Canada's Nuclear Regulator

Emergency Management and Fire Protection

Nuclear Emergency Preparedness and Response-Draft for Consultation

REGDOC-2.10.1, Version 3

2024

DRAFT

Canadian Nuclear Safety Commission
Commission canadienne de sûreté nucléaire

Canada

Nuclear Emergency Preparedness and Response

Regulatory document REGDOC-2.10.1, Version 3

PWGSC catalogue number CC172-115/2016E-PDF
ISBN 978-0-660-04206-0

Également publié en français sous le titre : Préparation et intervention relatives aux urgences nucléaires, Version 3

Document availability
This document can be viewed on the CNSC website. To request a copy of the document in English or French, please contact:

Canadian Nuclear Safety Commission
280 Slater Street
P.O. Box 1046, Station B
Ottawa, ON K1P 5S9
Canada

Tel.: 613-995-5894 or 1-800-668-5284 (in Canada only)
Fax: 613-995-5086
Email: cnsc.info.ccsn@cnsc-ccsn.gc.ca
Website: nuclearsafety.gc.ca
Facebook: facebook.com/CanadianNuclearSafetyCommission
YouTube: youtube.com/cnscccsn
Twitter: @CNSC_CCSN
LinkedIn: linkedin.com/company/cnsc-ccsn

Publishing history

October 2014	Version 1.0
February 2016	Version 2.0
August 2024	Version 3.0 (Draft for consultation)

Table of Contents

Table of Contents ..... **- 9 -**

1. Introduction ..... - 10 -
   - 1.1 Purpose ..... - 10 -
   - 1.2 Scope ..... - 10 -
   - 1.3 Accident management and its links with emergency preparedness and response, and the principle of defence in depth ..... - 10 -
   - 1.4 Overview of Canada's nuclear emergency management framework ..... - 12 -
   - 1.5 Relevant legislation ..... - 13 -
2. Emergency preparedness program ..... - 14 -
   - 2.1 Planning basis ..... - 15 -
   - 2.2 Emergency response plan(s) and procedures ..... - 16 -
     - 2.2.1 Emergency response organization and staffing ..... - 17 -
     - 2.2.2 Emergency response facilities and equipment ..... - 18 -
     - 2.2.3 Emergency categorization, activation and notification ..... - 19 -
     - 2.2.4 Emergency assessment requirements ..... - 20 -
     - 2.2.5 Interface and support for offsite response organizations ..... - 21 -
     - 2.2.6 Emergency personnel protection ..... - 22 -
     - 2.2.7 Public emergency information ..... - 24 -
     - 2.2.8 Validation of the emergency response plan and procedures ..... - 25 -
   - 2.3 Recovery plan ..... - 25 -
   - 2.4 Training and qualification ..... - 25 -
   - 2.5 Readiness ..... - 26 -
     - 2.5.1 Maintenance of emergency response facilities and equipment ..... - 26 -
     - 2.5.2 Testing the implementation of emergency measures ..... - 27 -
   - 2.6 Public preparedness ..... - 29 -
   - 2.7 Program management ..... - 32 -

References ..... **- 35 -**

Additional Information ..... **- 37 -**

Nuclear Emergency Preparedness and Response

1. Introduction

1.1 Purpose

REGDOC-2.10.1, *Nuclear Emergency Preparedness and Response*, sets out the emergency preparedness requirements and guidance of the Canadian Nuclear Safety Commission (CNSC) related to the development of emergency measures for licensees of Class I nuclear facilities and uranium mines and mills.

1.2 Scope

This regulatory document lists and discusses the components and supporting elements that CNSC licensees shall implement and consider when establishing an Emergency preparedness program (EP program) to prepare for, to respond to, and to recover from the effects of accidental radiological/nuclear and/or hazardous substance releases from Class I nuclear facilities or uranium mines or mills. REGDOC-2.10.1 refers primarily to nuclear events, but the planning basis must also address releases of hazardous materials. In addition, REGDOC-2.10.1 addresses how licensees shall test the implementation measures of their EP programs through the conduct of drills and exercises.

The requirements contained within this regulatory document are technology neutral. Therefore, this regulatory document applies to all Class I nuclear facilities and uranium mines and mills. Some requirements in this document are specifically designated as applying only to facilities that have a potential for offsite impacts, thus requiring emergency planning zones (EPZ), as determined by the facilities' planning basis.

An EP program should be developed in a manner that is commensurate with the complexity of the facility's associated undertakings, as well as the probability and potential severity of the emergency scenarios associated with the operation of the licensed facility, and as determined by the facility's planning basis. The planning basis identifies the potential hazards that the EP program must address based on the impact on health and safety, property, and the environment. The goal of the EP program is to minimize the impacts of an accidental release of radiological/nuclear and/or hazardous substances, including any of the associated dose consequences.

REGDOC-2.10.1 focuses on the aspects of emergency preparedness for all Class I nuclear facilities and uranium mines and mills, while requirements for accident management at reactor facilities are addressed in REGDOC-2.3.2, *Accident Management*, Version 2.

1.3 Accident management and its links with emergency preparedness and response, and the principle of defence in depth for reactor facilities

An effective response to an emergency requires strong linkages between accident management and emergency preparedness. The fundamental premise underlying accident management is that the organization operating a nuclear reactor must be able to respond to any accident that cannot be practically eliminated in order to:

- prevent the escalation of the accident
- mitigate the consequences of the accident
- achieve a long-term safe stable state after the accident

Thus, accident management provides capability to respond to an accident within the reactor facility. It is important to recognize that accident management interfaces closely but is distinct from emergency preparedness, which provides emergency responses to mitigate the onsite and offsite impacts of an accident to workers and the public. Both accident management and emergency preparedness form part of the defence in depth provisions.

Defence in depth is an hierarchical deployment of different levels of diverse equipment and procedures to prevent the escalation of anticipated operational occurrences and to maintain the effectiveness of physical barriers placed between a radiation source or radioactive material and workers, members of the public or the environment, in operational states and, for some barriers, in accident conditions. Emergency preparedness is the final, independent layer of defence in depth to prevent and/or mitigate the offsite consequences from an onsite accident.

During a nuclear emergency, the practical goals of emergency response are:

- to regain control of the situation and mitigate consequences at the scene
- to save lives, render first aid, and manage the treatment of radiation injuries
- to avoid or minimize the occurrence of tissue reactions (previously called deterministic health effects)
- to reduce the risk of stochastic health effects
- to mitigate, to the extent practicable, non-radiological consequences[1]
- to prevent, to the extent practicable, health effects caused by the release of hazardous substances
- to protect, to the extent practicable, property and the environment
- to keep the public informed and maintain public trust
- to prepare for the resumption of normal social and economic activity

