
# Provincial Nuclear Emergency Response Plan (PNERP)

# Implementing Plan for the Bruce Nuclear Generating Station (BNGS)

## January 2019

Prepared by Office of the Fire Marshal and Emergency Management

Ministry of Community Safety and Correctional Services

Ontario

**Executive Council of Ontario**
**Order in Council**

On the recommendation of the undersigned, the Lieutenant Governor of Ontario, by and with the advice and concurrence of the Executive Council of Ontario, orders that:

**Conseil exécutif de l'Ontario**
**Décret**

Sur la recommandation de la personne soussignée, la lieutenante-gouverneure de l'Ontario, sur l'avis et avec le consentement du Conseil exécutif de l'Ontario, décrète ce qui suit:

WHEREAS section 8 of the *Emergency Management and Civil Protection Act*, as amended, requires the Lieutenant Governor in Council to formulate an emergency plan respecting emergencies arising in connection with nuclear facilities;

AND WHEREAS pursuant to O.C. 2317/2017, the *Provincial Nuclear Emergency Response Plan (PNERP) Master Plan 2017* was adopted by the Lieutenant Governor in Council as an emergency plan respecting emergencies arising in connection with nuclear facilities formulated under section 8 of the *Emergency Management and Civil Protection Act*, as amended;

AND WHEREAS pursuant to O.C. 618/2018 the Lieutenant Governor in Council adopted the "*Provincial Nuclear Emergency Response Plan (PNERP) Implementing Plan for the Bruce Nuclear Generating Station*" (the "Bruce Implementing Plan, March 2018"), as an emergency plan under section 8 of the *Emergency Management and Civil Protection Act*, as amended;

AND WHEREAS the Bruce Implementing Plan, March 2018 has been amended;

THEREFORE the document entitled "*Provincial Nuclear Emergency Response Plan (PNERP) Implementing Plan for the Bruce Nuclear Generating Station (BNGS)" dated January 2019*, (the "Bruce Implementing Plan, January 2019") is hereby adopted as an emergency plan under section 8 of the *Emergency Management and Civil Protection Act*, as amended, and replaces the Bruce Implementing Plan, March 2018.

**O.C./Décret:** 128/2019

AND THAT Order in Council O.C. 618/2018 dated March 27, 2018 be revoked.

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ATTENDU QUE l'article 8 de la *Loi sur la protection civile et la gestion des situations d'urgence*, dans sa version modifiée, exige que le lieutenant-gouverneur en conseil établisse un plan de mesures d'urgence relatif aux situations d'urgence liées aux installations nucléaires;

ATTENDU QU'en vertu du décret numéro 2317/2017, la lieutenante-gouverneure en conseil a adopté le *Plan provincial d'intervention en cas d'urgence nucléaire (PPIUN) – Plan directeur 2017* à titre de plan de mesures d'urgence relatif aux situations d'urgence liées aux installations nucléaires établi en vertu de l'article 8 de la *Loi sur la protection civile et la gestion des situations d'urgence*, dans sa version modifiée;

ATTENDU QU'en vertu du décret numéro 618/2018, la lieutenante-gouverneure en conseil a adopté le « *Plan provincial d'intervention en cas d'urgence nucléaire (PPIUN) – Plan de mise en œuvre pour la centrale nucléaire de Bruce* » (le « Plan de mise en œuvre pour Bruce de mars 2018 ») comme plan de mesures d'urgence en vertu de l'article 8 de la *Loi sur la protection civile et la gestion des situations d'urgence*, dans sa version modifiée;

ATTENDU QUE le Plan de mise en œuvre pour Bruce de mars 2018 a été modifié;

EN CONSÉQUENCE, le document intitulé « *Plan provincial d'intervention en cas d'urgence nucléaire (PPIUN) – Plan de mise en œuvre pour la centrale nucléaire de Bruce (PCNB)* », daté de janvier 2019 (le « Plan de mise en œuvre pour Bruce de janvier 2019 »), est par les présentes adopté comme plan de mesures d'urgence en vertu de l'article 8 de la *Loi sur la protection civile et la gestion des situations d'urgence*, dans sa version modifiée, et remplace le Plan de mise en œuvre pour Bruce de mars 2018.

EN OUTRE, le décret numéro 618/2018, daté du 27 mars 2018, est révoqué.

**Recommended:** Minister of Community Safety and Correctional Services
**Recommandé par:** Ministre de la Sécurité communautaire et des Services correctionnels

**Concurred:** Chair of Cabinet
**Appuyé par:** Le président/la présidente du Conseil des ministres,

**Approved and Ordered:**
**Approuvé et décrété le:** JAN 3 1 2019

**Lieutenant Governor**
**La lieutenante-gouverneure**

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# Tables and Figures

# Foreword

**The province of Ontario's Nuclear Emergency Response Plan** has been developed pursuant to **Section 8** of the *Emergency Management and Civil Protection Act*, R.S.O. 1990, c. E. 9 (hereafter referred to as the *Emergency Management and Civil Protection Act* or *EMCPA*). The current edition of this plan supersedes and replaces all older versions which should be destroyed.

Holders of the *Provincial Nuclear Emergency Response Plan Implementing Plan for the Bruce Nuclear Generating Station* are responsible for keeping it updated by incorporating amendments, which may be issued from time to time.

This plan is administered by the **Minister of Community Safety and Correctional Services of Ontario**. All comments and suggestions relating to it should be directed to:

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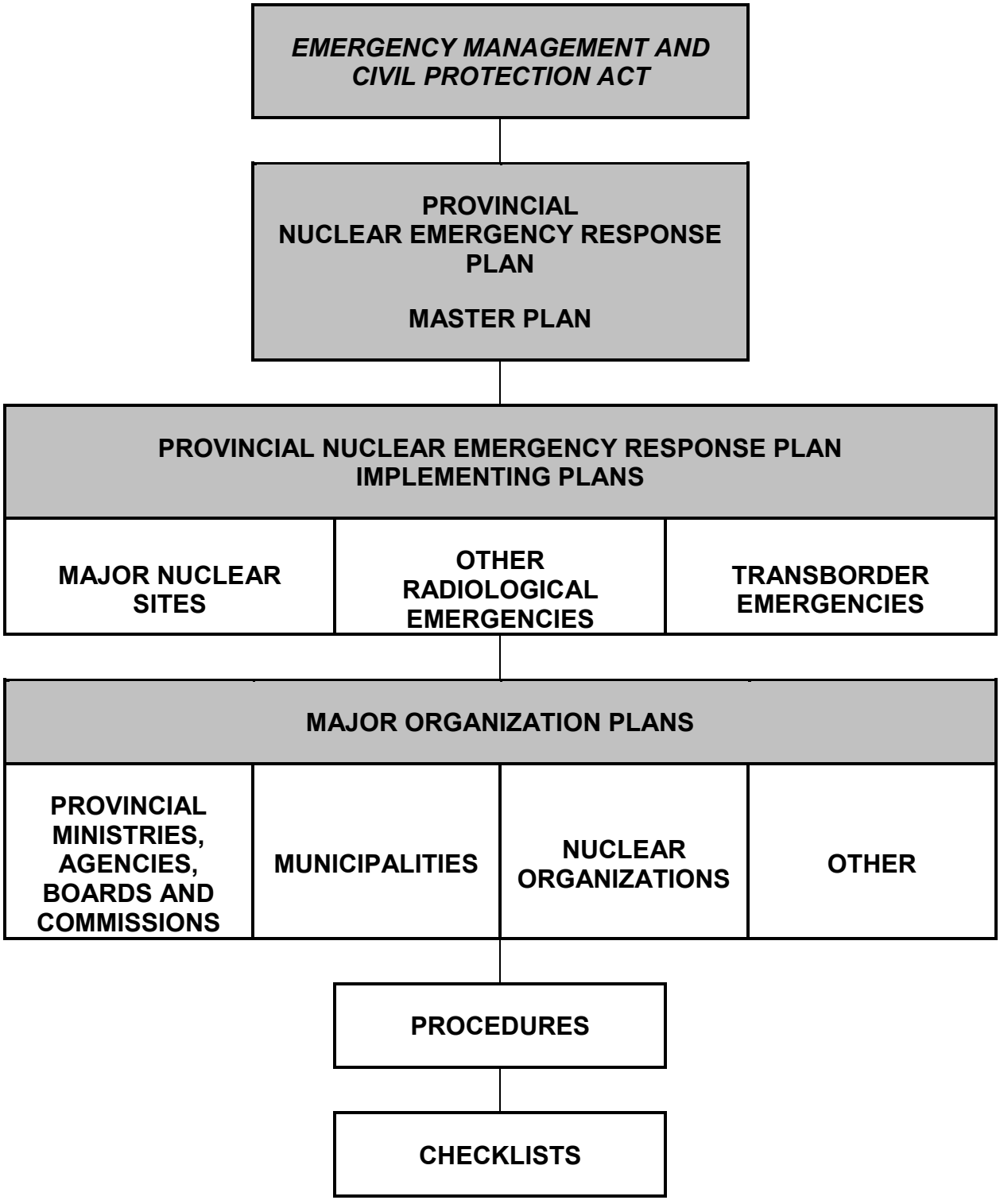
http://www.ontario.ca/gdu (French version)

**Figure I: Nuclear and Radiological Emergency Response Planning Structure**



# Nuclear and Radiological
# Emergency Response Planning Structure

The structure for nuclear and radiological emergency response planning in Ontario, illustrated on the previous page, consists of the following components:

a) The **Provincial Nuclear Emergency Response Plan (PNERP)**; developed pursuant to Section 8 of the EMCPA and subject to Cabinet approval:

- **The Master Plan**: sets out the overall principles, policies, basic concepts, organizational structures and responsibilities.

- **The Implementing Plans**: the elements of the **Master Plan** are applied to each major nuclear site, *transborder emergencies* and other types of *radiological emergencies*, and detailed provincial implementing plans developed. The major organization plans (as per **Figure I**) should be consistent with the requirements of these implementing plans.

b) **Major organization plans**: Each major organization involved (e.g., provincial ministries, agencies, boards and commissions, municipalities, and nuclear organizations, etc.) develops its own plan to carry out the relevant roles, responsibilities and tasks agreed to by them and consistent with their mandate. These plans are based on, and *should* be consistent with the **PNERP** and its Implementing Plans.

c) **Procedures**: Based on all of the above plans, procedures are developed for the various *emergency* centres to be set up and for the various operational functions required.

d) **Checklists**: The culmination of the planning process is the development of checklists based on the requirements of the procedures, e.g., individual position or function-specific checklists.

All emergency organizations involved in the preparation and implementation of the *Provincial Nuclear Emergency Response Plan should* employ common terminology. The terminology contained in the Glossary, **Annex D**, *should* be used for this purpose by all concerned. Words or phrases defined in the Glossary are italicized within the text of this document. Further reference information can be found in the Incident Management System (IMS) doctrine at www.ontario.ca/ims.

# Acronyms and Abbreviations

| | |
|---|---|
| AAZ | Automatic Action Zone |
| ALARA | As Low As Reasonably Achievable |
| ARGOS | Accident Reporting and Guidance Operational System |
| BDBA | Beyond Design Basis Accident |
| Bq | Becquerel |
| BWR | Boiling Water Reactor |
| CANDU | Canada Deuterium Uranium (reactor) |
| CCEM | Cabinet Committee on Emergency Management |
| CEOC | Community Emergency Operations Centre |
| CEOF | Corporate Emergency Operations Facility |
| CFIA | Canadian Food Inspection Agency |
| CMOH | Chief Medical Officer of Health |
| CNSC | Canadian Nuclear Safety Commission |
| CPZ | Contingency Planning Zone |
| CRL | Chalk River Laboratories |
| CSA | Canadian Standards Association |
| DBA | Design Basis Accidents |
| DNGS | Darlington Nuclear Generating Station |
| DPZ | Detailed Planning Zone |
| ECCC | Environment and Climate Change Canada |
| ECI | Emergency Coolant Injection |
| EIC | Emergency Information Centre |
| EMCPA | Emergency Management and Civil Protection Act |

| | |
|---|---|
| EME | Emergency Mitigating Equipment |
| EMST | Environmental Monitoring and Surveillance Team |
| ENDM | Ministry of Energy, Northern Development and Mines |
| EOC | Emergency Operations Centre |
| EPZ | Emergency Planning Zone |
| ERAMG | Environmental Radiation and Assurance Monitoring Group |
| FADS | Filtered Air Discharge System |
| FNEP | Federal Nuclear Emergency Plan |
| FNEP TAG | FNEP Technical Assessment Group |
| GC | Generic Criteria |
| GOC | Government Operations Centre |
| Gy | Gray |
| HC | Health Canada |
| HIRA | Hazard Identification Risk Assessment |
| IAEA | International Atomic Energy Agency |
| IMS | Incident Management System |
| INES | International Nuclear Event Scale |
| IPZ | Ingestion Planning Zone |
| ITB | Iodine Thyroid Blocking |
| KI | Potassium Iodide |
| km | Kilometre |
| LGIC | Lieutenant Governor in Council |
| LOCA | Loss-of-Coolant Accident |
| MCCSS | Ministry of Children, Community and Social Services |

| | |
|---|---|
| MCSCS | Ministry of Community Safety and Correctional Services |
| MDU | Monitoring and Decontamination Unit |
| MEOC | Ministry Emergency Operations Centre |
| Met | Meteorology, meteorological |
| MLDP | Modèle Lagrangien de Dispersion de Particules |
| MMAH | Ministry of Municipal Affairs and Housing |
| MNRF | Ministry of Natural Resources and Forestry |
| MECP | Ministry of Environment, Conservation and Parks |
| MOHLTC | Ministry of Health and Long-Term Care |
| MOL | Ministry of Labour |
| MOU | Memorandum of Understanding |
| MTO | Ministry of Transportation, Ontario |
| MW | Megawatts |
| NAADS | National Alert Aggregation and Dissemination System |
| NGS | Nuclear Generating Station |
| NIG | Nuclear Incident Group |
| NRCan | Natural Resources Canada |
| OIL | Operational Intervention Level |
| OMAFRA | Ontario Ministry of Agriculture, Food and Rural Affairs |
| OPP | Ontario Provincial Police |
| PCEIO | Provincial Chief Emergency Information Officer |
| PEOC | Provincial Emergency Operations Centre |
| PLERP | Provincial Liquid Emission Response Plan |
| PNERP | Provincial Nuclear Emergency Response Plan |

| | |
|---|---|
| PNGS | Pickering Nuclear Generating Station |
| PPE | Personal Protective Equipment |
| RD | Radiological Device |
| RDD | Radiological Dispersal Device |
| RED | Radiological Exposure Device |
| RHRP | Radiation Health Response Plan |
| RIMPUFF | Risø Mesoscale PUFF |
| SAMG | Severe Accident Management Guidelines |
| URI | Unified RASCAL Interface |
| USA | United States of America |
| UTCC | Unified Transportation Coordination Centre |
| UTMP | Unified Transportation Management Plan |

# Chapter 1
# SCOPE AND AUTHORITY

## 1.1 Aim

The aim of the **Provincial Nuclear Emergency Response Plan (PNERP) Implementing Plan for the Bruce Nuclear Generating Station (BNGS)** is to describe the measures that *should* be undertaken to *mitigate* the off-site effects of a *nuclear emergency* at BNGS.

## 1.2 Scope

1.2.1 This implementing plan *shall* be read and applied in the context of the **PNERP Master Plan**.

1.2.2 In case of any apparent differences between the provisions of the **PNERP Master Plan** and this Implementing Plan, the latter being more detailed and specific is applicable.

1.2.3 Together, these two plans focus on provincial level actions and should therefore be supplemented by the appropriate municipal plans and other supporting plans and procedures (see **Sections 1.3** and **1.4** below).

1.2.4 OFMEM *shall* establish and communicate guidance to verify stakeholder conformance with the PNERP Master Plan and this Implementing Plan.

## 1.3 Designated and Support Municipalities

1.3.1 Designated Municipalities

a) The Municipality of Kincardine is the *Designated Municipality* in the *Detailed Planning Zone* with respect to BNGS (**PNERP Master Plan, Annex A**).

b) The Town of Saugeen Shores is a *Designated Host Municipality* with respect to BNGS (**PNERP Master Plan, Annex A**).

c) In this document the terms “municipal” and “*Municipality*” *shall* include, unless the context indicates otherwise, the *Designated Municipality*, as well as the local police services and local boards whose area of operation includes the area covered by the municipal plans.

d) Pursuant to **Section 3(4)** of the *EMCPA*, as *Designated Municipalities*, the Municipality of Kincardine and Town of Saugeen Shores *shall* formulate plans to mitigate the off-site consequences of nuclear emergencies at BNGS.

e) These plans *shall* also contain, where applicable, arrangements for the provision of services and assistance by municipal departments, local police services, fire services, paramedic services, hospitals and local boards.

f) The plans prepared by the *Designated Municipalities* and by these other organizations, are collectively referred to as “municipal plans” in this document.

g) As required by **Section 8** of the *EMCPA*, municipal *nuclear emergency response* plans *shall* conform to the **PNERP** and be subject to the approval of the Solicitor General (this function is fulfilled by the Minister of Community Safety and Correctional Services). The Solicitor General may make such alterations as considered necessary for the purpose of coordinating the municipal plan with the province’s plan.

