emergency Management Ontario
42.	Mr Leonard CHU	Emergency Management Ontario
43.	Mr Tariq BUTT	Emergency Management Ontario
44.	Mr Ali ALAAWAD	Emergency Management Ontario
45.	Mr Andy OWEN	Ontario Power Generation
46.	Ms Parisa MAHDIAN	Ontario Power Generation
47.	Mr David DICKEY	Ontario Power Generation
48.	Mr Nick REICKER	New Brunswick Power
49.	Mr Roger SHEPARD	New Brunswick Emergency Measures Organization
50.	Mr Pete LUSSIER	New Brunswick Emergency Measures Organization
51.	Mr Walter LAUGHLIN	New Brunswick Emergency Measures Organization
52.	Ms Carolin GALVIN	New Brunswick Health
53.	Mr Mike CORREY	New Brunswick Environment

References

[1] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL CIVIL AVIATION ORGANIZATION, INTERNATIONAL LABOUR ORGANIZATION, INTERNATIONAL MARITIME ORGANIZATION, INTERPOL, OECD NUCLEAR ENERGY AGENCY, PAN AMERICAN HEALTH ORGANIZATION, PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION, UNITED NATIONS ENVIRONMENT PROGRAMME, UNITED NATIONS OFFICE FOR THE CO¬ORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION, WORLD METEOROLOGICAL ORGANIZATION, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR Part 7, IAEA, Vienna (2015).

[2] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR OFFICE, PAN AMERICAN HEALTH ORGANIZATION, WORLD HEALTH ORGANIZATION, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSG-2, IAEA, Vienna (2011).

[3] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL LABOUR OFFICE, PAN AMERICAN HEALTH ORGANIZATION, UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION, Arrangements for Preparedness for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GS-G-2.1, IAEA, Vienna (2007).

[4] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL CIVIL AVIATION ORGANIZATION, INTERNATIONAL LABOUR OFFICE, INTERNATIONAL MARITIME PORGANIZATION, INTERPOL, OECD NUCLEAR ENERGY AGENCY, UNITED NATIONS OFFICE FOR THE COORDINATION OF HUMANITARIAN AFFAIRS, WORLD HEALTH ORGANIZATION, WORLD METEOROLOGICAL ORGANIZATION, Arrangements for the Termination of a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSG-11, IAEA, Vienna (2018).

[5] FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, INTERNATIONAL ATOMIC ENERGY AGENCY, INTERNATIONAL CIVIL AVIATION ORGANIZATION, INTERPOL, PREPARATORY COMMISSION FOR THE COMPREHENSIVE NUCLEAR-TEST-BAN TREATY ORGANIZATION AND UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, Arrangements for Public Communication in Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSG-14, IAEA, Vienna (2020).

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Preparedness and Response for a Nuclear or Radiological Emergency Involving the Transport of Radioactive Material, IAEA Safety Standards Series No. SSG-65, IAEA, Vienna (2022).

Acronyms

ADM	Assistant Deputy Minister
ARM	Advance Reference Material
CANDU	Canada Deuterium Uranium (reactor)
CBRNE	Chemical, Biological, Radiological, Nuclear, Explosive
CNL	Canadian Nuclear Laboratories
CNSC	Canadian Nuclear Safety Commission
CSA	Canadian Standards Association
DBT	Design Basis Threat
DM	Deputy Minister
EAL	Emergency Action Level
EMAT	Emergency Medical Assistance Team
EMC	Emergency Management Committee
EMO	Emergency Management Ontario
EOC	Emergency Operations Centre
EPC	Emergency Preparedness Category
EPR	Emergency Preparedness and Response
EPREV	Emergency Preparedness Review
EPRIMS	Emergency Preparedness and Response Information Management System
FERP	Federal Emergency Response Plan
FNEP	Federal Nuclear Emergency Plan
FNST	Federal Nuclear Science and Technology

FPT	Federal/Provincial/Territorial
GOC	Government Operations Centre
HPERP	Health Portfolio Emergency Response Plan
HPOC	Health Portfolio Operations Centre
IAEA	International Atomic Energy Agency
ICS	Incident Command System
IMS	Incident Management Structure
METER	Medical Emergency Treatment for Exposures to Radiation
MST	Monitoring Strategy Tool
NBEMO	New Brunswick Emergency Measures Organization
NEMC	Nuclear Emergency Management Committee
NEMP	Nuclear Emergency Management Program
NEMS WG	National Environmental Monitoring Strategy Working Group
NPP	Nuclear Power Plant
NRCAN	Natural Resources Canada
OECD	Organisation for Economic Co-operation and Development
OHSA	Occupational Health and Safety Act
OIL	Operational Intervention Level
PEOC	Provincial Emergency Operations Centre
PHAC	Public Health Agency of Canada
PLNGS	Point Lepreau Nuclear Generating Station
PNERP	Provincial Nuclear Emergency Response Plan

PPE	Personal Protective Equipment
PSA	Probabilistic Safety Assessment
PSEMP	Provincial Security Event Management Plan
RWWG	Radioactive waste working group
SOG	Security Operations Group
TAG	Technical Assessment Group