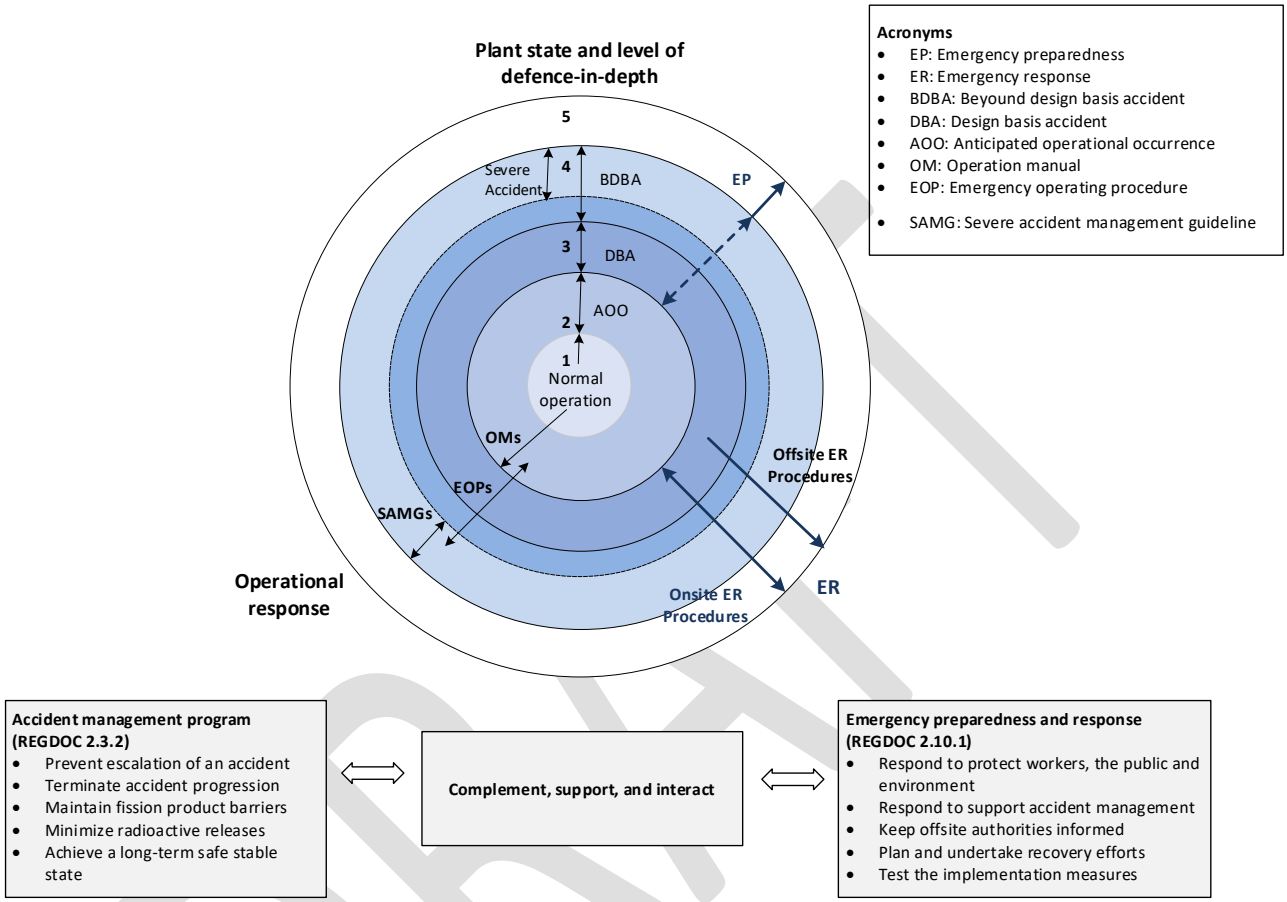
The goals of emergency response are most likely to be achieved in accordance with the principles for intervention by having an effective EP program as part of the infrastructure for protection and safety. An effective EP program ensures that arrangements are in place to ensure a timely, coordinated and effective response to any emergency. It also helps to build confidence that an emergency response would be managed, controlled and coordinated.

Figure 1 illustrates links between accident management, emergency preparedness and response, and defence in depth. Accident management focuses on preventing an event that has already occurred from escalating and minimizing its radiological releases through use of various physical and procedural provisions. The specific provisions may vary depending on the accident (which may be a design basis accident or beyond design basis accident, including a severe accident). REGDOC-2.3.2, *Accident Management,* version 2 provides complete descriptions of defence in depth levels and plant states.

An EP program establishes how nuclear facilities and other concerned organizations prepare for and plan to respond to emergencies (including nuclear or radiological emergencies, both onsite and offsite), in order to protect workers, the public and the environment.

[1] Non-radiological consequences are defined as adverse psychological, societal or economic consequences of a nuclear or radiological emergency or of an emergency response, affecting human life, health, property or the environment (IAEA Safety Standards Series No. GSR Part 7 Preparedness and Response for a Nuclear or Radiological Emergency, 2015). The term non-radiological consequences as defined here relates to emergency preparedness and response only.

Figure 1: Accident management (REGDOC-2.3.2) and nuclear emergency preparedness and response (REGDOC-2.10.1) and how they relate to one another



1.4 Overview of Canada's nuclear emergency management framework

Emergency management includes the prevention and mitigation, preparedness, response and recovery of nuclear emergencies.

Prevention of nuclear emergencies at Canadian nuclear facilities is the responsibility of the licensees. Through the authority of the *Nuclear Safety and Control Act* (NSCA), the CNSC regulates the Canadian nuclear industry in order to prevent unreasonable risk to the environment, the health and safety of persons, and national security. Mitigation of nuclear emergencies aims at ensuring that equipment, such as hydrogen recombiners, or procedures, such as emergency operating procedures and Severe Accident Management Guidelines (SAMGs), are put in place before a nuclear emergency to reduce the potential magnitude or impact of the hazard. Further information on accident management for reactor facilities can be found in REGDOC-2.3.2, *Accident Management*, Version 2.

Preparedness relates to actions taken before a nuclear emergency in order to be ready to respond and manage its consequences, and includes the development of response procedures and plans, training workers, maintaining emergency facilities, exercises and fostering public awareness.

Response refers to those actions taken during a nuclear emergency, both onsite and offsite, to reduce the magnitude of the hazard and manage its consequences on health, safety and the environment. Response actions include protecting workers, supporting accident management activities, emergency public communication, emergency medical assistance, and shelter-in-place or evacuation. In order to determine the type of response and the protective actions and measures on and offsite authorities must consider factors such as the pre-determined distances recommended for the implementation of a protective measure, the accident progression and time characteristics and frequency of a release and also the radioactive materials that would be part of the release.

Recovery includes the short-term and long-term actions taken both onsite and offsite in order to restore to an acceptable level both the organizations involved, and the communities affected by the nuclear emergency. The level of restoration would typically be determined by the responsible authorities, in consultation with the stakeholders affected by the nuclear emergency.

In Canada, the respective roles of the various levels of government in nuclear emergency management are derived from legislated responsibilities. Provincial and territorial governments bear the primary responsibility for protecting public health and safety, property and the environment within their borders and are ultimately responsible for the offsite response and the implementation of protective actions and measures. In Canada that the offsite authorities determine the size of EPZs, however regardless of the chosen size of EPZs, the requirements for emergency planning will be based on the facility's planning basis on the potential offsite impacts. Extended planning distances can also be considered as part of offsite planning. The distances are used to identify distances plumes could travel beyond EPZs and still need consideration for protective actions by off-site authorities. The federal government regulates the peaceful use of nuclear energy in Canada, manages nuclear liability, and supports the responses of provinces to nuclear emergencies within their boundaries.

The federal government is also responsible for liaising with the international community and diplomatic missions in Canada, for assisting Canadians abroad, and for coordinating Canada's response to nuclear emergencies that occur in foreign countries, but that have an impact on Canada.

Under the administrative framework of Public Safety Canada's Federal Emergency Response Plan (FERP) and the Federal Nuclear Emergency Plan (FNEP), all levels of government, along with various agencies and organizations, have responsibilities for developing and implementing emergency plans to address nuclear emergencies with impacts outside the boundaries of CNSC-licensed nuclear facilities.

During a nuclear emergency, the *Radiation Protection Regulations* would continue to apply to workers. However, the CNSC public dose limit would be superseded by generic criteria and operational intervention levels documented in provincial and territorial emergency response plans. These emergency response plans are largely based off Health Canada and international guidance documents.

1.5 Relevant legislation

The CNSC is the federal agency that regulates the use of nuclear energy and materials to protect health, safety, security and the environment, and to implement Canada's international commitments on the peaceful use of nuclear energy.

The NSCA requires persons and/or organizations to be licensed by the CNSC for carrying out the activities referred to in section 26. The regulations made by the Commission under the NSCA stipulate requirements for CNSC licensing, as well as the obligations of licensees and workers.

One of the CNSC's objectives is to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in order to prevent unreasonable risk to the environment and to the health and safety of persons, as well as unreasonable risk to national security, associated with that development, production, possession or use. To accomplish this, the CNSC has the authority to make regulations pursuant to section 44 of the NSCA.

Paragraph 3(1.1)(b) of the *General Nuclear Safety and Control Regulations* (GNSCR) states that the Commission may require any other information that is necessary to enable it to determine whether the applicant will make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed. Sections 12 and 17 of the GNSCR place obligations on both licensees and workers to take all reasonable precautions to protect the environment and the health and safety of persons, and to maintain security of nuclear facilities and nuclear substances.