1.3.2 Support Municipalities

a) In the event of a declared *emergency*, the Lieutenant Governor in Council (LGIC) or the Premier may order a *Municipality* to provide support or assistance to *Designated Municipalities* or to affected *municipalities*. Such orders, if made, would be authorized by **Sections 7.0.2(4)** or **7.0.3** of the *EMCPA*.

b) Support and assistance may include, but *shall* not be limited to, personnel, equipment, services and material.

## 1.4 Supporting Plans and Procedures

1.4.1 Other jurisdictions and organizations that have, or are assigned, some responsibility for responding to a BNGS *emergency should* develop appropriate plans or procedures for carrying out their roles and tasks. They include:

a) Provincial ministries, including:

i. MOHLTC and the Radiation Health Response Plan

ii. MTO and the Unified Transportation Management Plan

iii. MCSCS and the Environmental Radiation and Assurance Monitoring Group (ERAMG) Plan

iv. MCSCS and the Provincial Liquid Emission Response Plan (PLERP)

b) Municipal departments, local police services, local boards and other agencies assigned roles and responsibilities in the municipal plans.

c) The BNGS *operator's nuclear emergency* plan and emergency procedures.

1.4.2 Radiation Health Response Plan (RHRP)

a) The MOHLTC issues the **RHRP** as an organizational plan under the **PNERP**.

b) The RHRP establishes the roles and responsibilities, operational concepts and *response* principles for coordinating the provincial *response* of health organizations during a *nuclear emergency*.

1.4.3 Unified Transportation Management Plan (UTMP)

a) The BNGS **UTMP**, an organizational plan under the **PNERP**, shall be issued by the Ministry of Transportation (MTO), for the management of evacuating traffic in the Detailed Planning Zone as well as the traffic impact beyond it.

b) Representatives of the OPP and local police services, municipal road authorities and emergency services shall cooperate with MTO in the development and maintenance of the **UTMP** and in its implementation during a *nuclear emergency* response through the Unified Transportation Coordination Centre (UTCC).

c) The **UTMP** shall be designed to meet the requirements of the provincial and municipal *nuclear emergency* plans. For specific guidance see the following:

i. **Section 3.1.3** Unified Transportation Coordination Centre (UTCC)

ii. **Section 3.4** Telecommunications

iii. **Section 4.3** Internal Notifications

iv. **Section 4.6** Early Phase Response

v. **Section 5.3.1** Evacuation

vi. **Section 6.6** Entry Control

vii. **Section 6.7** Transportation Management

### 1.4.4 Environmental Radiation and Assurance Monitoring Group (ERAMG) Plan

The Environmental Radiation and Assurance Monitoring Group (ERAMG) Plan issued by MCSCS (OFMEM) *shall* describe the means by which the environment, water, milk and foodstuffs are sampled and analyzed during a nuclear or radiological emergency, to determine their safety.

### 1.4.5 Provincial Liquid Emission Response Plan (PLERP)

The **PLERP** for BNGS is an organizational plan issued by the MCSCS (OFMEM) to *mitigate* the effects of a waterborne *release* from a *reactor facility* resulting in discharges with above normal levels of radioactivity. Additional guidance on the application of the PLERP coincident with a *nuclear emergency* is provided in **Section 6.10**.

# Chapter 2
# THE PLANNING BASIS

## 2.1 General

2.1.1 This implementing plan details the response to an *emergency* at the Bruce Nuclear Generating Station (BNGS).

2.1.2 BNGS is located at latitude 44° 20' North and longitude 81° 35' West, on the shores of Lake Huron.

2.1.3 BNGS consists of two generating stations (Bruce 'A' and Bruce 'B'). Bruce 'A' houses 4 CANDU nuclear reactors, each having a power generating capacity of 750 megawatts. The CANDU reactors at Bruce 'B' have 4 reactors of 822 megawatts.

2.1.4 **Figure 2.1** shows a schematic diagram of a CANDU reactor.

## 2.2 The Hazard

2.2.1 If an *accident* were to occur at BNGS, the most probable result would be that its effects would be confined within the station boundary because of the facility's designed safety systems, structures and components.

2.2.2 *Nuclear emergency preparedness* requires a planning basis which considers both *design basis accidents,* and significantly less probable *beyond design basis accidents* (BDBAs), including *severe accidents* and multi-unit scenarios where applicable. For a detailed explanation regarding the basis for these reference *accidents*, refer to **PNERP Master Plan, Annex L - PNERP Planning Basis Background**.

2.2.3 Design Basis Accidents (DBA)

a) The DBA *release* provides the main platform for detailed planning and is generally characterized by one or more of the following:

i. Station *containment* systems function normally allowing *radiation* to start decaying prior to a controlled *release*.

ii. Sufficient time would be available to alert the public and implement *protective measures* prior to a *release*.

iii. The main radiological hazard to people would be external *exposure* to, and inhalation of, *radionuclides*.

iv. Filter systems function to remove almost all of the radioactive particulate and *radioiodine*. As a result, the *plume* would be mostly composed of inert noble gasses which would dissipate and do not pose a *contamination* hazard.

v. *Radiation doses* to the public would likely be below the *generic criteria* (GC) as defined in **PNERP Master Plan, Annex E**.

vi. Environmental *contamination* would be limited to very low levels.

vii. Low-level radioactive *releases* to the environment could occur on and off for some time (e.g., days or weeks).

b) An example of a *design basis accident* scenario is a *Loss-of-Coolant Accident* (LOCA), with the following typical progression:

i. The reactor building would “box-up” preventing any immediate *releases*. A “box-up” is a condition whereby all possible release pathways to the environment, such as ventilation stacks, are closed.

ii. Duct connections from the reactor building to the vacuum building would open, thereby reducing the former’s internal pressure to below atmospheric pressure, drawing *radioactive material released* from the damaged reactor fuel into the vacuum building. During this holdup time (e.g., 2 ½ days) the contained radioactivity would decay.

iii. If at any stage the pressure in the *containment* system nears atmospheric pressure, the contained radioactivity may be vented through filters to the environment. Such *venting* could be intermittent or continuous but may last for weeks (see **Section 4.6.6**). The level of radioactivity being *released* would progressively decline with time.

iv. Suitable meteorological conditions may make it possible to vent some of this contained radioactivity through filters in a direction away from populated areas. It may be possible to do this several times.

2.2.4 Beyond Design Basis Accidents (BDBA)

a) One or more of the following may define a BDBA:

i. Station *containment* systems may be impaired leading to significantly reduced hold up time and decay of *radioactive materials*.

ii. An early *release* of radioactivity from a BDBA with limited warning time.

iii. An uncontrolled *release* of radioactivity from a BDBA with limited warning time.

iv. The *plume* could include *radioiodine* and particulates along with noble gases.

v. *Radiation doses* could potentially be high.

vi. Environmental *contamination* could be quantitatively significant in both extent and duration.

vii. The area affected could extend beyond the *Detailed Planning Zone*.

viii. A multi-unit *accident* (i.e., an *accident* involving more than one reactor).

b) BDBAs which go unmitigated may evolve into *severe accidents* involving fuel degradation in the reactor core.

c) The response to BDBAs, including *severe accidents*, is facilitated by dedicated emergency mitigating equipment in addition to the measures already in place to respond to DBAs (see **Section 2.2.3** above) and the ability to expand their function.

d) The following additional planning and *preparedness* actions *shall* be conducted to *mitigate* the much less probable, but possibly more severe, *off-site* effects of BDBAs:

i. pre-distribution of Potassium Iodide (KI) pills (see **Section 5.3.3)**

ii. automatic, default actions to initiate public *alerting* (see **Section 6.2**) and to direct the implementation of protective actions, including *sheltering-in-place* (see **Section 5.3.4**) and *evacuation* (see **Section 5.3.1**)

iii. timely dispatch of aerial and ground monitoring teams to determine areas of *contamination* (see **Section 4.7.3**)

iv. priority *evacuations* for those closest to the hazard (see **Section 5.3.1**)

v. extension of protection actions to the Contingency Planning Zone (CPZ), if required, to reduce potential for exposure

vi. *radiation* monitoring and, if necessary, *decontamination* of persons (see **Section 6.9**)

vii. medical assessment, treatment and counselling as required (see **Section 6.9**)

## 2.3 Protective Actions

2.3.1 The protective actions available for minimizing the *radiation* hazard in a *nuclear emergency* include:

a) *precautionary measures*

b) *exposure control* measures

c) *ingestion control* measures

2.3.2 These measures are listed in **Table 2.1** below and defined in the glossary (**Annex D**).

2.3.3 The operational use of these measures is described in appropriate sections of this plan.

**Table 2.1 Protective Actions for a Nuclear Emergency Response**

| Precautionary Measures | Exposure Control Measures | Ingestion Control Measures |
|---|---|---|
| • Closing of beaches, recreation areas, etc.<br>• Closing of workplaces and schools<br>• Suspension of non-critical patient admissions in hospitals | • Sheltering-in-place<br>• Iodine Thyroid Blocking<br>• Evacuation | • Milk control<br>• Water control<br>• Pasture control<br>• Produce and crop control<br>• Livestock control |

## 2.4 Planning Zones

2.4.1 Automatic Action Zone (AAZ)

a) The AAZ is a pre-designated area immediately surrounding a *reactor facility* where pre-planned protective actions would be implemented by default on the basis of *reactor facility* conditions with the aim of preventing or reducing the occurrence of severe *deterministic effects*.

b) The BNGS AAZ is the area immediately surrounding the *reactor facility* extending out to an approximate radius of 3 kilometres.

c) The *Automatic Action Zone* comprises *Detailed Planning Zone* (DPZ) *response sector* 1 (see **Figure 2.2**) and includes an area adjacent to the BNGS Site boundary from Concession 8 to Inverhuron Provincial Park and extending east to Lake Range Road, Concession 6, the bluff and Concession 2.

2.4.2 Detailed Planning Zone (DPZ)

a) The DPZ is a pre-designated area surrounding a *reactor facility*, incorporating the *Automatic Action Zone*, where pre-planned protective actions are implemented as needed on the basis of *reactor facility* conditions, *dose* modelling, and environmental monitoring, with the aim of preventing or reducing the occurrence of *stochastic effects*.

b) The BNGS DPZ is the area immediately surrounding the *reactor facility* extending out to an approximate radius of 10 kilometres.

c) The *Detailed Planning Zone* for BNGS is shown in **Figure 2.2**. It includes the area within the Municipality of Kincardine bounded generally by County Road 11 and Concession 14 to the north, 10 Sideroad to the east, and Concession 7 to the south, but excluding the BNGS Site. The *Detailed Planning Zone* extends westward into Lake Huron to a radius of 10 kilometres. The exact boundaries of the zone can be determined from **Annex A**.

2.4.3 Contingency Planning Zone (CPZ)

a) The CPZ is a pre-designated area surrounding a *reactor facility*, beyond the *Detailed Planning Zone* (see **Paragraph 2.4.2 c)** above), where contingency planning and arrangements are made in advance, so that during a *nuclear emergency*, protective actions can be extended beyond the *Detailed Planning Zone* as required to reduce potential for *exposure*.

b) The BNGS CPZ is shown in **Figure 2.3** and includes the area between 10 and 20 kilometres surrounding the *reactor facility*.

c) Additional CPZ guidance is provided in **Annex C**.

2.4.4 Ingestion Planning Zone (IPZ)

a) The IPZ (see **Figure 2.3)** is a pre-designated area surrounding a *reactor facility* where plans or arrangements are made to:

i. protect the food chain

ii. protect drinking water supplies

iii. restrict consumption and distribution of potentially contaminated produce, wild-grown products, milk from grazing animals, rainwater, animal feed

Note: Wild-grown products can include mushrooms and game.

iv. restrict distribution of non-food commodities until further assessments are performed

b) The BNGS IPZ encompasses all areas of the Counties of Bruce, Grey and Huron that lie within a 50 km radius of the Bruce Nuclear Generating Station. The *Ingestion Planning Zone* includes the *Automatic Action Zone*, *Detailed Planning Zone and Contingency Planning Zone*. **Figure 2.3** also shows the sub-zones of the *Ingestion Planning Zone*.

## 2.5 Response Sectors

2.5.1 The *Detailed Planning Zone* for BNGS is divided into 9 *response sectors* which fall into the following sector rings around the station:

| | |
|---|---|
| *Automatic Action Zone* | Sector 1 and lake sector 7 |
| Inner Ring | Sectors 2, 3 and lake sector 8 |
| Outer Ring | Sectors 4, 5, 6 and lake sector 9 |

2.5.2 The boundaries of the DPZ *response sectors* are shown in **Figure 2.2**, and are detailed in **Annex A**.

## 2.6 Planning Data, Interface and Support

### 2.6.1 Planning Times for Radioactive Emissions

a) The time interval between the occurrence of an *accident* at BNGS and the commencement of an emission depends on the condition and functioning of the station *containment* system and on the effectiveness and timing of the actions taken by station *operators* to reduce the rate of vacuum structure repressurization thus prolonging the holdup and decay of *radioactive material* within *containment*.

b) For a normally functioning *containment* system, a minimum interval of 2 1/2 days (between the occurrence of the *accident* and the commencement of an emission) can be used for planning purposes.

c) When controlled *venting* is required (see **Section 4.6.6**), intermittent filtered releases of varying durations could continue for many weeks.

d) In the exceptional situation where the *containment* system was impaired, an emission could commence much earlier; in some cases, very soon after the *accident* and, the emission may be continuous.

### 2.6.2 Municipal Planning Data

*Designated Municipality nuclear emergency* plans *shall* detail the planning data necessary to undertake an effective *nuclear emergency* response. This data *should* be organized according to *planning zones*, sub-zone and response sector, and include:

a) population estimates (see **Annex B**)

b) institutional data

c) critical infrastructure

### 2.6.3 Evacuation Time Estimates

a) *Evacuation* time estimate studies *shall* be prepared and regularly updated to facilitate transportation planning and the management of transportation during a response.

b) *Evacuation* time estimate studies *shall* be developed in accordance with NUREG/CR-7002, **Criteria for Development of Evacuation Time Estimate Studies**, or similar standard.

c) *Evacuation* time estimates *shall* be based on current census data and future population growth projections until end of life of the *reactor facility* and take into consideration shadow *evacuations*[1].

d) The Province, *Designated Municipalities* and reactors facilities *shall* agree on their respective role in the development and maintenance of public evacuation time estimates and where they are documented.

e) *Nuclear emergency* response plans of provincial ministries, *Designated Municipalities* and reactor facilities shall identify:

   i. Their respective role in the development and maintenance of public *evacuation* time estimates.

   ii. Where public *evacuation* time estimates are documented.

2.6.4 Interface and Support

a) The BNGS operator *shall* provide an interface and support for OFMEM in accordance with the PNERP Master Plan and regulatory requirements[2].

b) For BNGS, this ensures that in the unlikely event of containment *venting* (see **Section 4.6.6**):

   i. There is a designated person onsite at all times with the authority for *venting*.

   ii. The Province, *Designated Municipalities* and Canadian Nuclear Safety Commission (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 these stakeholders as early as possible.

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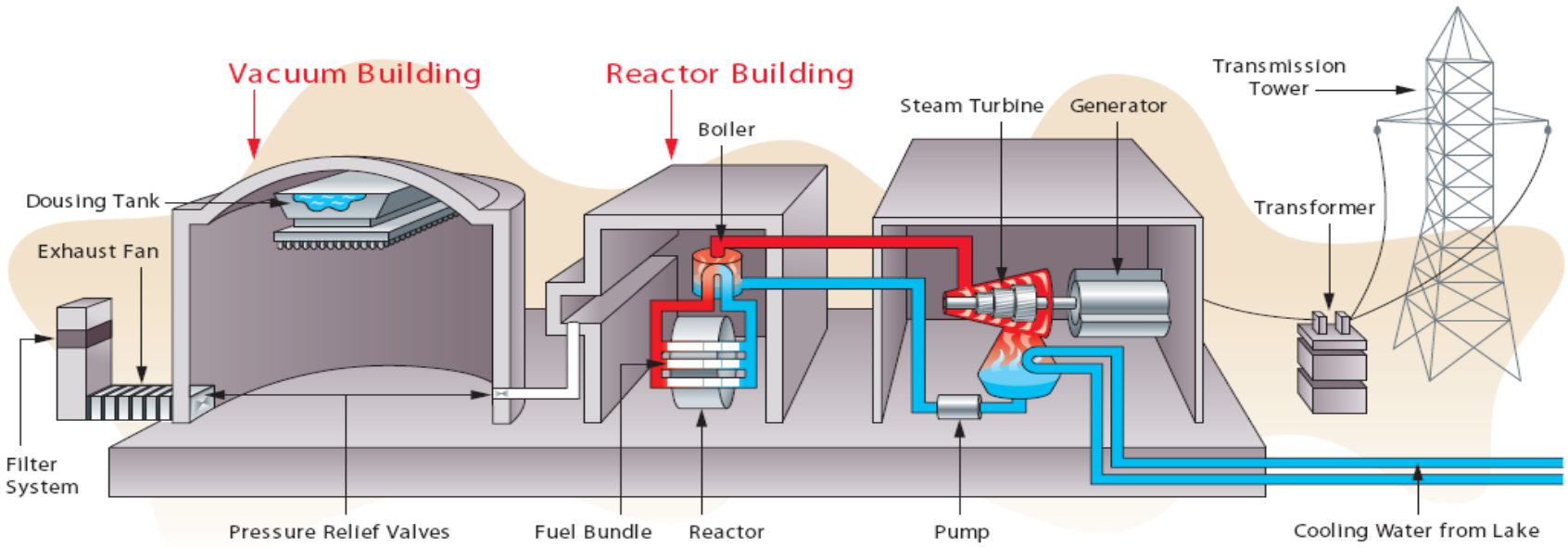
[1] "Shadow evacuation" is the term used to describe when people beyond the officially declared evacuation zone who are not directly affected by a *nuclear emergency* choose to voluntarily leave the area.

[2] Clause 2.2.4 of REGDOC 2.10.1 Nuclear Emergency Preparedness and Response.

**Figure 2.1: Nuclear Generating Unit Schematic of a CANDU Pressurized Heavy Water Reactor[3]**




[3] Nuclear Generating Unit Schematic – CANDU Pressurized Heavy Water Reactor is a generic diagram.

**Figure 2.2: Detailed and Contingency Planning Zones**

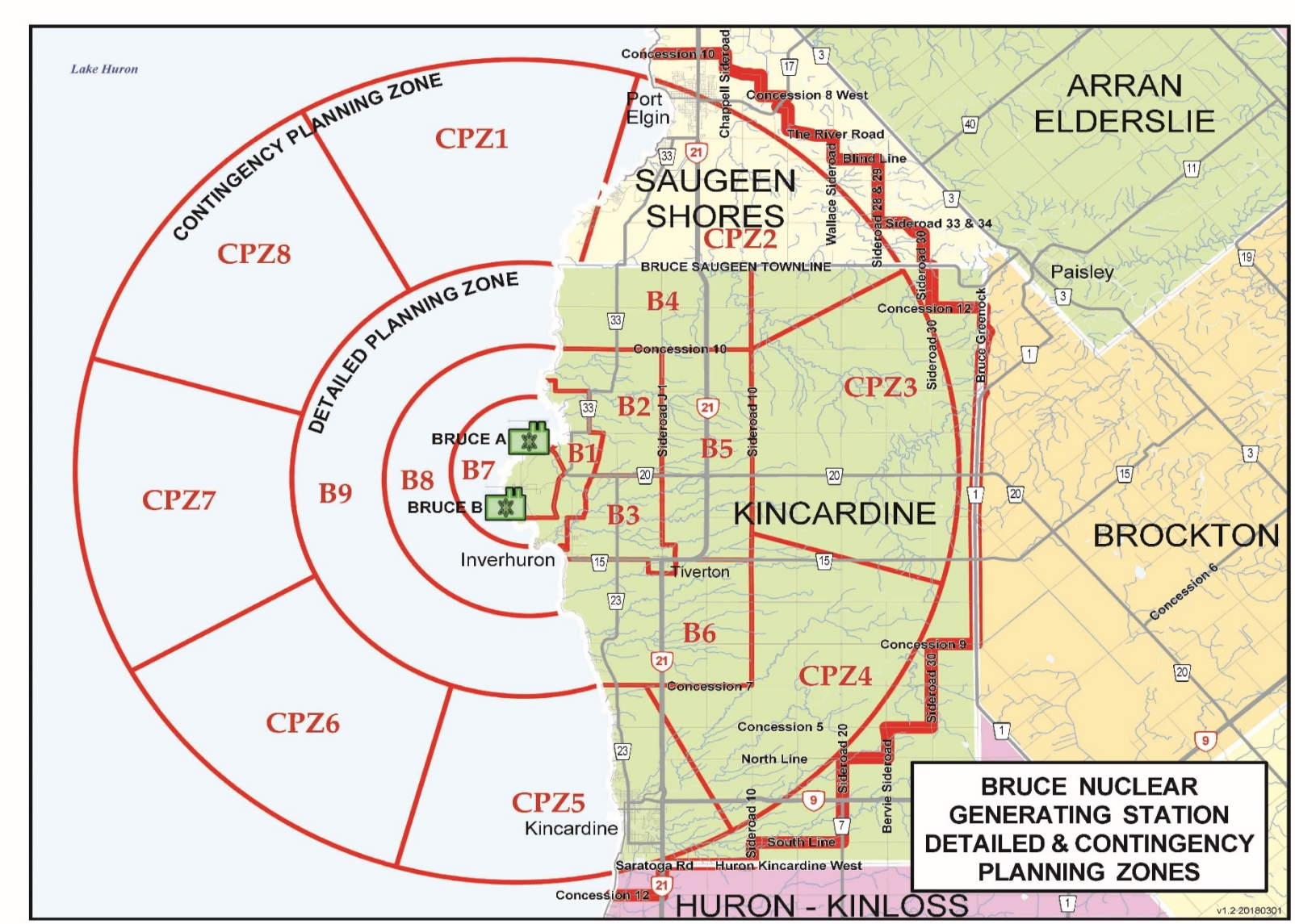
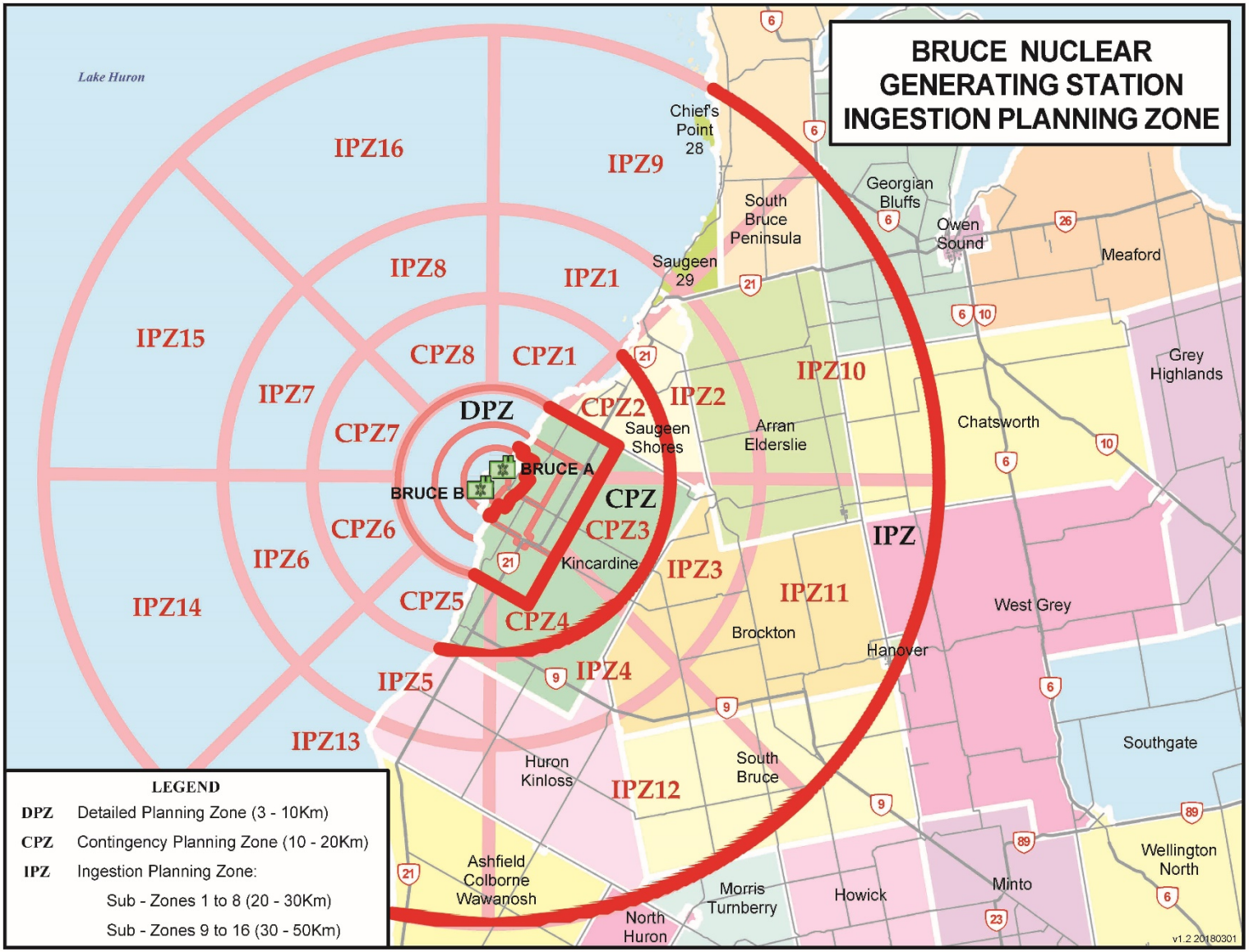


**Figure 2.3: Ingestion Planning Zone**



# Chapter 3
# EMERGENCY RESPONSE ORGANIZATION AND FACILITIES

## 3.1 Emergency Response Organization

3.1.1 The provincial *Emergency Response Organization* for managing a *nuclear emergency* at Bruce Nuclear Generating Station is shown in **Figure 3.1** and detailed in the **PNERP Master Plan, Chapter 4**.

3.1.2 Liaison Arrangements

a) To ensure liaison and coordination between different elements of the *Emergency Response Organization*, the following arrangements and agreements *shall* be made:

i. Each federal department and provincial ministry with a role in the *emergency* response to provide a representative to join the PEOC.

ii. The BNGS *operator* to provide:

- a liaison officer to the Municipal EOC (see **Paragraph 3.1.2 b)** below for functions)
- a corporate liaison representative to join the PEOC Operations Group
- a technical support staff to support the PEOC Nuclear Incident Group (NIG) if requested and resources are available

iii. Provincial staff to be deployed to join the Municipal Emergency Operations Centres (EOCs).

b) The role of the BNGS *operator* liaison officer at the Municipal EOC is to act as a link to the station in respect of the following types of issues:

i. BNGS operator support to the Municipalities, e.g., Monitoring and Decontamination Units and Emergency Worker Centres.

ii. Requests for mutual assistance (e.g., for additional *personal monitoring* resources, potassium iodine tablets, fire or paramedic services at Bruce Nuclear Generating Station etc.).

iii. Coordination of the *evacuation* of non-essential station staff, and of the movement of essential staff to and from the site.

iv. Facilitating the work of the *off-site* field monitoring teams.

v. Providing situational updates related to the *emergency* at the *reactor facility*.

vi. Providing technical briefings to the Municipal EOC staff in order to clarify the context within which the operational situation may be understood.

3.1.3 Unified Transportation Coordination Centre (UTCC)

A UTCC *shall* be set up and staffed for a BNGS *emergency* to implement the **UTMP** upon *notification* of either a partial or full *activation* response by the province.

3.1.4 Provincial Ministry Offices

The following regional, district and area offices of provincial ministries *shall* be prepared to respond to the *emergency* and provide the necessary assistance to the *Designated Municipalities*, as required by the **PNERP Master Plan**, **Annex I** and detailed in municipal plans or, as directed by their respective ministries:

a) Agriculture, Food and Rural Affairs - Clinton Office

b) Children, Community and Social Services - Southwest Region Office

c) Community Safety and Correctional Services, OPP - Western Region

d) Environment, Conservation and Parks - Southwestern Region Office and Owen Sound Area Office

e) Labour - Western Region, Hamilton and Radiation Protection Services, Toronto

f) Municipal Affairs and Housing- Municipal Services Office, Western Region

g) Natural Resources and Forestry- Aurora District

h) Transportation - Central Region, West Region and the Emergency Management and Planning Office

3.1.5 Designated Municipality Organization

Emergency plans for the *Designated Municipalities* (Municipality of Kincardine and Town of Saugeen Shores) *shall* describe their municipal *emergency response organizations* and its activation.

## 3.2 Contingency Provisions

3.2.1 The PEOC Commander issues *operational directives* to the *emergency* management and *response* organization through the centres in the tier below (see **Figure 3.1**). However, if for any reason, any of these centres is not functioning or is not responsive, the PEOC Commander may issue *operational directives* directly to any other element of the *emergency* management and *response* organization.

3.2.2 Similarly, *response* organizations are responsible for taking appropriate actions according to their respective plans, procedures and the requirements of the situation.

## 3.3 Municipal Emergency Facilities

a) Municipal *nuclear emergency* plans *shall* identify the location of the following *emergency* facilities and *shall* include provisions for their selection, staffing and resourcing:

- Reception Centres
- Evacuation Centres
- Monitoring and decontamination for evacuees may be accomplished either in a Reception Centre or may be set up separately
- Emergency Worker Centres (EWC). EWC locations should also be able to accommodate a command post for environmental monitoring operations of the Environmental Radiation and Assurance Monitoring Group (ERAMG)
- Emergency Information Centre

b) Municipal *nuclear emergency* plans *shall* also identify the location of alternate Municipal emergency facilities outside the CPZ.

## 3.4 Telecommunications

3.4.1 All stakeholder emergency plans *shall* describe how their *emergency* centres and facilities are linked via primary and backup communication systems which enable email and transfer of *emergency* information.

3.4.2 The BNGS *operator shall* establish primary and backup *communications* between its Emergency Management Centre (EMC) and the following centres:

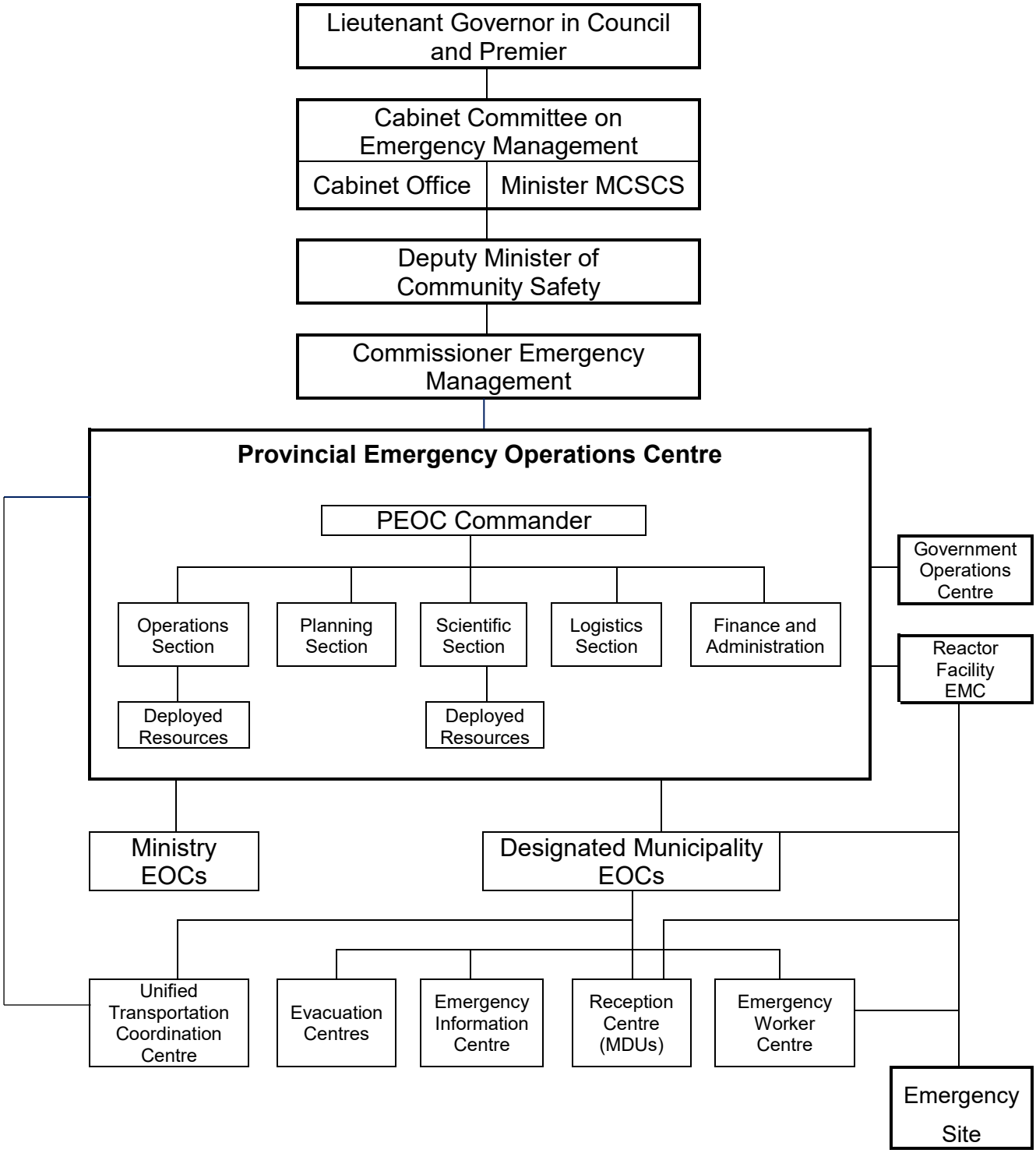
a) *Provincial Emergency Operations Centre* (PEOC)

b) Bruce Nuclear Generating Station (BNGS)

c) Municipal Emergency Operations Centres (EOCs)

3.4.3 All organizations and agencies involved in responding to a BNGS *nuclear emergency shall* ensure the availability of backup telecommunications systems.