The *Class I Nuclear Facilities Regulations* and the *Uranium Mines and Mills Regulations* require licence applications to include information related to emergency planning. For instance, paragraph 6(k) of the *Class I Nuclear Facilities Regulations* and subparagraph 3(c)(x) of the *Uranium Mines and Mills Regulations* stipulate that an application for a licence to operate a Class I nuclear facility, or a general application for a licence in respect of a uranium mine or mill, shall describe the proposed measures to prevent or mitigate the effects of accidental releases of nuclear substances and hazardous substances on the environment, the health and safety of persons, and the maintenance of security, including measures to:

- assist offsite authorities in planning and preparing to limit the effects of an accidental release
- notify offsite authorities of an accidental release or the imminence of an accidental release
- report information to offsite authorities during and after an accidental release
- assist offsite authorities in dealing with the effects of an accidental release
- test the implementation of the measures to prevent or mitigate the effects of an accidental release

2. Emergency preparedness program

An emergency preparedness program is based on the four pillars of emergency management: Prevention/mitigation, Preparedness, Response and Recovery. The EP program shall consist of the following components to effectively address the preparedness, response, and recovery functions, as prevention and mitigation are addressed in REGDOC-2.3.2, *Accident Management* and within the plant design (REGDOC-2.5.2, *Design of Reactor Facilities*):

1. **Planning basis:** an analysis of the risks and hazards that the EP program will address
2. **Emergency response plan and procedures:** a comprehensive description of how a response will be executed, with accompanying support material
3. **Recovery plan:** a high-level strategic plan that outlines how a response is to be transitioned into a recovery mode from the termination of the emergency
4. **Training and qualification:** a description of how emergency responders are trained and qualified to fulfill their response roles and responsibilities
5. **Readiness:** the processes to ensure that people, equipment and infrastructure will be ready to execute a response according to the emergency response plan and procedures
6. **Public preparedness:** a detailed description of how emergency information are incorporated into the facilities' public information program so that they are communicated to the surrounding communities and stakeholders
7. **Program management:** the management system aspects that assure the effectiveness of the

EP program

Licensed organizations with an existing EP program that address other corporate needs are encouraged to use this infrastructure to meet the requirements in this document.

2.1 Planning basis

All licensees shall:

1. establish a comprehensive and documented planning basis for their EP program based on the facility's risk assessments that consider the hazards that have, or could have, an adverse impact on the environment and the health and safety of onsite personnel or the public
2. include the results of the facility's safety analysis (e.g.. external hazards analysis, deterministic safety analysis (DSA) and probabilistic safety analysis (PSA), if applicable) for:
    a) all accidents and internal or external events that have been analyzed as having an unacceptable impact on their facilities. This includes design basis accidents (DBA) and beyond design basis accidents (BDBA), including severe accidents.
    b) multi-unit and/or multi-module accidents scenarios
    c) extended loss of power
    d) irradiated fuel bays or dry storage areas
3. based on the safety analysis:
    a) identify possible accidents that could have onsite and/or offsite impacts
    b) identify a series of limiting accidents to form the basis of the EP program for the facility, including:
        i. an estimate of the probability of such accidents occurring
        ii. an estimate of the associated radiological consequences, including isotopic release quantities (source term), possible release start time and duration and the geographical area potentially affected
    c) provide a recommendation on the EPZ sizes and extended planning distances for the offsite response authorities
4. use a risk informed approach to determine:
    a) the scope and depth of the EP program
    b) the level of preparedness required for effective onsite and offsite response
    c) the actions required offsite in the plume exposure pathway and the ingestion exposure pathway
5. undertake a formal review of the planning basis on a minimum frequency of five-years, or sooner if the facility undergoes major changes, and submit to the CNSC for review and acceptance. Upon CNSC's acceptance, provide the offsite authorities with the updated planning basis
6. provide regional, provincial and territorial offsite authorities with additional necessary information to allow for effective emergency planning policies and procedures to be established and modified, as requested

For licensees whose planning basis demonstrates that EPZs are necessary. These licensees shall:

7. ensure that an evacuation time study is conducted by an independent qualified third party every five years to inform the planning basis and associated EP program requirements

Guidance

A nuclear emergency may be caused by, or involve, different types of hazards, including natural incidents (e.g., flooding, tornadoes, tsunami, ice or snowstorms, forest fires) and equipment malfunctions (identified within the design basis and beyond design basis). All hazards that cannot be practically eliminated with possible initiating and propagating pathways should be identified within the planning basis. Response to criminal and malicious activity may be dealt with under a separate program.

The planning basis should be based on a full range of postulated scenarios that may challenge the facility's emergency response capabilities. This should include scenarios that involve a nuclear or radiological emergency combined with a conventional emergency, such as an earthquake or forest fire. Emergency Plans should be developed to also address unforeseen events to address level 5 defence in depth.

The scope and depth of the EP Program should also incorporate a review of all emergency functions that are placed on the facility fire brigade members. Therefore, the licensee should define and document the minimum number of facility fire brigade members, their qualifications and equipment required to be maintained within the protected area to provide immediate response. Staffing analysis should be conducted for the facility fire brigade that considers all responsibilities placed on the facility fire brigade members, including tasks associated with the following, if applicable:

- nuclear emergency response
- fire response and rescue
- medical response
- confined space rescue
- hazardous material response
- high angle rescue
- water rescue
- auto extrication
- trench rescue
- elevator rescue
- machinery entanglement extrication
- structural collapse / heavy rescue
- any agreements to provide emergency response services to facilities outside of the protected area
- any agreements with external agencies to provide emergency response services for the licensee facility

PSA information and insights should be used with DSA, engineering evaluations and defence in depth capabilities as inputs in the decision-making process to determine the appropriately sized EPZ.

Federal authorities would be provided emergency planning information through the CNSC.

2.2 Emergency response plan(s) and procedures

All licensees shall:

Develop and maintain emergency response (ER) plan(s) with supporting emergency response procedures. The ER plan shall be based on the planning basis as described in section 2.1 of this document. The ER plan shall identify and describe the methods that licensees use to respond to emergencies. This includes, but is not limited to, the following areas:

1. emergency response organization and staffing
2. emergency response facilities (ERFs) and equipment

3. emergency categorization, activation and notification
4. emergency assessment
5. offsite response organizations interface and support
6. emergency personnel protection
7. emergency information and public communications
8. validation of the ER plan and procedures

Guidance
The ER plan, which may consist of one or several documents, incorporates pertinent information directly or by reference. Plan content can vary to accommodate facility-specific needs and circumstances based on risk.

The ER plan may incorporate emergency preparedness and response procedures directly, or it may reference pertinent documents, such as the facility procedures manual(s). If referenced, the documents should be immediately accessible.

Procedures are used to define the necessary steps and/or requirements for various emergency preparedness and response processes and activities.

Licensees should also consult REGDOC-3.2.1, *Public Information and Disclosure*, concerning public disclosure protocols regarding events and developments at their facilities to ensure that information related to the health, safety and security of persons and the environment are effectively communicated to the public.

2.2.1 Emergency response organization and staffing

All licensees shall**:**

1. establish an emergency response organization (ERO) with a command structure that is clearly defined and integrated
2. define and document the minimum number of staff required to maintain the ERO and their qualifications
3. define the expected reporting times for the ERO to report to the ERF or designated area (see section 2.2.6 of this document) after it has been alerted to respond
4. document the requirement to maintain and retain logs of all actions, orders, and track and update actions throughout the emergency
5. define and document how the ERO staffing will be maintained and monitored to ensure the minimum shift complement is available at the nuclear facility at all times
6. define and document how licensees will maintain the ERO extended response over multiple shifts
7. define and document how communications between the ERO and any emergency services will be maintained

Guidance
An indication of an effective ERO is the demonstration of clear command and control over the emergency response. It should be clearly understood who is in charge and with whom final decisions and authorities lie. The ERO should be adaptable and flexible, so as to be able to manage an incident as it evolves or as its circumstances change rapidly or abruptly. Procedures should be in place to ensure:

- clear roles and responsibilities and authorities of each ERO position
- timely and adequate onsite and offsite communication
- periodic update and turnover briefings
- decisions documented in event logs
- effective and clear communication

Appropriate arrangements should be identified for shift turnover and provision of food and other amenities for prolonged duty caused by beyond design basis initiating events.

Additional guidance on ERO staff fitness for duty can be found in CNSC regulatory document REGDOC-2.2.4, *Fitness for Duty – Managing Worker Fatigue* , and guidance on the number of staff required to maintain the ERO and their qualifications can be found in CNSC regulatory document REGDOC-2.2.5, *Minimum Staff Complement*.

Members of mobile offsite survey teams need not be accounted for as part of the minimum complement for facilities equipped with real-time fixed radiological detection and monitoring capabilities, if the licensee makes provisions for immediate mobilization of offsite survey teams upon activation of the ERO.

Emergency Services can consist of the licensee's Facility Fire Brigade and Nuclear Response Force or offsite emergency services.

2.2.2 Emergency response facilities and equipment

All licensees shall**:**

1. identify an onsite ERF or designated area to be used as a response location
2. identify essential emergency response equipment, and describe how its operation and effectiveness during emergencies are assured; essential emergency response equipment includes equipment required to detect and assess hazards, and communicate response activities
3. identify and have emergency response equipment and materials that are operational and available in sufficient quantities for an extended multi-shift response; they shall also be readily accessible during emergency conditions

For licensees whose planning basis demonstrates that EPZs are necessary, these licensees shall:

4. have an ERF that is located near the control room inside the protected area
5. have an ERF located onsite, but outside of the protected area; if this cannot be achieved, describe security arrangements to prevent nuisance actors from interfering with emergency response, and provisions for alternate means of communication in the event of a total communications blackout
6. have an ERF located offsite and outside of the plume exposure planning zone
7. ensure that the ERF will ensure the health and safety of workers in the ERF and ensure the continuity of operations for all emergency situations that cannot be practically eliminated (if this cannot be achieved, then have a backup facility with similar capability for each of the onsite and offsite such that the backup facility is unlikely to be effected by an event that would disable the primary; in addition, activation or transfer of operations to the backup facility must be done without disruption to the response operations)
8. provide a workspace with computer, internet access and telephone for a CNSC representative in each ERF; in addition, the CNSC shall be granted access to install an antenna for a satellite phone at each ERF
9. ensure all ERFs have the capacity and capability of sustaining emergency response for a minimum of 72 hours without offsite support
10. ensure the design and layout of ERFs are able to support the emergency response
11. ensure ERFs have provisions in place to provide nuclear facility data
12. pre-arrange memoranda of understanding and/or other priority services agreements required to keep ERFs functional over prolonged periods, and ensure such agreements are documented and either referenced or attached to the ER plan
13. determine and implement methods for communicating with onsite personnel and offsite

authorities, including the implementation of at least two levels of backup communications systems; licensee communication links must be compatible with the licensee, province or territory, and the CNSC

14. determine and implement communication methods to maintain communications during extended loss of power and loss of telecommunication networks

Guidance

Licensees should describe the emergency response services, equipment, supplies and facilities that would be available during emergencies, including, but not limited to the following:

- administration facilities
- technical support centres
- control facilities
- personnel and public assembly areas
- emergency operations coordination centre
- centre to integrate onsite activities with offsite programs
- first aid and/or medical facilities
- laboratory services (fixed or mobile)
- decontamination facility
- backup power capable of sustaining emergency power to ERFs for a minimum of 72 hours
- reference materials, such as current and approved versions of charts, maps, plans, drawings, diagrams, specifications and procedures
- essential safety equipment, PPE and other appropriate supplies, such as food and water for a minimum of 72 hours
- administrative aids, such as status boards and reference materials
- fixed or portable instruments or equipment, as required, to detect, measure, monitor, survey, analyze, record, process, treat, transport, warn, announce, communicate, or assess

For licensees whose planning basis demonstrates that EPZs are necessary:

The CNSC workspace should have appropriate resources (such as computers, information access, internet access and satellite phones) to enable CNSC representatives to perform their functions adequately.

The preferred means of ensuring the protection of workers and the continuation of operation is to have hardened facilities that have:

- radiological protection/shielding
- adequate ventilation,
- contamination control
- the ability to withstand design-basis event hazards, such as wind, tornado, snow or ice

2.2.3 Emergency categorization, activation and notification

All licensees shall have ER plan(s) and procedures that**:**

1. describe the complete set of conditions that would require activation of the ERO
2. describe how unusual events, incidents and emergencies are to be determined and classified to initiate onsite response; the same notification categories and standard definitions used by offsite authorities shall be used and/or cross-referenced
3. define and document the criteria for the activation of the ERFs
4. define and document any transfer of commands that occur during the emergency
5. describe the immediate notification process and secondary communication methods to alert all onsite personnel, to initiate personnel assembly and accounting, and to activate the ERO and

associated emergency response and support facilities
6. define organizational methods, processes, timelines and emergency levels to notify the appropriate personnel and authorities
7. describe all offsite notification requirements and any time requirements that apply, ensuring that:
   a. the description includes identification of the appropriate positions, by title and agency, of the provincial, territorial and local government agencies, and Indigenous Nations and communities
   b. offsite authorities are notified within 15 minutes of initial categorization of the event and within 15 minutes of re-categorization of the event(s)
   c. CNSC is notified within 15 minutes of activation of the ERO, and within 15 minutes of re-categorization of the event(s)

Guidance

1. Licensees should follow provincial notification categories and criteria, or when none exist, use the following categories, listed in order of increasing significance, to categorize various events:
   - **reportable event:** an event affecting the nuclear facility that would be of concern to the offsite authorities responsible for public safety
   - **abnormal incident:** an abnormal occurrence at the nuclear facility that may have a significant cause and/or may lead to more serious consequences
   - **site area emergency:** a serious malfunction that results or may result in an emission at a later time
   - **general emergency:** an ongoing atmospheric emission of radioactive material, or one likely within a short time frame, as a result of a more severe accident

While item 7b above requires licensees to notify the offsite authorities within 15 minutes of event categorization, ideally such notification should be done as soon as possible. It is critical that the CNSC and offsite authorities be advised within the identified timeframes. The only acceptable exception to the requirement would be when immediate action was required to prevent a catastrophic incident from occurring.

2.2.4 Emergency assessment requirements

All licensees shall**:**
1. describe the methods and procedures to continually assess the emergency and predict both onsite and offsite conditions and parameters
2. continually characterize the magnitude of the offsite risk to the public and the environment
3. continually provide updates on a regular basis to offsite authorities and the CNSC

For licensees whose planning basis demonstrates that EPZs are necessary, these licensees shall:
4. have real-time fixed radiological detection and monitoring capabilities around the nuclear facility perimeter with appropriate backup power, and shall be capable of communicating results to offsite authorities and the CNSC
5. have sufficient capacity and capability for offsite radiological monitoring, including mobile offsite survey teams, and report results to the offsite response authorities and the CNSC
6. promptly and continuously assess and determine source term estimate, plume dispersion and dose modeling, and report results to the offsite authorities and the CNSC as soon as it is available, and on an hourly basis thereafter, in a format approved by the CNSC and the provincial authority
7. promptly and continuously estimate dose to the public based on source term estimation, plume dispersion and dose modeling, and provide the dose estimates to offsite response authorities and the CNSC

Guidance

Emergency assessment, including categorization, is performed to determine:

- the onsite response and staff mobilization required to protect onsite personnel and equipment
- the notification category necessary for the provincial or territorial authorities to determine the required offsite response to protect the public and the environment

Licensees should describe the methods and procedures for continual assessment of the following pertinent conditions and parameters:

- the status, integrity and stability of the affected facilities and their components
- identification, quantities, concentrations, or release rates of radiation, contaminants or other hazardous substances
- onsite and offsite impacts on or threats to health, safety and the environment
- location and direction of radioactive plumes or other emissions
- loss of instrumentation

2.2.5 Interface and support for offsite response organizations

All licensees shall:

1. establish plan(s) and procedures to coordinate response activities with appropriate offsite organizations
2. formally document any arrangements or agreements with other response organizations or personnel, including mutual aid agreements
3. ensure that agreed-upon resources, and the quantity of these resources required to respond to offsite conditions, are available at all times.
4. cooperate with and assist offsite organizations with their response activities to address offsite impacts; provide expertise and resources (personnel, emergency response equipment, and material) in support of offsite authorities during an emergency; and define the quantity of available resources within their ER plan(s)
5. promptly and regularly provide recommendations to offsite authorities when public protective actions are required and inform the CNSC