**Figure 3.1: Provincial Nuclear and Radiological Emergency Response Organizational Structure**



# Chapter 4
# NOTIFICATIONS AND RESPONSE

## 4.1 Initial Notification

4.1.1 According to responsibilities outlined in federal legislation, (see **PNERP**, **Master Plan Paragraph 5.2.1**) regulations and agreement with the provincial government, the Bruce Nuclear Generating Station (BNGS) *operator shall* notify the pre-designated contact points (see **Paragraph 4.1.12** below) in provincial and municipal *emergency* organizations as soon as conditions arise at the facility which require such *initial notification* under the criteria described in **Table 4.1** and, as incorporated in facility procedures.

4.1.2 The form and content of the *initial notification shall* be determined by the Commissioner of Emergency Management.

4.1.3 The BNGS *operator shall* make a *notification* to the designated provincial and municipal contact points within 15 minutes of categorizing the event.

4.1.4 The initial *notification* message from the BNGS *operator shall* include:

a) the *notification* category

b) recommended default *protective measures*

4.1.5 Where more than one criteria are applicable, the highest category triggered *shall* be reported in the *notification*. The *notification* message *shall* not be delayed to permit an accurate assessment of the applicable category.

4.1.6 In the case of a *General Emergency* or *On-Site Emergency notification*, the message must state whether an emission is ongoing or if not, give a best estimate of when it is expected to commence and the wind direction at the time of the *notification*.

4.1.7 During the initial stage (see **Paragraph 4.1.8** below) of an *emergency*, the *General Emergency* notification category (received by the PEOC Duty Officer) initiates the implementation of *off-site* default *protective measures*.

4.1.8 The initial stage of an *emergency* is defined as the earlier of:

a) The first 4 hours after the *initial notification*, or

b) Once ongoing reporting by the BNGS EMC to the PEOC Scientific Section is established.

4.1.9 If during the initial stages of an *emergency*, the assessment of the *on-site* situation changes to warrant a different category (and to recommended *protective measures)* than those initially notified, then the BNGS *operator shall* immediately issue such changes to the designated provincial and municipal contact points.

4.1.10 Once ongoing reporting is established between the BNGS EMC and the PEOC Scientific Section, any changes to the *notification* category or recommended *protective measures shall* be included in the regular data transmittals sent by the BNGS EMC to the PEOC Scientific Section and *shall* no longer be transmitted to the provincial and municipal contact points.

4.1.11 The BNGS *operator* cannot terminate or cancel a *notification* once it has been made. Such a *notification shall* automatically lapse when the provincial response to it is formally terminated (see **Paragraph 4.2.3** below).

4.1.12 Contact Points

a) Contact points and phone numbers shall be pre-determined and routinely validated to ensure availability.

b) The provincial contact point *shall* be the PEOC Duty Officer.

c) The following municipal contact points *shall* be set out in the municipal plans:

i. A contact point to receive an *initial notification* anytime, 24 hours per day, 7 days per week.

ii. A municipal *emergency* response staff person who can be contacted anytime 24 hours per day, 7 days per week for passage of information and monitoring of the situation following the initiation of a *notification*.

## 4.2 Initial Provincial and Municipal Response

4.2.1 The initial provincial response to a *notification* from BNGS *shall* depend on the category (and other relevant information) contained in the *notification* message (see **Table 4.1**).

4.2.2 Within 15 minutes of the receipt of an *initial notification*, the PEOC Commander *shall* decide on the initial response level to be adopted and inform the municipal contact point(s). This level *should* normally be the one linked to the category of the *notification* received (see **Table 4.2**) unless another level is judged to be more appropriate.

4.2.3 The PEOC Commander or PEOC Operations Chief may adopt another provincial response level as appropriate including termination of the provincial response. All *stakeholders shall* be notified of any such change.

4.2.4 The initial (and any subsequent) response level to be adopted by the *Municipalities* and other organizations *shall* be communicated by the PEOC Commander (see **Paragraph 4.2.2** above) to all *stakeholders*. The general municipal response for each level is outlined in **Table 4.2**; the specific response *shall* be described in the municipal plans.

## 4.3 Internal Notifications

4.3.1 Each organization or agency required to respond to a *nuclear emergency shall* have an internal *notification* system to inform all concerned staff of the imminence or occurrence of an *emergency* under this plan, and of the appropriate response to the *notification*.

4.3.2 Each jurisdiction and organization receiving a *notification* of an *activation response* (either partial or full) *shall* issue an appropriate *internal notification* to its units and individuals who are required to respond. The *notification shall* indicate the level of *activation* to be adopted.

4.3.3 The PEOC and each jurisdiction and organization required to respond and issue an internal or *external notification* (see **Section 4.4** below) *shall* prepare a *notification* procedure and list of recipients.

4.3.4 PEOC Notifications

a) If the PEOC is to be activated (whether fully or partially), then the PEOC Commander *shall* issue an appropriate *notification* (including an indication of the level of *activation*) to at least one pre-designated contact point in each of the following jurisdictions and organizations:

   i. Municipality of Kincardine

   ii. each provincial-level organization required to respond to the *emergency*

   iii. *Host Municipalities*

iv. Bruce Nuclear Generating Station

b) Additionally, the PEOC Commander *shall* notify:

i. PEOC staff

ii. Emergency Information Section staff

## 4.4 External Notifications

4.4.1 Additional organizations or agencies which might be affected by a *nuclear emergency* under this plan, or which may be required to assist in responding to it, *should* be notified at an appropriate stage by their links in the *Emergency Response Organization*. As such, upon adoption of an *activation response* (partial or full), *external notifications shall* be carried out as detailed below. The *notification* must indicate the level of *activation* being adopted.

4.4.2 The PEOC Commander *shall* ensure the following are notified:

a) the federal *Government Operations Centre* (GOC) and the Federal Nuclear Emergency Plan (FNEP) Duty Officer who *shall* then complete the *notifications* listed in **Section 4.4.3** below

b) the Province of Quebec (Sûreté du Quebec)

c) the State of New York Emergency Management Agency

d) the State of Ohio Emergency Management Agency

e) the State of Michigan Emergency Management Agency

f) Canada News Wire/National Alert Aggregation and Dissemination System (NAADS)

g) Bell Canada

h) wireless phone providers

4.4.3 As directed by the FNEP Duty Officer, the federal Government Operations Centre (GOC) shall notify:

a) Natural Resources Canada (NRCan)

b) Royal Canadian Mounted Police (RCMP)

c) Privy Council Office (PCO)

d) Transport Canada

e) Department of National Defence (DND)

f) Canadian Coast Guard (which *shall* notify the US Coast Guard under agreed protocols)

g) CNSC Duty Officer

h) Global Affairs Canada

i) Canadian Food Inspection Agency (CFIA)

j) Canada Border Services Agency (CBSA)

k) Indigenous Services Canada (ISC)

l) Air Traffic Control

m) CN Rail

n) CP Rail

o) U.S. Department of Homeland Security

p) international organizations under existing agreements, conventions and departmental *emergency* plans

4.4.4 Other agencies and organizations *shall* be notified by the following:

a) Ministry of Agriculture, Food and Rural Affairs *shall* notify the Dairy Farmers of Ontario.

b) Ministry of Children, Community and Social Services *shall* notify the Red Cross, Ontario Zone.

c) Ministry of Natural Resources and Forestry *shall* notify:

   i. Central Lake Ontario Conservation Authority

   ii. Toronto and Region Conservation Authority

d) Municipal plans *shall* include provisions for the following *external notifications*:

   i. Bruce County

   ii. Town of Saugeen Shores

iii. Bluewater Board of Education

iv. Grey-Bruce County Catholic District School Board

v. paramedic services

vi. Inverhuron Provincial Park

vii. Brucedale Conservation Area

viii. Bruce Municipal Telephone System

ix. local utilities (e.g., hydro, gas, water)

x. local branches of voluntary organizations

## 4.5 Provincial Response Levels

4.5.1 The provincial response level adopted depends on the *notification* category received from BNGS (see **Table 4.2**).

4.5.2 Reportable Event and Abnormal Incident

a) In the event of a *Reportable Event notification* from BNGS the provincial response level adopted *should* be Routine Monitoring, unless the PEOC Commander decides otherwise.

b) In the event of an *Abnormal Incident notification* from BNGS, the provincial response level adopted *should* be Enhanced Monitoring, unless the PEOC Commander decides otherwise.

c) In these cases, the *notifications* and level of staffing *shall* proceed according to **Table 4.2**, unless the PEOC Commander decides otherwise.

d) The PEOC Commander *shall* ensure the applicable *stakeholders* are notified when a response to a Reportable Event or *Abnormal Incident* has been terminated.

4.5.3 On-site Emergency

An On-site Emergency can result in either a partial or full *activation* provincial response (see **Figure 4.1**), depending on the source of the *accident* and the prospects for the resulting emission:

a) An On-site Emergency with no emission occurring *shall* normally result in a partial *activation* response.

b) An On-site Emergency with a (non-reactor) emission occurring or expected within 12 hours *shall* normally result in a full *activation* response.

4.5.4 General Emergency

A *General Emergency notification* from BNGS *shall* result in a full *activation* response (see **Figure 4.2**) as it denotes an emission from a reactor can result due to fuel and *containment* failures.

4.5.5 The remainder of this chapter therefore deals with the operational response to an *accident* at BNGS which results in, or has the potential to result in, an emission of *radioactive material* to the atmosphere, and therefore requires a partial or full *activation response*.

4.5.6 The partial and full *activation response* to a *nuclear emergency* is described below in relation to the three successive phases defined by the **PNERP Master Plan, Section 5.9**.

**Figure 4.1: Initial Provincial Response to an On-Site Emergency Notification**

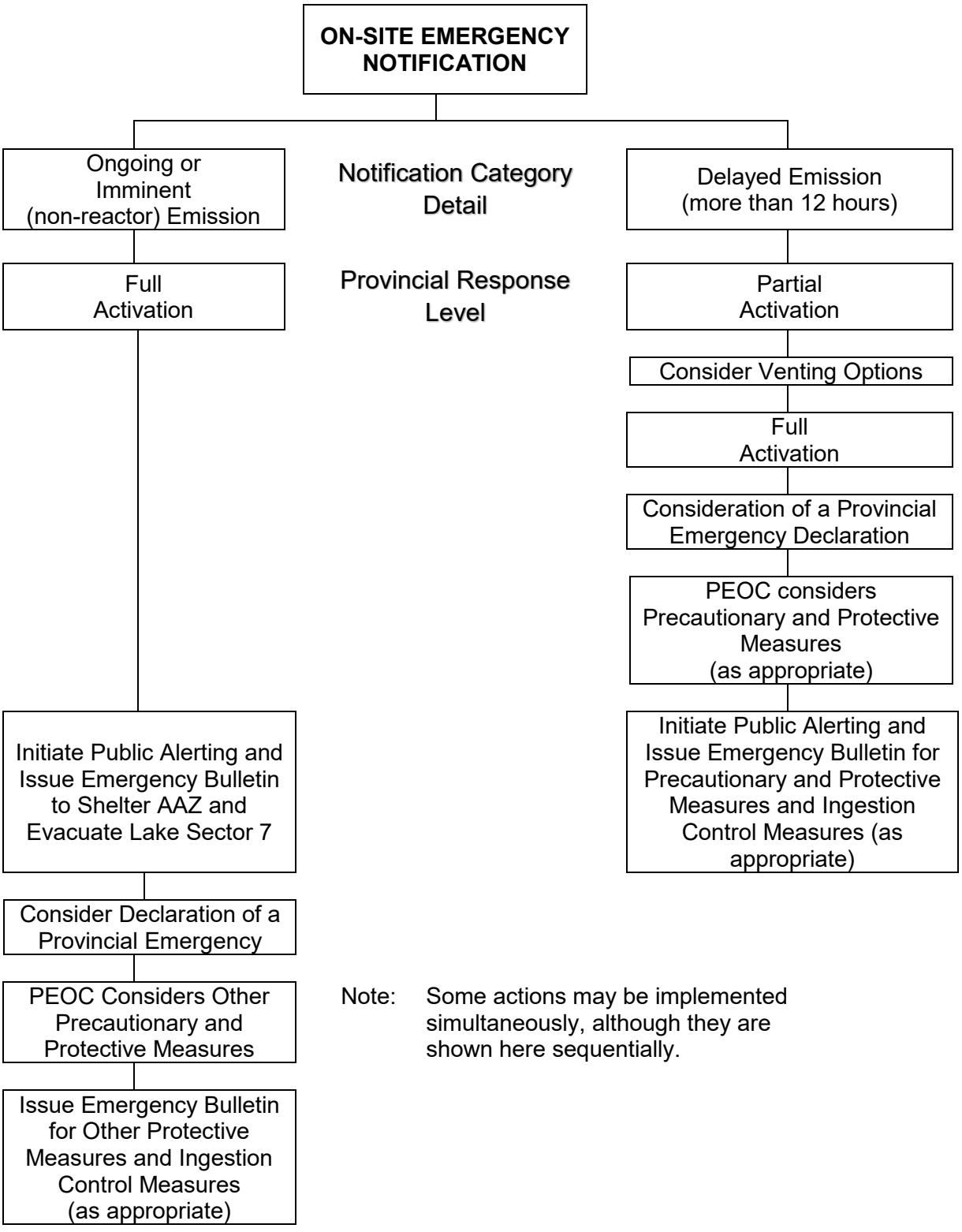
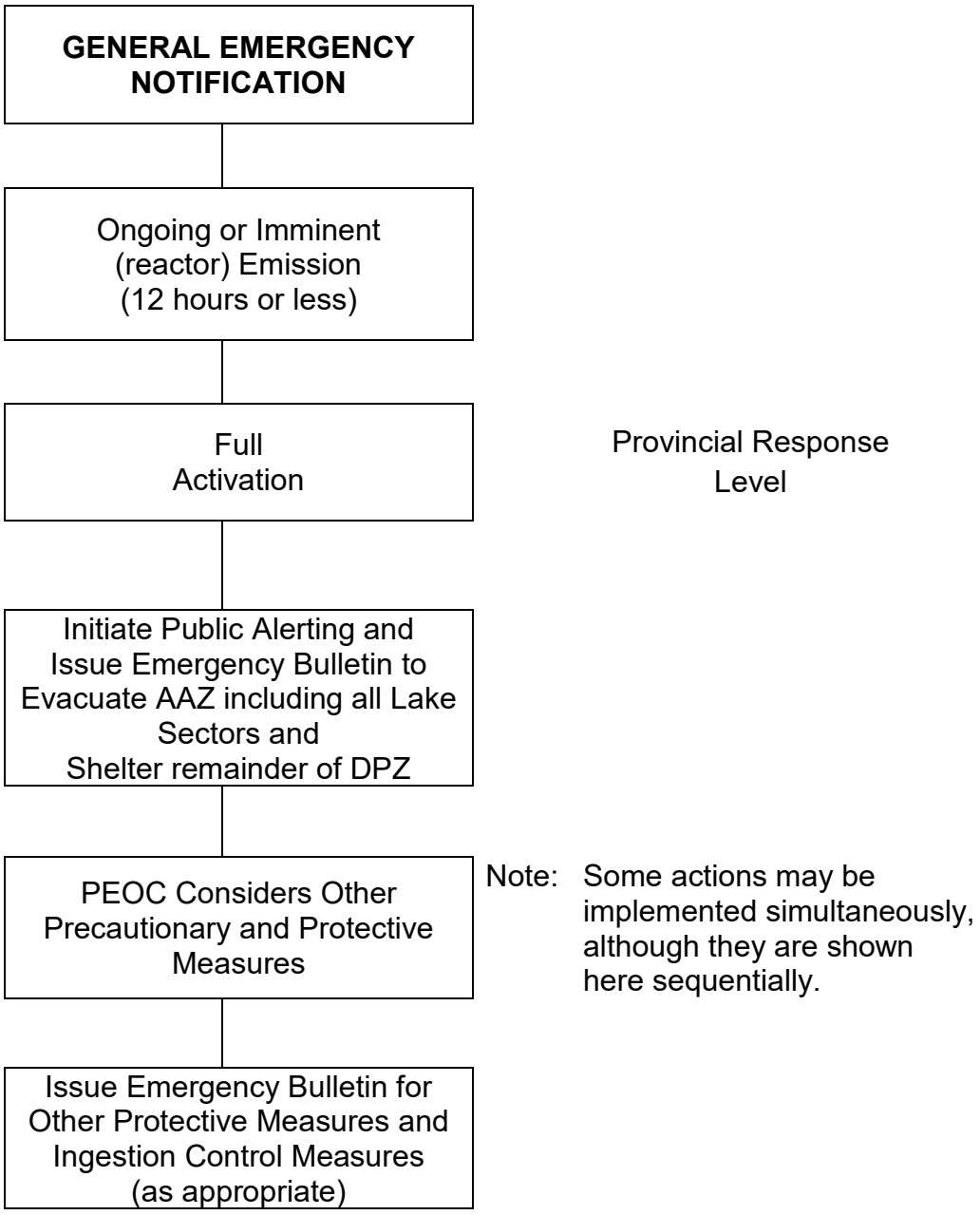


**Figure 4.2: Initial Provincial Response to a General Emergency Notification**



## 4.6 Early Phase Response

4.6.1 The early phase:

a) Begins with an *initial notification* of an *emergency* prior to, or during a radioactive *release*.

b) Lasts anywhere from hours to days and in the event of, an ongoing or imminent emission, *should* involve the implementation of automatic default *protective measures* (see **Table 4.3**).

c) Ends when the radioactive *release* is brought under control and reliable environmental *radiation* monitoring is available to be used for protective action decision-making.

d) *Shall* be terminated and the intermediate phase *shall* begin based on the criteria in **Section 4.7** below.

4.6.2 The operational response in this phase differs depending on whether the initial provincial response level is partial or full *activation*.

4.6.3 Partial Activation

a) A PEOC partial *activation* response (see **Figure 4.1**) is adopted when it is expected that a radioactive *release* will occur at some point in the future and therefore protective or *operational measures* (other than monitoring and assessment of the situation) are not likely to be required within 36 hours.

b) When the PEOC is partially activated, initial actions include:

i. *Notification of the emergency* management organization and set up and full staffing of the PEOC and the Municipal EOCs to monitor and assess the situation on a continuous basis.

ii. *Activation* of the Ministry EOCs and Unified Transportation Coordination Centre and staffing as appropriate to the situation.

iii. *Activation* of the *Emergency Information Centres* (EICs) with staffing at an appropriate level. Provincial staff to be dispatched, as appropriate.

iv. All *emergency response* personnel not immediately required *should* be placed on standby. This provision *should* ensure that personnel can be quickly contacted when needed to report to their duty stations.

v. Other *emergency* centres *should* be readied to a level where they can become fully operational without undue delay, when required. Specific levels of readiness *shall* be described in the municipal plans.

vi. Consideration *shall* be given to issuing an *emergency bulletin(s)* and news release(s).

c) Technical assessments of the *accident* situation and projected *radiation doses shall* be carried out on a regular basis by the PEOC Scientific Section, as described in **Section 4.6.5** below.

d) The technical assessments carried out by the PEOC Scientific Section, as well as inputs from the other PEOC sections *shall* be compiled by the PEOC Planning Section Chief into recommendations for protective action decision-making, to the PEOC Commander.

e) The PEOC Commander, in consultation with the PEOC Command Section and select stakeholder organizations (including MOHLTC, *Designated Municipalities* and others deemed appropriate), *shall* consider and decide on the need for *operational measures* as well as future protective actions and ensure that all stakeholders are so informed.

f) If the *emergency* situation is resolved and the potential for *off-site* consequences is eliminated, the PEOC Commander *shall* downgrade the provincial response level, as appropriate.

g) Alternatively, the PEOC Commander *shall* upgrade the response level to full *activation* when a radioactive emission seems likely to occur in 36 hours or less or, as deemed appropriate.

4.6.4 Full Activation

a) A PEOC full *activation* response *should* be adopted as a result of:

i. An *initial notification* from BNGS stating that an emission is ongoing or imminent (On-site or *General Emergency*), or

ii. An escalation of an existing *emergency* situation, where an emission is now expected in 36 hours or less

b) The following actions *shall* be initiated upon adoption of a full *activation response*:

i. All emergency operations centres, Emergency Information Centres, Reception Centres, Evacuation Centres, Emergency Worker Centres and Monitoring and Decontamination Units are fully staffed and operational.

ii. All emergency response personnel from **Paragraph i.** above immediately report to their places of duty.

iii. Public alerting is initiated and emergency bulletins issued concurrently (see **Sections 6.2** and **6.4**).

iv. Operational directives (or emergency orders) issued for protective actions per **c)** or **d)** below, as appropriate.

v. PEOC Commander advises government of the need for a provincial emergency declaration (see **PNERP Master Plan Section 1.5.1**).

vi. Provincial Chief Emergency Information Officer (PCEIO) *shall* consider establishing a *Joint Information Centre* as necessary (see **Paragraph 6.5.2 e)**).

c) Where the full *activation* response level is adopted as a result of an *initial notification* from BNGS that an emission is ongoing or imminent (see **Paragraph (a) (i)** above), the default actions noted in **Table 4.3** *shall* be implemented, unless there are good reasons for modifying the response. This default response is undertaken due to the potential lack of detailed information or plant data together with a lack of available time for analysis.

d) Where an escalating event results in the upgrade to a full *activation* response (see **Paragraph (a) (ii)** above), data gathering and analysis are already being undertaken by the *emergency response organization*, with a protective action decision-making process in place. Therefore, in this escalating type of scenario, the technical and operational assessments and the recommendation process (see **Section 4.6.5** below) replaces the need for default actions.

4.6.5 PEOC Scientific Section Technical Assessments

In the early phase, prior to or during a radioactive emission, the PEOC Scientific Section *shall* undertake technical assessments in accordance with PEOC Scientific Section procedures which *shall* serve as input into the PEOC Planning Section recommendations for Command decision-making. Examples of technical assessments include:

a) Accident Assessments

The Nuclear Incident Group (NIG) of the PEOC Scientific Section *shall* receive hourly plant status and data from the BNGS EOC, through agreed to transmission systems (and backup), and *shall* on an ongoing basis:

i. Evaluate the status of relevant station systems and make ongoing assessments of possible *accident* progressions, considering both positive and negative outcomes (see **paragraph ii** below).

ii. Monitor the progress of station vacuum structure repressurization and continually forecast the date and time when its pressure could reach, firstly, the minimum level required for the Filtered Air Discharge System (FADS) operation and, secondly, the level at which FADS operation becomes necessary.

iii. Analyze *venting* data and make projections to inform *venting* decision-making by the PEOC Commander and stakeholders (see **Section 4.6.6** below).

iv. Liaise with EMC staff and undertake a technical projection of the maximum distance from the *reactor facility* at which the *generic criteria* (see **PNERP Master Plan, Annex E, Appendix 1**) for *protective measures* against the *plume* are likely to be reached during the anticipated duration of the emission (allowance *should* be made for the effects of early *venting*, if applicable):

- *evacuation*
- *sheltering-in-place*
- *iodine thyroid blocking*

b) Condition of Station Systems

i. **Table 4.3** describes four main categories for the condition of station systems along with some examples of each. It can provide a baseline for making appropriate judgements or, if time and adequate information are not available, it may be used to determine default measures.

ii. In an actual event, the estimate of station conditions may not conform exactly to the various sets of conditions given in **Table 4.3**. In such a case, the default *protective measures* listed in the table, may be appropriately modified.

iii. The PEOC Scientific Section Chief *shall* determine and make recommendations to the PEOC Commander for approval on:

- the set of *protective measures* that best match the current conditions
- whether current meteorological conditions warrant any change to the distance out to which *protective measures* are advised
- the DPZ and CPZ response sectors likely to be affected by the emission

c) Exposure Levels

The PEOC Scientific Section *shall* make an assessment as to whether the *dose* in any sector(s) is likely to require the *activation* of the **Radiation Health Response Plan** (see **Paragraph 6.9.6**).

d) Subsequent Technical Assessments

As more data and projections become available, the PEOC Scientific Section *shall* continuously update the assessments made in order to establish whether any additional *protective measures* are required.

4.6.6 Venting of Containment

a) During a *Design Basis Accident* (DBA), the holdup period of any radioactive material within the station *containment* structure (e.g., vacuum building) permits the *venting* of said contained radioactivity in a controlled manner and in a safe direction, i.e., over the lake (refer to **PNERP Master Plan, Annex G**).

b) During a *Beyond Design Basis Accident* (BDBA), the holdup period of any radioactive material may be significantly reduced and radioactive material may be *released* in an uncontrolled manner. BDBAs are categorized as *General Emergencies* and as such the PEOC assumes full *activation* as described in **Section 4.6.4** above.

c) For all *accidents*, the PEOC Commander may decide at any time to upgrade to full *activation* as conditions warrant however the Commander *should* upgrade no later than 36 hours prior to *venting*.

d) For all *accidents*, the BNGS *operator shall* include, in each hourly report to the PEOC, an estimate of the time at which the vacuum building pressure would reach the minimum level at which a venting system can be operated.

e) The time interval between the occurrence of the *accident* and *containment* pressure reaching this minimum level may depend on the condition and

behaviour of the *containment* system. With no impairment to *containment*, this time interval is expected to be about 2 ½ days (an impaired *containment* could significantly reduce that time).

f) For all accidents, the BNGS operator *shall* consult with the Province, *Designated Municipalities* and CNSC before undertaking any *venting* activity, unless *venting* must be performed in an urgent manner to protect the structural integrity of containment (see **Paragraph 2.6.4 b)**). In such a case, every effort shall be made to inform these stakeholders as early as possible.

g) The PEOC Commander *should* consider, in consultation with the BNGS *operator*, the CNSC, and Municipality of Kincardine, whether *venting* over Lake Huron (according to the considerations in the **PNERP Master Plan, Annex G**), would be feasible and advisable. Detailed procedures for such decision-making *should* be developed in consultation with the above agencies and incorporated in the PEOC procedures for the PEOC Scientific, Operations and Command Sections, as appropriate.

h) Environmental Radiation Monitoring

If *venting* over Lake Huron, ground monitoring teams from BNGS *shall* complete radiological surveys following the shoreline, out to 20 km on either side of the plant to detect any “blow back” of radioactivity towards land during *venting*. Any radioactivity detected *shall* be immediately reported by the BNGS *operator* to the PEOC.

4.6.7 Early Phase Protective Action Decision-Making

a) The PEOC Scientific Section’s technical assessment of the situation *should* produce a projection of the maximum distance from BNGS at which the *generic criteria* for *evacuation*, sheltering-in-place and KI ingestion are likely to be reached during the anticipated duration of the emission.

b) The PEOC Planning Section *shall* undertake an evaluation of this technical assessment, taking into account operational and public policy considerations, and *shall* prepare a preliminary assessment regarding the need to implement these measures, proposed timings, and the area within which these measures should be taken.

c) These assessments *shall* be continually updated and, as soon as a reasonably certain picture of the *evacuation* (and other *protective measures*) distance is achieved, the PEOC, through the Command Section, *shall* consult with applicable stakeholders (*Designated Municipalities*, host and support *Municipalities*, federal departments, the *reactor facility*).

d) Command decisions on protective action *shall* be communicated to the *emergency response organization* (see PEOC Command Section procedures) and the applicable *emergency* bulletin(s) *shall* be issued (per PEOC Operations Section procedures).

## 4.7 Intermediate Phase Response

4.7.1 The intermediate phase begins once the radioactive *release* has been brought under control and reliable environmental *radiation* monitoring is available for use in protective action decision-making.

4.7.2 Following the radioactive emission, the PEOC Scientific Section's input into the protective action decision-making process *shall* no longer be based on modelling the *projected doses* or on default measures but rather on the tangible results of environmental *radiation* monitoring.

4.7.3 The PEOC Scientific Section *shall* undertake, and continuously update, the following assessments:

a) *Off-site* environmental *radiation* monitoring undertaken by the ERAMG *shall* produce a picture of the *contamination* situation.

b) The PEOC Scientific Section Chief *shall* make technical recommendations for protective action (*exposure* and *ingestion control* measures) based on the results of the actual *contamination* levels as compared against the *Operational Intervention Levels* (OILs) (per the **PNERP Master Plan, Annex E, Appendix 2**).

c) The PEOC Scientific Section Chief *shall* make recommendations regarding sector safety status on behalf of *emergency workers* operating in the area.

d) The intermediate phase operations of the PEOC Scientific Section *shall* be detailed in the Scientific Section procedures.

4.7.4 Intermediate Phase Protective Action Decision-Making

a) The PEOC Planning Section *shall* undertake an assessment of these Scientific Section technical recommendations, in light of operational and public policy considerations, and *shall* prepare recommendations for the PEOC Commander regarding the *protective measures*, areas where they *should* be implemented, and implementation timings.

b) These assessments *shall* be continually updated and, as soon as a reasonably certain picture of the *evacuation* (and other *protective measures*) distance is achieved, the PEOC Commander *shall* advise all stakeholders of the protective

action strategy to be undertaken. If time is available, the PEOC Commander *shall* undertake prior consultation with applicable stakeholders on the protective action strategy recommendations.

c) Planning for the management of radioactive waste (see **Section 6.11**) generated by the *emergency should* preferably begin during the intermediate phase.

## 4.8 Transition to the Recovery Phase

4.8.1 During the *recovery* phase actions will commence to restore the affected area to pre-*emergency* conditions and to scale back the *emergency response organization*.

4.8.2 As there may not be a clear distinction between phases, with *emergency* response operations occurring in all three, planning for *recovery* should begin as soon as practical.

4.8.3 Stakeholder *recovery* plans *should* include measures to address the following as applicable to their organization:

a) *recovery* organization structure

b) care for persons exposed or contaminated

c) long-term relocation

d) resettlement and return of evacuees

e) long-term support for those living in contaminated areas

f) *decontamination* and reconstruction of property damaged during the *emergency*

g) economic impact issues and improvement plans

4.8.4 Stakeholder *recovery* plans *should* be prepared in advance and conform to the provincial *recovery* plan.

**Table 4.1: Initial Notification Categories and Criteria**

| CATEGORY | CRITERIA (Alternative) | EXAMPLES |
|---|---|---|
| **REPORTABLE EVENT** | 1. Any event or condition that reduces the *reactor facility's* capability to *mitigate* an *emergency on-site*, and which persists for longer than the allowable time limits. | 1A. Level 1 or 2 impairment of a special safety system, which persists for more than 4 hours.<br>1B. Entry into emergency operating procedures. |
| | 2. Any event or condition that reduces the *reactor facility*'s capability to provide the agreed *off-site emergency* support, and which is expected to persist for over 8 hours, or actually does so. | 2. Reduced ability to:<br>A. Carry out *off-site* field monitoring.<br>B. Provide *source term* data.<br>C. Provide required *off-site ERO* staff. |
| | 3. Natural, toxic, flammable, destructive or other phenomena which have the potential to lead to a minor* break in the physical integrity of the nuclear heat transport system boundary or the moderator system. | 3A. Equipment failure.<br>3B. Extreme environmental conditions.<br>3C. Earthquake.<br>3D. Fire or explosion. |
| | 4. Unexpected or unplanned *activation* of the emergency cooling injection system or the *containment* system (including box-up). | 4A. Unexpected or unplanned *activation* of the ECI system component that does not result in injection.<br>4B. Unexpected or unplanned *activation* of the *containment* system.<br>4C. Excludes events initiated during testing. |
| | 5. Declaration of a Station Emergency, *with no potential for off-site effects*. | 5. As per nuclear emergency procedures. |
| | 6. Any credible publicly announced threat to, or attempted or actual breach of, the facility's security that threatens its safe operation. | 6A. A publicized bomb threat.<br>6B. A breach or attempted breach of the protected area. |
| **ABNORMAL INCIDENT** | 1. A minor* break in the physical integrity of the nuclear heat transport system boundary with no *fuel failures* (actual or likely). | 1. LOCA on one or more units, without fuel failures and with or without *containment* impairment. |
| | 2. Natural, toxic, flammable, destructive or other phenomena which have the potential to lead to the major* break specified in Item 1 under *On-Site Emergency*. | 2. Similar causes as for # 3 under REPORTABLE EVENT. |
| | 3. *Activation* of the emergency cooling injection system or the *containment* system (including box-up) due to a process system upset which is not reportable under any other category. | 3A. *Activation* of the ECI system component that results in injection.<br>3B. *Activation* of the *containment* system on high activity or pressure. |
| | 4. Declaration of a Station Emergency due to an occurrence which has the potential to result in *off-site* effects. | |

* To be defined in *reactor facility* procedures.