For licensees whose planning basis demonstrates that EPZs are necessary, these licensees shall:

6. incorporate the provincial or territorial EPZ that is being used for plume exposure and ingestion pathways; the provincial or territorial plans shall be directly referenced
7. collaborate with the municipal or regional authorities to develop and maintain public evacuation time estimates based on current census data, and future population growth projections on a per-decade estimation until end of life of the facility
8. have, at all times, a designated onsite person with the authority and responsibility to categorize a nuclear emergency and to perform the following promptly and without consultation, upon categorization of the emergency:
   a. initiate an appropriate onsite response
   b. notify the appropriate offsite authorities
9. provide the designated person with a suitable means of alerting onsite response personnel and notifying the offsite notification point
10. provide sufficient information for an effective offsite response
11. when venting forms a part of the facility response strategy:
    a. have, at all times, a designated person onsite with the authority for venting, if.
    b. ensure that offsite authorities and the CNSC are consulted before undertaking any venting activity, unless venting must be performed in an urgent manner to protect the structural integrity of containment; in such a case, every effort shall be made to inform the offsite

authorities and the CNSC as early as possible2

c. include, in each report to the CNSC and offsite authorities, whether venting will be required and estimates of when venting will need to occur

12. coordinate with the CNSC to define the data content; maintain and document procedures to disseminate critical information to the CNSC and offsite authorities during a nuclear emergency on an hourly basis, including:
    a. categorization of the accident
    b. status of reactor safety systems including containment (if applicable)
    c. status of emergency mitigating equipment (EME, if applicable)
    d. re-pressurization estimates (if applicable)
    e. source term estimates
    f. field monitoring data
    g. onsite weather data
    h. dose projection estimates
    i. operational procedures and/or guidance that are in use to mitigate the accident
    j. under severe accident conditions, additional information regarding SAMG entry, implementation, and exit (if applicable)
13. transmit live predetermined and agreed upon by the CNSC safety-critical plant data for the diagnosis, prognosis, and mitigation of accident conditions, in an agreed-upon format and mechanism with the CNSC, to the CNSC Emergency Operations Centre during a nuclear emergency. Existing NPPs shall strive to meet this requirement, but an alternate approach to continuously transmit plant data may be proposed to the CNSC for approval. Refer to Appendix A for the required predetermined plant parameters that give indication of the reactor status for the current CANDU NPPs

Guidance

Licensees should identify the jurisdictions, organizations or persons that could be formally involved in emergency preparedness and response activities pertaining to facility emergencies and then develop mutual aid and community agreements where appropriate.

During an emergency it is critical to have an onsite person with the required authority to order emergency venting if required. However, this authority can be delegated if it is impractical to have a senior emergency officer onsite at all times.

The ER plan should also define a clear and concise strategy for communications between onsite and offsite organizations. All communications, including event data and the decisions made throughout the emergency response, should be documented and recorded. While the licensee is required to provide recommendations to offsite authorities, it is at the discretion of the authorities to accept, reject or modify recommendations.

2.2.6 Emergency personnel protection

All licensees shall:

1. install an intelligible one-way communication system within all occupied buildings onsite and exterior areas, which ensures that all onsite personnel can be notified of any emergency occurring onsite. The communication system shall:
    a. have the ability to deliver instructions in event of an emergency
    b. be tested for audibility to ensure complete onsite coverage at a minimum frequency of

[2]Where containment venting is not applicable, licensees shall follow confinement processes.

every 3 months
   c. be accompanied by a visual alarming device, when (i) located in an area where the use of hearing protection is required, (ii) located in an area with high operational noise levels
2. develop and document emergency radiation protection measures that align with their radiation protection program
3. continuously take appropriate measures to protect onsite personnel
4. document the criteria for determining in what circumstances the effective and equivalent dose limits set out in section 15 of the Radiation Protection Regulation apply, including when they take effect and cease to apply
5. have sufficient personal protective equipment (PPE) and provisions to respond to emergencies and protect the plant personnel acting as emergency responders for the first 72 hours without offsite assistance
6. maintain sufficient PPE and response equipment, calibrated and poised for immediate use in an emergency; the type and amount of PPE and defined emergency response equipment shall be based on criteria for design-basis accidents and beyond-design-basis accidents

Guidance

Licensees need to be able to manage the first 72 hours of an emergency response without offsite support, in case outside assistance is unavailable. Remotely located facilities (such as those on northern sites) may experience significant emergency response delays because of effects such as severe weather. In such cases, licensees should demonstrate how their ER plan(s) have accounted for the possibility that offsite assistance may not be available for extended periods of time.

Calibrated electronic dosimeters should be poised and immediately available for designated emergency work. Systems used for maintaining, reading and charging these dosimeters should be in working condition at all times. For battery-operated equipment, sufficient quantities of batteries should be available. Backup facilities and emergency response equipment needed to maintain equipment for electronic dosimeters, radiation instrumentation and laboratory services should be referenced within the ER plan.

Emergency protective provisions may include, but are not limited to:

- establishing or designating areas for the emergency assembly of site personnel
- ensuring that assembly areas are located in areas that can be accessed safely during emergencies
- ensuring that there are alternate safe access routes to radiation instrumentation and electronic dosimeters, in addition to assembly areas and PPE during emergencies
- accounting for site personnel and all other persons on site (contractors, visitors, etc.); all onsite staff should be able to be accounted for within 30 minutes; accounting should be commensurate with the scale/categorization of the emergency
- using dose records to assign specific emergency response tasks
- ensuring offsite emergency responders have access to radiation protection assistance from onsite personnel
- implementing special administrative measures, such as action levels to control radiation doses
- documenting the process by which the effective dose and equivalent dose received by and committed to persons participating in the control of an emergency remain as low as is reasonably achievable, social and economic factors being taken into account
- conducting radiation surveys and radioactive contamination monitoring
- monitoring and tracking of radiation doses
- implementing back-out dose limits and protective actions when emergency action levels are exceeded through pre-set electronic personnel dosimeter alarms

- providing search and rescue, decontamination and first aid services
- providing dosimetry and any other emergency response equipment, instruments, materials, facilities and services necessary to ensure that onsite and offsite personnel are protected
- ensuring appropriate radiological and hazardous substances protection and information are provided to all emergency responders, including those from external organizations providing onsite support
- ensuring that PPE, electronic dosimeters and radiation survey meters / radiation instrumentation are appropriate for their intended use
- interfacing with offsite responders (e.g., ambulance attendants and hospital staff) to ensure that pertinent hazardous material and radiological information is provided to medical staff
- providing thyroid-blocking agents (potassium iodide pills) when applicable
- briefing, tracking, and debriefing the dispatched teams on safety requirements, communication requirements, etc.; emergency response personnel's briefing should include personal safety requirements and a three-way communication strategy continued verification of the habitability of all ERFs, including monitoring for radiation fields and hazardous materials, where appropriate
- documenting workers' roles and responsibilities during an emergency and the risks associated with radiation to which workers may be exposed during the control of an emergency
- keeping a list of workers that should receive this information, and update the list periodically
- ensuring that all persons to whom information on i) their responsibilities during an emergency and ii) radiation risks during the control of the emergency, is provided. These persons should confirm in writing that they have received the information
- informing persons other than nuclear energy workers responding to an emergency of the associated risks and of their responsibilities with regards to the emergency response

This document does not address shift turnover. Additional guidance on shift turnover can be found in REGDOC-2.2.5, *Minimum Staff Complement*.

2.2.7 Public emergency information

All licensees shall:

1. provide information about the emergency to offsite authorities during the emergency response and recovery phases
2. coordinate with offsite authorities when communicating emergency information to the public

Guidance

Licensees should describe the procedures to communicate information about the emergency to offsite authorities during emergencies in EP. These procedures should ensure that emergency information is sent routinely – and as conditions change (either positively or negatively) – to offsite authorities so the information can be disseminated to the public.

The information communicated to offsite authorities and should include possible radiological and non-radiological hazard(s), including their short-term effects as well as their potential long-term effects on the public, for all emergency scenarios.

Licensees should describe the protocols to ensure coordinated public communications during an emergency. For nuclear power plants, provisions should include consideration of communications strategies and describe the roles and responsibilities of organizations that are responsible for communicating key information to the public. Refer to REGDOC-3.2.1: Public Information and Disclosure for additional information.

Licensees should also consult REGDOC-3.2.1, *Public Information and Disclosure*, concerning public disclosure protocols regarding events and developments at their facilities.

2.2.8 Validation of the emergency response plan and procedures

All licensees shall:

1. validate ER plan(s) and procedures to demonstrate that systems as designed (equipment, procedures and personnel elements) meet performance requirements and support safe operation
2. validate any changes to ER plan(s) or procedures before implementing them, to ensure continued effectiveness
3. notify the CNSC of changes to ER plan(s)and procedures, and submit the results of the validation to the CNSC in accordance with the license to operate.

Guidance

For additional details on notification of changes to ER plan(s) and procedure(s), please refer to licence condition G.2.

2.3 Recovery plan

All licensees shall:

1. describe the process to transition from emergency response to recovery after the termination of an emergency, including the requirements to establish a recovery organization
2. prepare in advance a strategic recovery plan that:
   a. identify and describe the resources (personnel, facilities and emergency response equipment) that are to be available for recovery purposes
   b. describe how personnel will be protected when assessing or implementing the recovery program (e.g., personnel protection measures for entry into hazardous areas)
   c. provide for post-accident assessments of the causes, details, impacts and/or consequences of the events
   d. ensure all recovery efforts operate in accordance with the licensee's safety and control measures

Guidance

The conceptual recovery plan can act as the basis for developing the final recovery plan after the event has occurred and when the emergency phase is completed. The recovery plan should identify the positions/titles, authorities and responsibilities of the individuals who will fill key positions in the recovery organization; this organization should also include technical personnel with responsibilities to develop, evaluate and direct recovery and re-entry operations.

Once the emergency phase of an emergency response has ended, workers undertaking recovery operations (such as repairs to plant and buildings, waste disposal or decontamination of the site and surrounding area) are subject to the occupational dose limits listed in the CNSC's *Radiation Protection Regulations*.

2.4 Training and qualification

All licensees shall:

1. collaborate with responding offsite agencies to provide radiation protection training commensurate with the risk and hazards onsite
2. train and qualify all EROs in accordance with the positions to which they have been assigned. This shall include:

   a. initial and continuing training programs for EROs
   b. ERO staff qualifications
   c. ERO positions for which incumbents will be required to undertake periodic or on-going training
3. provide educational materials for any person who would be responding to the emergency on behalf of an offsite authority, not just the first responders
4. establish requirements for frequency of re-qualification training for all ERO positions

Guidance

Licensees should provide necessary training to individuals and/or organizational units to assure and demonstrate they are qualified and able to completely fulfill their assigned emergency response roles. The training is intended for any person who would be responding to the emergency on behalf of an offsite authority and is not solely limited to first responders.

ERO training may consist of both formal and informal instruction (including workplace and classroom instruction). Licensees can also develop and use online training materials. Emergency drills are an additional option. Typical attributes of an emergency drill include:

- limited scope
- limited number of personnel
- specific equipment
- timely feedback
- realistic environment

An emergency drill typically involves testing a procedural or physical component of the emergency response program. An emergency drill may be conducted as an initial or periodic test, as a supervised training session or as an evaluation of a remedial event. For example, after steps are taken to correct a weakness identified by an emergency exercise, a drill may be held to further evaluate the effectiveness of the remedial measures.

Training requirements for contractors and offsite organizations (e.g., firefighters, police personnel, paramedics, hospital staff) that support or participate in onsite activities – insofar as these requirements relate to training that is outside their typical professional duties, but that is required for responding to onsite emergencies; such training could address subjects like access requirements or radiation protection.

Personnel assigned to emergency response roles should demonstrate and maintain their capability to perform assigned tasks at all times. Drills should include the use of all procedures, PPE, response equipment, EME and facilities that could be required during an actual emergency.

Requirements and guidance for training systems can be found in REGDOC-2.2.2, *Personnel Training*.

2.5 Readiness

Readiness consists of activities to ensure that people, equipment and infrastructure will be ready to respond to an emergency, in accordance with the ER plan and procedures.

2.5.1 Maintenance of emergency response facilities and equipment

All licensees shall:

Identify and implement requirements and provisions to assure that the necessary ERFs, equipment, and materials are maintained and in working condition at all times. However, facilities and equipment may be taken out of service for required maintenance if alternate provisions are put in place during these periods.

Guidance

ERFs, equipment and materials should be in a state of readiness at all times. Accordingly, licensees should implement provisions to ensure that such equipment, facilities and materials are always in working condition. These provisions should include regular inspection, calibration, testing, and maintenance, or replacement as required, within formal systems of quality control and inventory control and accounting. This criterion includes all required PPE and EME.

2.5.2 Testing the implementation of emergency measures

All licensees shall:

1. perform drills and exercises to test the effectiveness of their EP program, including minimum complement validation drills and exercises per section 2.2.8.
2. ensure emergency drills and exercises are based on accident scenarios identified in planning basis
3. establish specific objectives for each emergency drill and exercise; the type and number of objectives will depend on the scope of the drill/exercise
4. design drill/exercise objectives to sufficiently challenge their capability and capacity to respond to emergencies
5. include provisions in emergency drill/exercise objectives for:
    a. management and coordination of the emergency response
    b. accident assessment and categorization
    c. effective notification to offsite authorities
    d. protection of facility personnel
    e. protection of the public and the environment
    f. termination of an emergency
    g. adequacy and conduct of exercises/drills
6. test all requirements listed in this document over a five-calendar year period, including the completion of at least one full-scale exercise during this period
7. track the completion of exercises/drills in order to demonstrate that all response components have been exercised/drilled within the 5 year cycle; the status of drill/exercise completion shall be submitted to the CNSC on an annual basis along with the annual drill and exercise schedule.
8. submit exercise objectives, team organization and scenario development framework, and exercise technical data and materials to the CNSC at least 20 business days before conducting full-scale emergency exercises (in case of operational requirements and factors beyond licensee control, changes can be made up to the day of the exercise)
9. provide to the CNSC with the latest revisions of safety and control measures related documents, procedures, and guidelines used in the assessment of the accident conditions and accident mitigation no later than 20 business days prior to the full-scale exercise
10. demonstrate sound organizational and professional execution in the conduct of the exercises by:
    a. keeping exercise scenarios unknown to the participants before exercises are conducted
    b. providing timely and realistic injects (i.e. data, messages and materials)
    c. having exercise participants demonstrate realistic and professional behaviour for simulated actions
    d. not providing coaching to exercise participants
11. ensure persons perform their required tasks during exercises as though actual emergency conditions were present
12. staff and train exercise controllers and evaluators to control and evaluate exercises, and

provide them with exercise materials that include:
   a. instructions about how to control/evaluate exercises
   b. exercise evaluation criteria
13. provide direction pertaining to existing requirements for safety and security measures, adhere to applicable regulations and licence conditions during exercises, ensuring all participants are aware of the actions and interventions that are not permitted while exercises are in progress
14. provide feedback after exercises to improve the participants overall ability to respond effectively to emergencies, including updates to emergency plans and procedures if necessary.
15. prepare self-assessment reports regarding the execution of full-scale emergency exercises; such reports must be submitted to the CNSC within 40 business days after exercises have been conducted

For licensees whose planning basis demonstrates that EPZs are necessary, these licensees shall:

16. demonstrate the capability to deploy and connect EME within the required established timelines as determined within the ER plan and procedures within the 5-year drill and exercise cycle
17. conduct an integrated full-scale emergency exercise at least once every five calendar years involving a severe accident scenario requiring implementation of public protective actions, and, at a minimum, regional and provincial offsite authority participation
18. test the identification of the entry into severe accidents and/or exit out of accident condition within the 5-year drill and exercise cycle.

Guidance

Emergency drills and exercises test the adequacy of EP programs and the implementation of emergency measures. This includes an evaluation of the adequacy of the procedures and training of the ERO to respond to an emergency.

Emergency drills are generally shorter in length and test specific components of an emergency response. Drills can be used to test specific skill sets and/or components of an emergency response. Multiple drills can be performed to enhance areas of a response that need enhancement to improve the overall response or exercise performance. Deficiencies in drills are identified and corrective measures implemented either immediately or in a timely process after the drill if the correction results in a change to a process or a procedure.