**Table 4.1: Initial Notification Categories and Criteria (continued)**

| CATEGORY | CRITERIA (Alternative) | EXAMPLES |
|---|---|---|
| **ON-SITE EMERGENCY** (Note: A *notification* with this category **must** state whether an emission is ongoing or, if not, give a best estimate of when it is expected to commence). | 1. A major* break in the physical integrity of the nuclear heat transport system boundary, the moderator system, or the irradiated (or spent) fuel handling and storage system, with *fuel failures** but **with a fully intact and functioning containment system.**<br>2. An abnormal emission* of *radioactive material* to the atmosphere from any non-reactor source.<br>3. An event or condition which has the potential to lead to a ***General Emergency*** criterion, concurrent with the loss of the ability to detect or control such a development.<br>4. *Hostile action* in the protected area resulting in actual or potential loss of control over station safety or safety related systems **but excluding reactor control systems**. | 1A. LOCA with *fuel failures* on one or more units.<br>1B. Fuelling machine *accident*.<br>2. Spent fuel bay *accident*.<br>3A. Loss of all AC power.<br>3B. Extreme environmental conditions.<br>3C. Earthquake damage.<br>3D. Fire or explosion.<br>3E. Entry requirements met for SAMG or EME to maintain fuel cooling. |
| **GENERAL EMERGENCY** (Note: A *notification* with this category **must** state whether an emission is ongoing or, if not, give a best estimate of when it is expected to commence). | 1. Damage to reactor fuel leading to the *release* of radioactivity from the fuel **coincident with** the failure, impairment, or bypass of *containment*, resulting in an atmospheric emission or, a reasonable expectation of an emission within the next 12 hours.<br>2. *Hostile action* in the protected area resulting in actual or imminent loss of the ability to achieve and maintain the reactor in a cold *shutdown state*. | 1. LOCA with actual or imminent *fuel failures* on one or more units and impaired *containment*.<br>2. Inability to control or maintain reactivity control or fuel cooling. |

* To be defined in *reactor facility* procedures.

**Table 4.2: Initial Provincial and Municipal Response**

| INITIAL NOTIFICATION | INITIAL PROVINCIAL RESPONSE | INITIAL MUNICIPAL RESPONSE |
|---|---|---|
| **REPORTABLE EVENT** | ROUTINE MONITORING<br>1. *Provincial Emergency Operations Centre* (PEOC) *shall* notify the municipal contact point(s), *reactor facility operator*, and others as appropriate, and *shall* monitor the situation.<br>2. PEOC Scientific staff is consulted, if appropriate.<br>3. If and when appropriate, Emergency Information Section (EIS) staff issues news release(s). | *Emergency* response staff remain in contact with the PEOC, and monitor event. |
| **ABNORMAL INCIDENT** | ENHANCED MONITORING<br>1. PEOC *should* adopt Enhanced Monitoring and *shall* inform the municipal contact point(s), *reactor facility operator*, and any other organizations affected.<br>2. *External notifications* to Michigan, New York, Ohio and Quebec are made.<br>3. PEOC to set up a duty team consisting of operations staff, scientific staff, *reactor facility operator* representative(s), EIS staff, and others as required.<br>4. If and when appropriate, EIS staff *shall* issue news release(s).<br>5. Provincial staff are notified to remain available to report in for duty. | *Emergency* response staff monitor event, preferably from Municipal Emergency Operations Centres (EOCs). |
| **ON-SITE EMERGENCY** (*No emission occurring*) | PARTIAL ACTIVATION<br>1. PEOC *should* adopt partial *activation* response (for details, see **Section 4.6.3**), and *shall* initiate the appropriate internal and *external notifications* (**Section 4.3** and **Section 4.4** respectively), including the municipal contact points and the host communities.<br>2. If a reactor emission is expected to occur in 36 hours or less, PEOC *should* consider adopting full *activation* response and consider the need to implement the immediate measures per *General Emergency* below.<br>3. PEOC *shall* be fully staffed. Consideration *shall* be given to issuing an *emergency bulletin* (**Section 6.4)**, news release or both.<br>4. Ministry EOCs and Unified Transportation Coordination Centre (UTCC) to be established and appropriately staffed. | 1. Issue *notification* placing municipal *Emergency Response Organization* on standby.<br>2. Municipal EOCs fully staffed.<br>3. *Emergency Information Centres* (EICs) to be established.<br>4. Other emergency centres readied to become operational without undue delay. |

**Table 4.2: Initial Provincial and Municipal Response (Continued)**

| INITIAL NOTIFICATION | INITIAL PROVINCIAL RESPONSE | INITIAL MUNICIPAL RESPONSE |
|---|---|---|
| **ON-SITE EMERGENCY** *(Emission Ongoing or expected within 12 hours)* | FULL ACTIVATION<br>1. PEOC *should* notify and require the municipal contacts to activate the *public alerting* system (**Section 6.2**).<br>2. PEOC *should* adopt full *activation* (**Section 4.6.4**), and *shall* initiate the appropriate internal and *external notifications* (**Section 4.3** and **Section 4.4** respectively), including the host *community*.<br>3. PEOC *shall* issue the appropriate *emergency bulletin* (**Section 6.4**).<br>4. PEOC *shall* issue *operational directives* implementing the following *operational measures*, unless there are good reasons for modifying this response, for:<br>a) Sheltering (**Section 5.3.4**) in the *Automatic Action Zone*.<br>b) Suspension of road and rail traffic through the *Automatic Action Zone*.<br>c) Clearance of all boaters in Lake Sector 7.<br>5. PEOC *shall* assess the situation for further action.<br>6. PEOC *shall* issue further *emergency bulletins*, as appropriate (**Section 6.4**).<br>7. EIS staff *shall* issue news releases, as appropriate.<br>8. UTCC and Ministry EOCs *shall* be established. | 1. Initiate public *alerting*.<br>2. Issue *notification* activating municipal *Emergency Response Organization*.<br>3. Municipal EOCs, EICs and other centres to be activated and operational.<br>4. Implement *operational directives*, as issued by the PEOC. |

**Table 4.2: Initial Provincial and Municipal Response (Continued)**

| INITIAL NOTIFICATION | INITIAL PROVINCIAL RESPONSE | INITIAL MUNICIPAL RESPONSE |
|---|---|---|
| **GENERAL EMERGENCY** (*Emission ongoing or expected within 12 hours)* | FULL ACTIVATION<br>1. PEOC *shall* notify and ensure that the municipal contacts have activated the public *alerting* system (**Section 6.2**).<br>2. PEOC *shall* issue the appropriate *emergency bulletin* (**Section 6.4**).<br>3. PEOC *shall* issue *operational directives* implementing the following *operational measures* for:<br>a) Suspension of road, rail and air traffic throughout the *Automatic Action Zone.*<br>b) *Evacuation* of the *Automatic Action Zone* and Lake Sectors 7 through 9 unless there are good reasons for modifying this *response*.<br>c) *Precautionary measures* in the DPZ.<br>4. If emission is ongoing or, if *evacuations* will not be completed prior to emission, issue *operational directives* implementing the *operational measures* for:<br>a) Evacuees to report for *radiation* monitoring or, if not possible, to evacuate to a destination beyond the DPZ and to undertake self-*decontamination*.<br>b) Ingestion of KI pills (**Section 5.3.3** ) in the *Automatic Action Zone*.<br>c) Sheltering (**Section 5.3.4**) in the rest of the *Detailed Planning Zone*. Otherwise, take this action 4 hours (or, at a time deemed appropriate) before the expected time of commencement of the emission.<br>5. PEOC *shall* adopt full *activation* (**Section 4.6.4**), and *shall* initiate the appropriate internal and *external notifications* (**Section 4.3** and **Section 4.4** respectively), including the host *community*.<br>6. PEOC *shall* assess the situation for further action.<br>7. PEOC *shall* issue further *emergency bulletins*, as appropriate (**Section 6.4**).<br>8. EIS staff *shall* issue news releases, as appropriate.<br>9. Ministry EOCs and UTCC to be established. | 1. Initiate public *alerting*.<br>2. Issue *notification* activating municipal *Emergency Response Organization*.<br>3. Municipal EOCs, EICs and other centres activated and fully staffed.<br>4. Implement *operational directives*, as issued by the PEOC. |

**Table 4.3: Default Protective Measures**

| CONDITION OF STATION SYSTEMS | EXAMPLES | DEFAULT PROTECTIVE MEASURES<br>Issue Immediate Operational Directives |
|---|---|---|
| **A**. Intermediate to severe core damage with an accompanying loss of the *containment* function. | *Either*:<br>1. Failure of reactor shutdown, or<br>2. LOCA and failure of ECI, or<br>3. LOCA causing early flow stagnation in a core pass.<br><br>*Combined with either:*<br>a) Large hole in the containment envelope (e.g., airlock doors open, multiple airlock seal failures), or<br>b) An emission pathway bypassing containment. | 1. **Evacuation** of the *Automatic Action Zone*, all other *Detailed Planning Zone* sectors likely to be affected by the emission, and the area beyond the *Detailed Planning Zone* likely to be affected by the emission up to a distance of 20 km from the reactor.<br>2. **Iodine Thyroid Blocking**: All evacuees from the *Detailed Planning Zone* to ingest a KI dose.<br>3. **Personal Monitoring**: All evacuees from the *Detailed Planning Zone* to proceed to a facility for *personal monitoring* or to self-decontaminate at destination.<br>4. **Sheltering**: All sectors likely to be affected by the emission, which are not immediately evacuating, to shelter. Also, all sectors and areas adjacent (in the same ring) to sectors and areas being evacuated *should shelter-in-place*. |
| **B**. Intermediate level of core damage and a loss of the filtered pathway. | *Either*:<br>1. LOCA and failure of ECI, or<br>2. LOCA and failure of emergency coolant recovery.<br><br>*Combined with either:*<br>a) Containment envelope impairment resulting in loss of pressure control, or<br>b) Impairment of the FADS, including a reduction in filter efficiency. | 1. **Evacuation** of the *Automatic Action Zone* and all other *Detailed Planning Zone* sectors likely to be affected by the emission.<br>2. **Iodine Thyroid Blocking**: All evacuees to ingest a KI dose.<br>3. **Personal Monitoring**: All evacuees to proceed to a facility for *personal monitoring* (ongoing emission only) or to self-decontaminate at destination.<br>4. **Sheltering**: All sectors likely to be affected by the emission, which are not immediately evacuating, to shelter. Also, all sectors adjacent (in the same ring) to those being evacuated *should shelter-in-place*. |

**Table 4.3: Default Protective Measures (continued)**

| CONDITION OF STATION SYSTEMS | EXAMPLES | DEFAULT PROTECTIVE MEASURES Issue Immediate Operational Directives |
|---|---|---|
| **C**. Intermediate to severe fuel damage with *containment* envelope impairment leading to early *venting*. | *Either*:<br>1. LOCA causing flow stagnation in a core pass, or<br>2. LOCA and failure of ECI, or<br>3. LOCA and failure of emergency coolant recovery, or<br>4. End-fitting or other failure and fuel ejection from a channel, or<br>5. LOCA in fuelling machine.<br><br>*Combined with:*<br>A loss of *containment* pressure control requiring early *venting*. | 1. **Evacuation** of the *Automatic Action Zone* and all sectors in the Inner Ring likely to be affected by the emission.<br><br>2. **Personal Monitoring**: All evacuees to proceed to a facility for *personal monitoring* (ongoing emission only) or to self-decontaminate at destination.<br><br>3. **Sheltering**: All sectors in the Inner Ring adjacent to those being evacuated *should shelter-in-place*. Sectors beyond this zone likely to be affected by the emission to also *shelter-in-place*. |
| **D**. All other events or conditions likely to lead to an emission. | Spent fuel bay *accident*. | 1. **Sheltering** the *Automatic Action Zone* and evacuate Lake Sector 7. |

# Chapter 5
# PROTECTIVE ACTION RESPONSE STRATEGY

## 5.1 Protective Action Response Strategy

During the response to a *nuclear emergency*, the PEOC *shall* implement a protective action response strategy to protect the public and responding *emergency workers* from the effects of a radioactive emission. Protective actions include:

a) *precautionary measures*

b) *exposure control protective measures*

c) *ingestion control protective measures*

d) additional measures to protect the public

## 5.2 Precautionary Measures

The PEOC Commander *shall* direct as appropriate, any or all of the following *precautionary measures* in the *Detailed Planning Zone* (or part thereof) and adjacent areas (e.g., CPZ). Consideration *shall* also be given to the most suitable timing for the measures (in the case of a delayed emission it may be appropriate to delay the application of some of them) and issue the necessary bulletin(s) and directions for their implementation. These measures are:

a) closing of beaches, recreation areas, etc.

b) closing of workplaces and schools

c) suspension of admissions of non-critical patients in hospitals

d) *entry control* (see **Section 6.6**)

e) clearing the milk storage of dairy farms

f) banning consumption of any item of food or water that may have been exposed outdoors

g) banning consumption and export of locally produced milk, meat, produce, milk- and meat-producing animals

h) removing milk- and meat-producing animals from outside pasture and exposed water sources

## 5.3 Exposure Control Protective Measures

5.3.1 Evacuation

a) *Evacuation* time estimates (see **Section 2.6.3**) *should* be used to inform decision-making regarding the implementation of *evacuation* strategies.

b) All available routes will be utilized to evacuate the public.

c) Shadow *evacuations* may occur spontaneously in areas contiguous to the *Detailed Planning Zone* and subsequently contribute to the *Detailed Planning Zone evacuation* time.

d) Contamination

i. In the event of a delayed emission, evacuees are not expected to be contaminated nor require monitoring and *decontamination*.

ii. In the event of an ongoing or imminent emission, evacuees exposed to the radioactive emission can be expected to have varying levels of *contamination*.

iii. *Contamination*, where found, would be in the form of loose particulate on people, their belongings and vehicles.

iv. Internal *contamination* may be present in individuals exposed to a radioactive emission.

v. Given the population density, self-*decontamination* may be the primary means of *decontamination*, if required.

vi. Monitoring and *decontamination* facilities are required for those evacuees who are not able to self-decontaminate as well as for those who desire assurance monitoring.

e) Transportation

i. During a *nuclear emergency*, traffic density and volume on major arterial roads and highways are significantly increased and therefore, travel times in all directions are significantly longer than normal.

ii. Integrated and multi-model transportation management is required to ensure that *evacuations* can proceed as smoothly as possible.

f) Family Reunification Prior to Evacuation

i. Families will want to reunite and evacuate together, as far as practical.

ii. The feasibility of family reunification depends on the time of day at the onset of the *emergency* and on the urgency for *evacuations* to proceed (i.e., timing of the emission).

iii. Factors affecting family reunification include workplace location, school children, residents of hospitals, long-term care homes or other institutions, etc.

g) Mass Care

i. The majority of evacuees will make their own arrangements for care and lodging. Mass care arrangements are required for those evacuees without such resources.

ii. Evacuees requiring public or privately provided accommodation, may need assurances that these accommodations are not contaminated.

h) Protection and Care of Animals

i. Pursuant to **Section 7.0.2. (4)**, of the *EMCPA*, Municipal *emergency* response plans *should* make provisions for the protection and care of all animals, including those left behind during an *evacuation*.

ii. *Designated Municipalities should* request assistance as necessary from the following to develop plans for the protection and care of animals:

- Ontario Society for the Prevention of Cruelty to Animals (OSPCA) (whose mandate is to protect all animals in Ontario)
- OMAFRA (provincial lead on farm animal disease (OIC 1157/2009))
- the Ministry of Natural Resources and Forestry (MNRF) for issues pertaining to wildlife

iii. The PEOC *should* provide assistance to the *stakeholders* above as required for the protection and care of animals.

i) Directing Evacuations

i. *Evacuations should* be directed by response sector or *planning zone* ring of sectors and include information detailing the boundaries of the *evacuation* area by readily identifiable roads or landmarks.

ii. Evacuees who may have been exposed to an emission *shall* be directed either to proceed to a Monitoring and *Decontamination* Unit (MDU) or to self-decontaminate upon reaching their destination. Information on locations for monitoring *shall* be provided at the time of the *emergency*.

iii. Evacuees who are not at *risk* of being contaminated *shall* be instructed to leave the *Detailed Planning Zone* and not be directed to an MDU or to self-decontaminate.

iv. Evacuees *shall* be permitted to evacuate the affected area in the direction and to the destination of their choosing, subject to restrictions (due to weather, traffic conditions etc.) announced by the PEOC Commander through the *emergency bulletins*.

v. The responsibility for the expeditious movement of evacuees via the provincial transportation network is identified in the Unified Transportation Management Plan.

vi. The Unified Transportation Coordination Centre *shall* monitor the provincial transportation network utilized by evacuees and inform the PEOC Commander of any issues impacting the *evacuation*.

j) Evacuation Arrangements

i. The Municipality of Kincardine's *emergency* plan *shall* include arrangements for mass *evacuation* transportation and medical transfers.

ii. The *evacuation* of the affected public *should* be facilitated by the planning and *preparedness* undertaken in advance, including:

- transportation management (e.g., Ministry of Transportation)
- *reception* and *evacuation centres* (e.g., *Designated Municipalities*)
- long-term housing (e.g., multi-ministry and multi-jurisdictional planning group)
- health issues (led by the Local Public Health Units and Medical Officers of Health in conjunction with the MOHLTC, Local Health Integration Networks (LHINs) and Paramedic Services)

iii. Medical assistance required during an *evacuation* is the responsibility of the *emergency* medical services and hospitals under municipal arrangements and *should* be detailed in the municipal plans.

iv. *Designated Municipalities* and *Host Municipalities shall* include provisions for the reception and care of evacuees in their *emergency* plans.

v. The BNGS *operator shall* include provisions for the monitoring and *decontamination* of evacuees in its *emergency* plan and associated procedures (see **Section 6.9**).

vi. *Emergency* plans of the schools in the *Detailed Planning Zone should* provide for the movement of staff and students to pre-arranged host schools and, if necessary, to Monitoring and *Decontamination* Units for prior monitoring and *decontamination*. Evacuated students are the responsibility of their school staff until collected from the host school by their guardians, or parents.

vii. *Emergency* plans of hospitals, long-term care homes, and other institutions in the *Detailed Planning Zone should* include provisions for the transfer of staff/residents/patients to an appropriate facility outside the *Detailed Planning Zone*, with which prior arrangements have been made. Provisions *should* also be made to take staff/residents/patients to Monitoring and *Decontamination* Units, if necessary.

viii. As it may not be possible or desirable to evacuate some of these persons, special arrangements *shall* be made for the care of staff/residents/patients remaining behind, as identified in the municipal plans.

k) Bruce Nuclear Generating Station (BNGS) - Evacuation

BNGS prepares its own *evacuation* plans for non-essential *on-site* personnel. During an *emergency*, the actual *evacuation* of *on-site* personnel *should* be carried out in consultation with the PEOC Commander. Where time permits without compromising the safety of station staff (i.e., delayed or imminent emission), the timing and sequence of *on-site evacuations should* be agreed to in advance with the PEOC Commander.