Typical attributes of an emergency drill include:

- short duration in time (i.e. up to several hours)
- can be repeated several times to reinforce training concepts
- focuses on specific target areas or key skills that have been identified as needing improvement or being maintained.

Emergency exercises simulate emergency events and conditions over a minimum of several hours, in order to test the integrated performance of the EP program. Emergency exercises simultaneously measure and demonstrate: the preparedness and competence of participants in the specific emergency response roles, the quality of the associated procedures, and the effectiveness of the administrative framework. Exercises designed with a high degree of complexity and fidelity ensure that the performance observed could be reasonably expected during an actual event. Deficiencies that are identified during emergency exercises should be rectified as soon as possible, to provide assurance that the ER plan and procedures can and will be implemented successfully in the event of an emergency.

Typical attributes of an emergency exercise include:

- mobilization of emergency equipment and resources in a realistic environment over an extended period of time
- demonstration of inter-agency and other government department cooperation
- verification of emergency contacts and main points of contact at inter-agency and other government departments
- testing of communication systems and/or public information systems
- testing of ERFs and equipment readiness
- conduct of the exercise with the minimum complement numbers of staff, in order to demonstrate adequacy of the response
- criteria to terminate the exercise that are established ahead of time, in order to ensure that all of the required actions are completed
- success criteria that are established during the planning phase, and a corresponding evaluation of performance during the exercise

Exercises involving severe accidents, test the integration of the technical support group and decision making of the ERO outside of response procedures.

A full-scale integrated exercise tests the capacity of onsite and offsite agencies to respond to an emergency that results in a release of nuclear substances from the affected unit(s). Full-scale emergency exercises should involve, at minimum, several onsite and provincial and regional offsite stakeholders but simulation cells can be used where operational conflicts arise. Larger full-scale exercises can include federal and – where appropriate – international authorities and agencies. Emergency exercises do not always need to be full-scale. For example, tabletop emergency exercises, such as those for notification and communications, may be sufficient to stimulate discussion of various issues regarding a hypothetical emergency.

Emergency exercises should not be used as part of a participant's training development. Participation in an exercise is not meant to evaluate an individual's competency, but rather is intended to assess the adequacy of an EP program and its implementation. Coaching and training should not be provided to participants in exercises by controllers or evaluators. Exercises should be conducted in accordance with the minimum requirements of the ER plan.

Self-assessment reports should contain the following information:

- success and failures of exercise drills
- lessons learned
- areas for improvement
- corrective action plans
- tracking and completion of corrective actions

2.6 Public preparedness

All licensees shall:

Incorporate information on public emergency preparedness into their public information program (established as per *REGDOC-3.2.1, Public Information and Disclosure*) to ensure information on emergency preparedness and response is communicated to surrounding communities and stakeholders.

For licensees whose planning basis demonstrates that iodine thyroid-blocking (ITB) agent administration may be required for members of the public, these licensees shall provide the necessary resources and support to provincial and municipal authorities in implementing the provincial and municipal plans to do the following, or shall do the following:

1. ensure that a sufficient quantity of ITB agents is pre-distributed, to all residences, businesses and institutions within the designated plume exposure planning zone or as otherwise defined by the provincial or municipal authorities, together with instructions on their proper administration
2. ensure that a sufficient quantity of ITB agent is pre-stocked and ready for prompt distribution within the designated ingestion control planning zone or as otherwise defined by the provincial or municipal authorities ; this inventory of ITB agents shall be located so that it can be efficiently obtained by, or distributed to, members of the public when required
3. ensure that ITB agents can be obtained by residents of the designated ingestion control planning zone at any time
4. ensure that ITB can be delivered to residents identified in extended planning distances as identified by the provincial or municipal authorities if so required
5. ensure that particular consideration is given to sensitive populations such as children and pregnant persons within the designated ingestion control planning zone
6. ensure that the pre-distributed and pre-stocked ITB agents are maintained within expiry date
7. ensure that the pre-distribution plans are supported by a robust, ongoing, and cyclical public education program
8. ensure that all residences, businesses and institutions within the designated plume exposure planning zone are provided with public emergency preparedness information detailing how they should prepare for a nuclear emergency and what they should do or expect during a nuclear emergency; this information will reinforce the public education program designed to support the pre-distribution of ITB agents
9. Incorporate information on public emergency preparedness into their public information program (established as per *REGDOC-3.2.1, Public Information and Disclosure*) to ensure information on emergency preparedness and response is communicated to the population within the EPZ
10. ensure that this public emergency preparedness information is readily available to the general public, including online

Guidance

Licensees may, where possible, leverage existing communication channels (such as those used by local municipalities or those identified in their public information program as per REGDOC-3.2.1, *Public Information and Disclosure*).

Licensees should periodically assess the adequacy of public emergency preparedness information.

Additional guidance for licensees whose planning basis demonstrates the requirement for off-site EPZs that would require the implementation of ITB:

The term ITB agent is used generically and includes potassium iodide (KI) tablets.

The pre-distribution of ITB agents should be undertaken by representatives of the health and/or emergency management authorities of the province or region/municipality, with support from the licensee. The pre-distribution of ITB agents should be done in a carefully planned and coordinated manner, to ensure that the public receives the appropriate information and education related to the benefits, risks and usage instructions of ITB agents.

It must be noted that the ingestion control planning zone is an area around a nuclear facility where specific measures are taken to protect the public from potential contamination of food and water. Its purpose is to protect the food chain and drinking water safety. There could be a very low presence of radioactive iodine within the ingestion control planning zone, thus eliminating the need for ITB agents for radioactive iodine exposure. The pre-stocking of ITB agents within the ingestion control planning zone is an added measure for contingency planning. Pre-stocked ITB agents for the designated ingestion control planning zone should be located to facilitate prompt and efficient distribution during an emergency as required. Recognizable locations with credible persons within the community (such as fire stations, police stations and pharmacies) should be considered in the selection of pre-stocking locations.

Following the completion of pre-distribution activities, periodic reviews with the local populations to assess the adequacy of pre-distribution programs should be performed.

The term “plume exposure planning zone” is sometimes referred to as “automatic action zone”, “detailed planning zone”, “contingency planning zone” or “emergency planning zone”. The size of the plume exposure planning zone is determined by the appropriate offsite authorities based on information in the planning basis.

The term “ingestion control planning zone” is sometimes referred to as “extended planning distance” or “ingestion planning zone”. Appropriate offsite authorities determine the size of the ingestion control planning zone based on information in the planning basis.

The term “extended planning distance” is a distance that is determined by the provincial or municipal authorities that exceeds emergency planning zones but may still require protective actions or measures.

To ensure the public have easy access to the required emergency preparedness information, licensees should collaborate with municipalities to provide residents with useful information on how they should prepare, what they should expect and how they should respond to an emergency at the nuclear facility.

An emergency preparedness information product should be distributed in hard copy annually to every residence, business and institution within the plume exposure planning zone, and posted on a variety of websites, including those of the licensees, municipalities and provincial emergency management organizations.

This should include information on:

- how they will be alerted
- how they will be notified or informed on what to do
- sheltering-in-place instructions
- evacuation orders
- how/when to take ITB agents, and where to get them if not pre-distributed
- contact details for where to obtain additional information, such as websites and social media sites

Licensees may, where possible, leverage existing communication channels (such as those used by local municipalities or those identified in the public information program).

In discussion with local authorities, licensees should consider providing public preparedness information with ITB packages when distributing to local populations.

Licensees can refer to Health Canada guidelines (Generic criteria and operational intervention levels for nuclear emergency planning and response .: H129-86/2018E-PDF - Government of Canada

Publications - Canada.ca) for information on public emergency preparedness for their public information program. Information is also available on the CNSC website. (https://nuclearsafety.gc.ca/eng/resources/educational-resources/feature-articles/potassium-iodide-KI-pills.cfm).

Provincial, or territorial authorities may provide instructions with regards to protective measures such as evacuation, sheltering in place, or administration of ITB. Similar emergency measures could also be taken on-site at licensed facilities. ITB can be used to protect the thyroid gland from radioactive iodine that may be released into the air in the unlikely event of a radiological or nuclear emergency. ITB only protects the thyroid gland from radioactive iodine; it is not effective against any other nuclear substance. Depending on the nature of the emergency, ITB is a protective measure that can be used in isolation or in combination with other protective measures (i.e., evacuation, shelter-in-place).