5.3.2 Temporary Relocation

a) Temporary relocation:

i. Is the displacement of people from their homes for a period beyond one week and up to one year to avoid chronic *exposure* to *radiation*, usually from ground *contamination.* Beyond one-year, the PEOC *should* consider permanent resettlement.

ii. Can be directed post-*release*, during the intermediate *response* phase, based on actual measured *contamination* levels.

iii. Can be directed as a subsequent measure to *evacuation*, or *sheltering-in-place*, or as a separate measure.

iv. Is determined following analysis of environmental *radiation* monitoring results and assessment against *Operational Intervention Levels* (OILs; **PNERP Master Plan Annex E, Appendix 2**).

b) The *evacuation* arrangements described in **Section 5.3.1 j)** above *shall* be considered and applied as appropriate for the implementation of temporary relocation.

c) The PEOC *should* consider socioeconomic factors before recommending temporary relocation as the potential impacts of this action may not be justified in areas where the OIL for relocation is minimally exceeded.

5.3.3 Iodine Thyroid Blocking

a) It is the responsibility of the BNGS *operator* to procure adequate quantities of KI pills for the *Detailed Planning Zone* population (**PNERP Master Plan, Section 6.5.2**).

b) *Designated Municipalities shall* detail in their plans the means by which they facilitate:

i. Availability of KI pills for *Detailed Planning Zone* institutions and for *emergency* centres (*Emergency worker*, Reception and *Evacuation Centres* and MDUs).

ii. Availability of KI pills for any members of the *Detailed Planning Zone* population who may wish to possess a supply.

c) Other operational responsibilities regarding *iodine thyroid blocking* (stocking, distribution and administration) are described in the **Radiation Health Response Plan**, as prepared by MOHLTC.

d) The Chief Medical Officer of Health *shall* decide when to administer KI in consultation with the PEOC Commander.

5.3.4 Sheltering-in-Place

The need for future sheltering-in-place as a protective measure *should* be broadcast through the *emergency bulletin* as soon as that need is identified. The timing to actually issue an operational directive for sheltering-in-place (or, in the event of a declared *emergency*, advise that *emergency* orders have been made) *shall* be ultimately made by the PEOC Commander (as a general guidance, however, the *emergency bulletin* to direct this protective measure *should* be issued at least 4 hours prior to the expected emission time) following escalation to a full *activation* response.

## 5.4 Ingestion Control Measures

5.4.1 Before an emission commences, appropriate *ingestion control* measures *should* be directed as a precaution within and, if necessary, areas adjacent to the *Detailed Planning Zone* (e.g., the CPZ).

5.4.2 After an emission commences, precautionary *ingestion control* measures *should* be reviewed by the PEOC Scientific Section and adjusted as necessary once environmental monitoring results become available.

5.4.3 If environmental monitoring indicates the need, appropriate *ingestion control* measures *should* be considered in areas known or suspected to be contaminated.

5.4.4 Based on the data produced by ground monitoring, additional *ingestion control* measures *should* be considered, where necessary, while the original *precautionary measures* may be lifted where appropriate.

## 5.5 Additional Measures to Protect the Public

5.5.1 The PEOC Commander may recommend other, practical *dose* reduction measures to the public. Such measures may be implemented in combination with the measures described above or, may simply be recommended to provide an additional level of protection against possible *radionuclides* present in the air or on the ground but which do not meet the *generic criteria* or OILs. Such measures include:

a) Respiratory protection, such as covering of the nose and mouth with available material that can filter particulates when present in the air.

b) Self-*decontamination*, including removing and bagging contaminated clothing, showering, and decontaminating surfaces of critical areas and objects.

c) Staying indoors to the extent that it is practical, e.g., only conducting outdoor tasks when necessary (e.g., seeking medical attention, buying *foodstuff* and necessities).

5.5.2 Detailed advice regarding these measures *shall* be provided for in public awareness and education materials as well as in *emergency bulletins*.

# Chapter 6
# OPERATIONAL RESPONSE

## 6.1 General

6.1.1 Operational response strategies are employed during a *nuclear emergency response* in order to facilitate the implementation of *protective measures* against the effects of a radioactive emission.

6.1.2 Responsibility and strategies for operational response implemented during a BNGS *emergency* are described below.

## 6.2 Public Alerting

6.2.1 Public Alerting System Activation and Responsibilities

a) Whenever the public *alerting* system is to be activated, the PEOC Commander *shall* concurrently issue an *emergency bulletin* (see **Section 6.4**) to the broadcast media. The bulletin *shall* contain specific instructions on what actions the public *should* take and where to get more information. *Emergency bulletins should* be continuously repeated.

b) In case of a *General Emergency notification* from BNGS stating that an emission is ongoing or imminent, the municipal contact points of the *Designated Municipalities should immediately* activate the public *alerting* system. Reference to any other authority is not required.

c) In all other cases, the PEOC Commander *shall* decide when to activate the public *alerting* system and issue the necessary instructions to the *Designated Municipalities*.

6.2.2 Public *alerting* systems used to implement this **PNERP** *shall* conform to the following principles:

a) The Municipality of Kincardine, as a *Designated Municipality* in the BNGS *Detailed Planning Zone* (see **PNERP Master Plan, Annex A**) *shall* make provisions, in their *nuclear emergency* plans, for a *public alerting* system which *shall* ensure that their *Automatic Action Zone* populations that may be required to undertake the default or immediate *protective measures* of (e.g., *sheltering-in-place*, *evacuation*, and ingestion of KI) can be alerted within 15 minutes of initiation.

b) Municipal plans *shall* detail how this requirement is met and, pursuant to **Section 5** of the *EMCPA*, plans of *Lower-tier Municipalities* whose populations reside within the required *alerting* area, *shall* conform to the Municipal Plan.

c) The Municipality of Kincardine and the province *shall* include provisions in their *nuclear emergency response* plans to coordinate the timing of *public alerting*, public direction and *emergency* information. This *should* ensure that the population receives timely and accurate information on what *protective measures* to take once they have been alerted of an *emergency*.

d) The Municipality of Kincardine *shall* ensure an initial evaluation of any new *public alerting* system is completed to verify that the requirements under this **PNERP** are met. Further, regular integrated testing of existing *public alerting* systems *shall* be included as a component of municipal *exercise* programs.

e) Where the public *alerting* area includes more than one *Municipality*, the selected system(s) *shall* be compatible or integrated in order to ensure consistency in timing, type of signal and other key implementation specifications.

f) Such a public *alerting* system, coupled together with *emergency bulletins*, *should* ensure that the population within the *Detailed Planning Zone* is notified in an effective and timely manner.

6.2.3 The public *alerting* system for a BNGS *emergency shall*, in addition to adhering to the principles in **Section 6.2.2** above, meet the following requirements:

a) The Municipality of Kincardine's *nuclear emergency response* plan *shall* describe how the public *alerting* system has the capability to issue a public alert to practically 100%[4] of the population, located both indoors and outdoors, within the *Automatic Action Zone*, within 15 minutes[5].

b) The Municipality of Kincardine's *nuclear emergency* response plans *shall* describe how the public *alerting* system has the capability to issue a public alert to the population, located both indoors and outdoors, in the *Detailed Planning Zone* within 15 minutes.

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[4] The term "practically 100%" means that the public alert can be heard or received by everyone in the alerting area unless exceptional circumstances provide an impediment.

[5] The focus of the public alerting system capability is on issuing the public alert. For example, if an auto dialer is used it needs to demonstrate that it has the capability to make all of the calls required within the specified timeframe.

c) The provincial Alert Ready program *shall* also be used to alert all populations within and beyond the DPZ[6].

6.2.4 The *operators* of the Bruce NGS, pursuant to the *Nuclear Safety and Control Act*, *shall* provide resources and assistance to the Municipality of Kincardine to establish and maintain a public *alerting* system in their *Detailed Planning Zone*.

## 6.3 Technical Assessments - PEOC Scientific Section

6.3.1 The PEOC Scientific Section is responsible for assessing the radiological consequences of the *nuclear emergency* through the operations of its Nuclear Incident Group (NIG) and the Environmental Radiation Assurance and Monitoring Group (ERAMG).

6.3.2 In the early phase of the *emergency* the majority of the assessments undertaken *shall* be by the NIG (**Section 4.6.5**). The ERAMG *shall* be focussed on ensuring the availability of baseline *radiation* information.

6.3.3 Once the emission has ceased, the ERAMG *shall* begin operations to determine the level and extent of radioactive *contamination* (**Section 4.7.3**).

## 6.4 Public Direction - Emergency Bulletins

6.4.1 The responsibility for issuing *emergency bulletins* rests with the PEOC Commander and may be delegated to the PEOC Operations Chief.

6.4.2 The aim of public direction is to communicate, directly to the affected public through *emergency bulletins*, the direction and guidance regarding protective actions they *should* take in order to ensure their safety and welfare. Public direction principles are described in the **PNERP Master Plan, Section 7.3**.

6.4.3 *Emergency bulletins* issued during a partial *activation* response level, before an emission is expected to occur, *should* be informative and permissive, whereas *emergency bulletins* issued once a full *activation* response has been adopted *should* be increasingly directive.

6.4.4 While the need for future sheltering *should* be broadcast through *emergency bulletin* as soon as that need is identified, the actual sheltering directive *should* be made, via *emergency bulletin*, at least 4 hours prior to the expected emission time.

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[6] The provincial Alert Ready program ensures that emergency bulletins are broadcast in a timely manner via radio, television and mobile devices.

6.4.5 At a partial *activation* response, the *emergency bulletin shall* include the following information, as applicable:

a) date and time of expected emission

b) sectors (by geographical description) which may be affected

c) applicable precautionary and *protective measures* for the affected sectors or area and applicable timings (in the case of a delayed emission it may be appropriate to delay the application of some of them)

d) public inquiry phone number(s) and websites

6.4.6 As successive *emergency bulletins* are issued, as much additional information as possible *should* be provided which may encourage those who can leave early to evacuate.

6.4.7 Once a full *activation* response level has been adopted and an emission is expected in 36 hours or less, *emergency bulletins should* ensure that they include directions regarding:

a) date and time of expected emission

b) *precautionary measures* directed in the applicable zone(s)

c) *protective measures* and the affected sectors or zones

d) *Reception Centres* which can receive evacuees without accommodation

e) KI pill ingestion details and availability information, as applicable

f) public inquiry phone number(s) and websites

6.4.8 Marine Notification and Public Direction

a) The PEOC Commander *shall* ensure the Canadian Coast Guard is notified by the GOC whenever the PEOC receives a *notification* (partial or full *activation*) under this plan (see **Paragraph 4.4.3 f)**) and they, in turn, *shall* notify the U.S. Coast Guard.

b) In the case of a full *activation response*, the Canadian Coast Guard *shall* broadcast an *emergency* message through their radio stations to marine craft on the marine radio channel. The message *should* notify all marine craft in the vicinity of the *emergency* and direct them to remain clear of the *Detailed Planning Zone*.

c) Municipal plans *shall* detail how the South Bruce OPP Marine Unit assists in notifying and evacuating marine craft that do not have radios on board.

6.4.9 The public awareness and education program for nuclear emergencies *shall* include information regarding the means by which public direction will be communicated.

## 6.5 Emergency Public Information

6.5.1 Lower Level Response

When the *off-site response* adopted is Routine Monitoring or Enhanced Monitoring, (see **Table 4.2**), all news releases pertaining to the event and prepared on behalf of the province, *shall* be issued by the Director Communications Branch, MCSCS who acts as the Provincial Chief Emergency Information Officer (PCEIO).

6.5.2 Higher Level Response

a) When the *off-site response* adopted is partial *activation* or full *activation*, (see **Table 4.2**), the Director of Communications Branch, MCSCS, assumes their role as PCEIO, establishing the provincial Emergency Information Section (EIS), on behalf of the province.

b) The *Designated Municipalities*, the *reactor facility operator* and the federal government each have their own *emergency* information operations.

c) In order to ensure the coordination and consistency of all *emergency* information issued to the public, all *stakeholders should* inform the provincial EIS if they plan to issue news releases or other *emergency* information materials.

d) *Stakeholders should* coordinate the release and content of *emergency information* for public release with the provincial Emergency Information Section.

e) *Stakeholder emergency* plans *should* include provisions for supporting the operation of a *Joint Information Centre* (JIC) if established by the PCEIO (e.g., public affairs/spokesperson).

6.5.3 The Provincial Emergency Information Section (EIS)

a) The provincial EIS, located in Toronto, *shall* ensure that the province's *emergency* information is coordinated with the *emergency* information produced and disseminated by the *Designated Municipalities*, nuclear *operator*, federal partners and other *stakeholders* to ensure consistent messaging.

b) *Stakeholders should* share *emergency* information prior to release wherever possible and practicable.

c) The EIS functions include:

   i. Coordinating all of the provincial *communications* related to the *nuclear emergency*.

   ii. Issuing provincial *emergency* information.

   iii. Sharing and coordinating *emergency* information with Municipal EICs to ensure continuity and uniformity of messaging.

   iv. Sharing copies of all news releases, fact sheets, and other public information materials with EICs prior to release to the public, if or when possible.

   v. Sending a liaison officer(s) to the Municipal EICs, if so requested.

6.5.4 Municipal Emergency Information Centre (EIC)

a) Emergency plans for the *Designated Municipalities shall* each describe how an EIC is established at a partial or full *activation response*.

b) The EIC is responsible for the collection, dissemination and monitoring of local *emergency* information.

c) The *Designated Municipalities* may invite the BNGS *operator*, neighbouring *Municipalities*, federal, and provincial liaison officers to participate in the EIC operation.

d) The functions of the EIC include:

i. Issuing news releases and other public information documents to the local media and residents describing the *emergency* and *response* measures.

ii. Keeping the provincial EIS and JIC informed regarding the development and distribution of news releases and other public information documents to local residents and media.

iii. Keeping the EIS apprised of local public perceptions, rumours, and reactions.

iv. Assisting media covering the *emergency*.

v. Monitoring local media to ensure that local news is being correctly transmitted to the public by the media and confirming this with the EIS.

vi. Arranging media briefings, as required, to communicate “key messages” to the public.

6.5.5 Public Inquiry

a) Provincial public inquiries *shall* be coordinated by the EIS and include use of the Service Ontario’s hotline.

b) The *Designated Municipalities shall* be responsible for establishing their own public inquiry operation.

## 6.6 Entry Control

6.6.1 Management of the main transportation routes *shall* be coordinated by the PEOC as follows:

a) In the case of marine, air and rail, through the relevant coordinating agency in the PEOC (federal liaison, MTO, OPP).

b) In the case of road traffic, by the Unified Transportation Coordination Centre (UTCC) via the MCSCS representative in the PEOC.

6.6.2 In the event of an ongoing emission or one that is imminent, the PEOC Commander *should* consider the following *entry control* measures and notify the proper authorities for implementation as appropriate:

a) Suspension of through traffic on Highway 21.

b) Suspension of marine traffic in the *Detailed Planning Zone* area (Sectors 7 - 9) of Lake Huron.

c) Aircraft *should* be kept clear of the *Detailed Planning Zone*.