2.7 Program management

All licensees shall include, at a minimum, the following elements in their management systems:

1. a written policy statement issued by licensee senior management, committing all units of the organization to the system and its effective implementation
2. a program owner identified with the authority to ensure that resources are given to all aspects of the EP program
3. procedures describing the planned and systematic actions necessary to provide adequate confidence that all specified requirements are satisfied
4. procedures that specify who (position or unit) is to review and update the program on an ongoing basis, and how this is to be done
5. review and update EP program and associated documentation (e.g., response plan, training material, procedures, etc.) at defined intervals to take into account relevant factors, such as operating experience, changing needs or circumstances, and lessons learned from real events

Guidance

The EP program should be managed as part of a facility's overall management system. A management system is generally defined as a set of interrelated or interacting elements that establish policies and objectives, and that enables those objectives to be achieved safely, efficiently and effectively. The management system brings together the processes needed to satisfy EP program requirements in a planned and integrated manner.

The management system's requirements primarily aim to ensure that safety is not compromised, by considering the implications of all actions with regard to safety as a whole. Safety should be the paramount consideration, guiding decisions and actions, in the establishment of a management system.

As stated in their licences and licence conditions handbooks, licensees should:

- manage their EP programs in accordance with management system requirements
- detect and report deficiencies, and ensure all corrective actions are tracked and implemented as per management system requirements
- notify CNSC if any updates/revisions to EP affect other RegDocs (such as REGDOC-3.2.1, Public Information and Disclosure)

Appendix A: Plant parameters to be shared with the CNSC EOC for CANDUs for reactor status

Plant parameters to be shared with CNSC EOC for accident assessment and prognosis	Unit
Reactor Power	% FP
Shutdown System 1	Y/N
Shutdown System 2	Y/N
Boiler Level	m
Boiler Pressure	kPa (g)
Heat Transport System (HTS) Sub-Cooling Margin	-
HTS Status	Intact (Y/N)
HTS Header Level	m
HTS Temperature	°C
HTS Pressure	MPa (g)
HTS Storage Tank Level	m
Boiler Room Temperature	°C
Moderator Level	mm
Moderator Temperature	°C
Moderator Pressure	kPa (g)
Moderator Cover Gas Pressure	kPa (g)
End Shield Cooling (ESC) tank level	m
ESC Temperature	°C
Containment Isolation Signal Indication	Y/N
Containment / Reactor Building (RB) Activity	mrem/h
RB / Vault Pressure	kPa
RB Air Conditioning Units (ACUs)	Available? (Y/N)
H_2 Ignitors	ON/OFF
RB / Vault Temperature	°C
Pressure Relief Valve (PRV) Manifold pressure	kPa
Vacuum Building Pressure	kPa (a)
Vacuum Building Temperature	°C
Vacuum Building Water Level	m
Emergency Coolant Injection (ECI) Status	Activated? (Y/N)
ECI (ECC for PLGS) Water Storage Tank Level	m
ECI Recovery Sump Level	m
Dousing Tank Level	m
Emergency Water Storage Tank Level	m
Feedwater Activity	mrem/h
Primary Irradiated Fuel Bay (IFB) /Spent Fuel Reception Bay (SFRB) for PLGS Water Level	ft
Primary IFB/SFRB Water Temperature	°C
Primary IFB Gamma Readings	mrem/h
Primary IFB Airborne Radioactivity Sample	mrem/h
Secondary IFB/SFRB Water Level	ft
Secondary IFB/SFRB Water Temperature	°C
Secondary IFB Gamma Readings	mrem/h
Secondary IFB Airborne Radioactivity Sample	mrem/h
Electrical Systems (Class IV,III, Emergency Power Supply)	Available? (Y/N)
Radiation Fields at Station Boundary	mrem/h
Emergency Mitigating Equipment	Available? (Y/N)
CFVS Status	Available? (Y/N)

Abbreviations

AOO	abnormal operational occurrence
BDBA	beyond design basis accident
DBA	design basis accident
DSA	deterministic safety analysis
EOP	emergency operational procedure
EM	emergency management
EME	emergency mitigating equipment
EPZ	emergency planning zone
EP program	emergency preparedness program
ERF	emergency response facility
ERO	emergency response organization
ER plan	emergency response plan
FERP	Federal Emergency Response Plan
FNEP	Federal Nuclear Emergency Plan
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
ITB agent	iodine thyroid-blocking agent
KI	potassium iodide
NSCA	Nuclear Safety and Control Act
OM	operation manual
PPE	personal protective equipment
PSA	probabilistic safety analysis
SAMG	severe accident management guideline

Glossary [Currently not in REGDOC 3.6]

The following definitions will be relocated to REGDOC-3.6, *Glossary of CNSC Terminology*.

arrangements
The pre-determined integrated set of infrastructural elements necessary to provide the capability for performing a specified function or task required in response to a nuclear or radiological emergency. These elements may include hardware (e.g., equipment and instrumentation), authorities and responsibilities, organization, coordination, plans, procedures, personnel and training.

emergency planning zone (EPZ)
The offsite area around a facility for which emergency planning and preparation are done in advance, to ensure that necessary and effective protective actions can be taken to protect the public, property or the environment in case of an accident.

References

1. International Atomic Energy Agency (IAEA), IAEA Safety Standards Series, GSR Part 7, *Preparedness and Response for a Nuclear or Radiological Emergency*, Vienna, Austria, 2015.

2. IAEA, IAEA Safety Standards Series, GS-G-2.1, *Arrangements for Preparedness for a Nuclear or Radiological Emergency*. Vienna, Austria, 2007.

3. IAEA General Safety Guide No. GSG-11, *Arrangements for the Termination of a Nuclear or Radiological Emergency,* Vienna, Austria, 2018.

4. IAEA, *Preparation, Conduct and Evaluation of Exercises to Test Preparedness for a Nuclear or Radiological Emergency*, Vienna, Austria, 2005.

5. Canadian Nuclear Safety Commission (CNSC), REGDOC-2.3.2, *Accident Management*, Version 2, Ottawa, 2015.

6. CNSC, REGDOC-2.2.5, *Minimum Staff Complement,* Ottawa, 2019.

7. CNSC, REGDOC-2.5.2, *Design of Reactor Facilities, Version 2.1*, Ottawa, 2023.

8. CNSC, REGDOC-3.2.1., *Public Information and Disclosure*, Ottawa, 2018.

Additional Information

NOTE: With permission of the publisher, Canadian Standards Association (CSA) Group, all nuclear-related CSA standards may be viewed at no cost through the CNSC webpage "How to gain free access to all nuclear-related CSA standards".

1. CSA Group, CAN/CSA-Z731-02 *Emergency Preparedness and Response*, Mississauga, 2003.

2. CSA Group, N286-05, *Management System Requirements for Nuclear Power Plants*, Mississauga, reaffirmed 2010.

3. CSA Group, CAN/CSA-Z1600-08, *Emergency Management and Business Continuity Programs*. Mississauga, 2008.

4. Health Canada, *Canadian Guidelines for Intervention During a Nuclear Emergency*, Ottawa, 2003.

5. Health Canada, *Canadian Guidelines for the Restriction of Radioactively Contaminated Food and Water Following a Nuclear Emergency*, Ottawa, 2000.

6. International Commission on Radiological Protection, *The 2007 Recommendations of the International Commission on Radiological Protection*, ICRP Publication 103: Ann. ICRP 37(2-4), 2007.

7. International Commission on Radiological Protection, *Publication 146 Radiological Protection of People and the Environment in the Event of a Large Nuclear Accident*. Ann ICRP 49(4), 2020.

8. Health Canada, *Generic Criteria and Operational Intervention Levels for Nuclear Emergency Planning and Response*, Ottawa, 2018.

9. Health Canada, *Guidance on Planning for Recovery Following a Nuclear or Radiological Emergency*, Ottawa, 2020.

10. United States Nuclear Regulatory Commission, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants* (NUREG-0654/FEMA-REP-1), Washington, DC, 2019.