## 6.7 Transportation Management

6.7.1 A Unified Transportation Management Plan (UTMP) *shall* be developed for the *Detailed Planning Zone* as well as the arterial roads that provide access to this zone. During an *emergency*, the Unified Transportation Coordination Centre (UTCC) (see **Paragraph 3.1.3**) *shall* be responsible for implementing the UTMP.

6.7.2 The Unified Transportation Coordination Centre (UTCC) *shall* operate in coordination with the Municipal Emergency Operations Centres (EOCs), and the *Provincial Emergency Operations Centre* (PEOC).

6.7.3 The UTMP *shall* be designed to allow implementation in incremental stages consistent with the agreed upon evacuation time estimate data and the provincial emergency response levels. For example, a staged approach may include:

a) Stage 1: The aim in this stage could be to keep traffic flowing smoothly on the main *evacuation* routes and ensure that these routes remain open.

b) Stage 2: UTMPs could prevent traffic from entering the *Detailed Planning Zone* and divert traffic around it. However, access *should* be allowed for *emergency workers* who have tasks to perform in the *Detailed Planning Zone*. Stage 1 measures *should* continue.

c) Stage 3: Could be initiated when it appears that particular sectors are likely to be evacuated. Additional resources *should* be deployed to ensure that *evacuation* proceeds smoothly beyond the *Detailed Planning Zone* boundary. Stages 1 and 2 measures *should* continue.

6.7.4 The timing and order of sector *evacuations shall* be determined by the PEOC Commander, in coordination with the UTCC.

6.7.5 The UTMP *shall* provide, where applicable, for the priority *evacuation* of any *response sectors* if and when ordered.

6.7.6 *Operational directives* implementing *evacuations* (or *emergency* orders issued in the event of a declared *emergency*) *shall* be accompanied by *emergency bulletins* issued by the PEOC Commander.

## 6.8 Emergency Worker Safety

6.8.1 At the commencement of an *emergency* resulting in the *activation* of this plan, the *response sectors* in the *Detailed Planning Zone shall* be assumed to carry the following default safety status (**PNERP Master Plan**, **Annex H**), based on the category of the *notification* initiated by BNGS:

a) On-Site Emergency Notification with an ongoing emission:

i. Sectors 1 and 7 - ORANGE

ii. All other sectors - GREEN

b) General Emergency Notification with an ongoing emission:

i. Sectors 1 and 7 - RED

ii. Sectors 2, 3 and 8 - ORANGE

iii. All other sectors - GREEN

c) All other cases:

If there is no ongoing emission, then the sector safety status for all sectors *should* be GREEN and *should* remain GREEN until an emission commences.

6.8.2 The PEOC Scientific Section Chief *shall* make recommendations on sector safety status to the PEOC Commander for approval and update recommendations as data becomes available.

6.8.3 The PEOC Commander *shall* reassign safety status to all sectors and update them periodically as soon as relevant data is available.

6.8.4 During the course of an emission over land, safety sector status updates *shall* be done on an hourly basis and promptly communicated by the PEOC Commander to all *stakeholders*.

6.8.5 It is the responsibility of each organization with *emergency workers* operating or required to operate in the *Detailed Planning Zone* to ensure that they are kept apprised of the current safety status of *response sectors*.

6.8.6 The municipal plans *shall* provide for the setting up of *Emergency Worker Centres* (EWCs), as appropriate (**PNERP Master Plan, Paragraph 7.10.3**).

6.8.7 The BNGS *operator* is responsible for the monitoring and *decontamination* aspect of EWCs, the relevant details of which are provided in their plans and procedures.

6.8.8 *Emergency workers* who need to enter a sector *shall* first report to an EWC, where they will be provided with *personal monitoring* devices and briefed on the health risks and precautions they *should* observe and any maximum time limit on their stay in the sector (see **Paragraph 6.8.1** above).

6.8.9 If an emission is ongoing, *emergency* services (police, fire and paramedic services) who are required to operate in the *Automatic Action Zone* (before an *Emergency Worker Centre* is functioning) *should* carry and use the following equipment:

a) personal protective equipment (e.g., respiratory protection, gloves, etc.)

b) dosimetry

c) stable iodine tablets (one tablet to be ingested prior to entering a RED sector)

d) a card listing the default safety status of sectors (see **Paragraph 6.8.1** above) and the precautions to be taken for each safety status (**PNERP Master Plan, Annex H**)

6.8.10 Municipal plans *shall* detail how these *emergency* services obtain these items, appropriately store them, and maintain such equipment so that it is readily available when needed. The BNGS *operator shall* provide assistance in obtaining and maintaining items **Paragraph 6.8.9 a)** and **b)** above.

## 6.9 Population Monitoring and Medical Management

6.9.1 The BNGS *operator shall* resource two Monitoring and *Decontamination* Units (MDUs) as follows:

a) Two MDUs *should* be located at fixed sites (e.g., at the *Reception Centres* in Kincardine and Port Elgin).

b) MDUs *should* be mobile facilities and transportable when required to locations which have been pre-designated.

c) Resources *shall* be provided that support mobility and relocation if required.

6.9.2 *Designated Municipalities* and the BNGS *operator shall* collaborate to identify in their respective emergency plans, multiple sites within the DPZ and CPZ which could host mobile MDUs, to ensure the availability of infrastructure and amenities to support their operation.

6.9.3 Fixed and pre-designated sites for mobile units *shall* be selected so as to provide, as far as practical, monitoring and *decontamination* options for all directions surrounding the *Detailed Planning Zone*.

6.9.4 Fixed and mobile MDUs *shall* provide both assurance monitoring, for those who have undertaken self-*decontamination*, as well as monitoring and *decontamination* for those evacuees who either require or desire it upon evacuating the *Detailed Planning Zone*.

6.9.5 The MOHLTC is responsible for leading and coordinating the health *response* and maintaining health services during *nuclear and radiological emergencies*. As such, the MOHLTC *shall* develop arrangements, in coordination with the BNGS *operator*, hospitals, *Designated Municipalities* and their public health units, to track evacuees for the purposes of *contamination* assessments (internal and external) and to provide follow up with those affected.

6.9.6 The **Radiation Health Response Plan (RHRP)** *shall* be fully activated through the MOHLTC EOC when it seems likely that the incident may result in high *radiation exposures* to some persons necessitating medical management.

## 6.10 Provincial Liquid Emission Response Plan (PLERP)

6.10.1 The main *radiation* (e.g., tritium) *exposure* pathway for a liquid emission from BNGS is through *contamination* of a water supply source, with the resulting hazard being the subsequent ingestion of contaminated water.

6.10.2 If a liquid emission has occurred at BNGS in conjunction with an event that meets the *notification* category system as detailed in this implementing plan, then it *shall* be managed within this implementing plan.

6.10.3 If a liquid emission has occurred at BNGS and has not occurred in conjunction with an event that meets the *notification* category system as detailed in this implementing plan, then it *shall* be managed in accordance with the BNGS *operator's* liquid emission response plan.

6.10.4 A liquid emission *response* undertaken pursuant to the **PLERP**, may shift to a **PNERP** *response* if events escalate to a magnitude where it is deemed appropriate by the PEOC Commander.

## 6.11 Management of Radioactive Waste

6.11.1 For large waste volumes and high radioactive levels, existing disposal facilities may be insufficient or unsuitable, thereby necessitating alternative means of disposal, including the potential for construction of new facilities.

6.11.2 The following factors *should* be considered in the determination of waste disposal siting (existing or new):

a) proximity to the incident area

b) proximity to residential areas or commercial districts

c) proximity to transportation corridors

d) for newly designated sites, the existing level of *contamination* and potential for remediation

e) consistency with national and international standards and practices for the management and control of radioactive waste; and

f) solutions to protect the health and safety of persons and the environment

6.11.3 When appropriate, the PEOC Commander *shall* appoint a working group to implement a waste management plan, including representatives from:

a) provincial ministries (e.g., MEPC, ENDM, MOL and MTO)

b) federal departments (e.g., CNSC and Health Canada)

c) municipal public works departments

d) *reactor facility* specialists

e) private sector organizations, as applicable

# ANNEXES

**ANNEX A: RESPONSE SECTOR BOUNDARIES**

**ANNEX B: POPULATION DATA**

**ANNEX C: CONTINGENCY PLANNING ZONE GUIDANCE**

**ANNEX D: NUCLEAR / RADIOLOGICAL GLOSSARY**

# ANNEX A
# RESPONSE SECTOR BOUNDARIES

(Reference: **Paragraph 2.4.2**)

| SECTOR | SECTOR BOUNDARY (north; east; south; west) |
|---|---|
| 1 | Concession 8 (including Scott's Point); Lake Range Road; Concession 6; Bluff; Concession 2; east and south boundaries of Inverhuron Provincial Park. |
| 2 | Concession 10; J Sideroad; Concession 4; east boundary of Sector 1. |
| 3 | Concession 4; J Sideroad; old boundaries of (former Tiverton Village); County Road 15; east boundary of Sector 1. |
| 4 | Concession 14 and County Road 11; 10 Sideroad; Concession 10; Shoreline. |
| 5 | Concession 10; 10 Sideroad; County Road 15; J Sideroad (excluding former Tiverton). |
| 6 | County Road 15 (excluding Tiverton); 10 Sideroad; Concession 7; Shoreline. |

# ANNEX B
# POPULATION DATA

(Reference: **Paragraph 2.6.2**)

| SECTOR | POPULATION[7] |
|---|---|
| 1 | 600 |
| 2 | 197 |
| 3 | 1,779 |
| 4 | 515 |
| 5 | 467 |
| 6 | 950 |
| BNGS Site | 3,400 |
| | **TOTALS** |
| Municipality of Kincardine (Bruce Township/Tiverton/Kincardine Township) | 4,508 |
| BNGS Site | 3,400 |
| TOTAL SECTORS | 7,908 |

[7] Population estimates based on the 2016 Canada Census.

# ANNEX C
# CONTINGENCY PLANNING ZONE GUIDANCE

(Reference: **Section 2.4.3**)

**General**

1. The *Contingency Planning Zone* (CPZ) is a pre-designated area surrounding a *reactor facility*, beyond the *Detailed Planning Zone*, where contingency planning and arrangements are made in advance, so that during a *nuclear emergency*, *protective measures* can be extended beyond the *Detailed Planning Zone* as required to reduce potential for *exposure*.

2. The CPZ included within the PNERP Master Plan and Implementing Plans is aligned with new standards and guidance documents, including the Canadian Standards Association's (CSA) **N1600 General Requirements for Nuclear Emergency Management Programs**, International Atomic Energy Agency's (IAEA) **General Safety Requirements (GSR) Part 7**.

3. The CPZ is intended to be used as necessary in the event of very low probability, *severe accident* situations where the area affected could extend beyond the *Detailed Planning Zone*.

4. The CPZ does not require the same level or type of detailed arrangements as the *Automatic Action Zone or Detailed Planning Zone*, in so far as there are no default or pre-planned *protective measures* associated with the CPZ.

5. *Response* activities within the CPZ may occur in the event of a limited and localized radiological release and based on the results received from environmental *radiation* monitoring activities.

6. The distribution of *Iodine Thyroid Blocking* pills should be undertaken in a manner consistent with the processes established for the *Ingestion Planning Zone*.

7. Public Education requirements are consistent with the processes stipulated for the *Ingestion Planning Zone*.

8. The designation of additional primary emergency facilities beyond those designated in the *Detailed Planning Zone* is not required (e.g., Emergency Operations Centres (EOCs), *Emergency Information Centres* (EICs), Reception Centres, Evacuation Centres, MDU facilities, etc.). However, *municipalities* are required to identify and document in their municipal plans, those sites that could be used as a back-up or

alternative location in the event that the primary emergency facility becomes unavailable.

**Operational Response Activities Within the CPZ**

9. Operational *response* activities within the CPZ *should* unfold using the planning, communication, assessment and command and control mechanisms set out in this document and the PNERP Master Plan. For example, *public alerting* and emergency communications would be conducted using existing processes and systems as established for the *Ingestion Planning Zone* and beyond.

10. Operational response activities within the CPZ would be focused on monitoring dose rates from deposition (e.g., *groundshine*) in order to determine which specific locations or areas beyond the *Detailed Planning Zone* may require the imposition of *exposure control* measures (e.g., *evacuation, sheltering-in-place*, *Iodine Thyroid Blocking* (ITB), etc.).

11. In the event of a radiological release, the PEOC would undertake the following functions:

    a) The PEOC would determine and advise *stakeholders* on the direction of the radioactive plume and likely *radioactive material* deposition locations.

    b) The PEOC would direct field sampling teams to measure for *radioactive material* deposition in suspected locations.

    c) The PEOC Scientific Section would employ its existing mechanisms, processes and procedures to assess environmental radiation monitoring results and analyze the data received from the field sampling teams to identify the size and boundaries for the response activities within the eight CPZ sub-zones **(**see **Figure 2.2)** and to make protective action recommendations to the PEOC Commander, consistent with the results received and in line with this plan's guiding principles **(PNERP Master Plan, Section 1.2)**.

    d) The PEOC Commander would promulgate protective actions using existing communication methods specified in this Implementing Plan.

12. *Municipalities* would be required to identify any emergency facilities that may be at risk of exposure to a radioactive plume during the emergency. *Municipalities* and the PEOC would then collaborate to determine which previously identified alternate facilities would be used to support the *response*. In the event of an emergency where all previously identified alternative facilities are unavailable, the PEOC will identify and source appropriate alternate facilities and communicate the location of these facilities to the *Emergency Response Organization*.

13. The emergency information function would be engaged to advise the public and *stakeholders* which areas of the CPZ have been impacted and what protective actions are required.

# ANNEX D
# NUCLEAR / RADIOLOGICAL GLOSSARY

(Reference: **Paragraph 2.3.2**)

(For other references see Provincial Glossary)

**Abnormal Incident:** An abnormal occurrence that may have a significant cause and/or may lead to more serious consequences. (Source: CNSC Glossary)

**Accident:** Any unintended event, including operating errors, equipment failures or other mishaps, the consequences or potential consequences of which are significant from the point of view of protection or safety. With respect to nuclear criticality safety, the term *accidents* or *accident* sequences means events or event sequences, including external events that lead to violation of the sub-criticality margin (that is, to exceeding the upper subcritical limit). (Source: CNSC Glossary)

**Activation:** Decisions and actions taken to implement a plan, a procedure or to open an emergency operations centre. (Source: Provincial Glossary)

**Alerting:** Informing the population, by means of an appropriate signal, that a *nuclear emergency* has occurred or is about to occur.

**As Low As Reasonably Achievable (ALARA):** A principle of *radiation* protection that holds that *exposures* to *radiation* are kept as low as reasonably achievable, social and economic factors taken into account. (Source: CNSC Glossary)

**Automatic Action Zone (AAZ):** A pre-designated area immediately surrounding a *reactor facility* where pre- planned protective actions would be implemented by default on the basis of *reactor facility* conditions with the aim of preventing or reducing the occurrence of severe *deterministic effects*. (Source: Canadian Standards Association (CSA) *N1600, General requirements for nuclear emergency management programs*)

**Becquerel (Bq):** The International System of Units (SI) unit of radioactivity. One *becquerel* (Bq) is the activity of a quantity of *radioactive material* in which one nucleus decays per second. In Canada, the Bq is used instead of the non-SI unit curie (Ci). (Source: CNSC Glossary)

**Beyond Design Basis Accident (BDBA):** An *accident* less frequent and potentially more severe than a *design-basis accident*. Note**:** For a *reactor facility*, a *beyond-design-basis accident* may or may not involve fuel degradation. (Source: CNSC Glossary)

**Boiling Water Reactor (BWR):** A common type of light-water reactor, where water is allowed to boil in the core, generating steam directly in the reactor vessel to generate electrical power. (Source: CNSC Glossary)

**Buffer Zone:** An area beyond the *Restricted Zone*, where limited areas of radioactivity are detected. The *buffer zone* is initially delineated based on results of preliminary environmental *radiation* monitoring. *Ingestion control* measures may be applied within this zone, based on guidance provided by the *Operational Intervention Levels* (OILs) and, in accordance with direction provided by the Environmental Radiation and Assurance Monitoring Group (ERAMG).

**CANDU Reactor:** A Canadian-invented pressurized heavy-water reactor that uses heavy water (deuterium oxide) for moderator and coolant and natural uranium for fuel. “CANDU” is short for CANada Deuterium Uranium. Also called CANDU. (Source: CNSC Glossary)

**Cloudshine:** *Gamma radiation* from *radioactive materials* in an airborne *plume*.

**Communications:** Advisories, directives, information and messages that are transmitted. (Source: Provincial Glossary)

**Community:** A generic term that includes both *Municipalities* and First Nations. (Source: Provincial Glossary)

**Containment (System):** A series of physical barriers that exist between *radioactive materials* contained in a *reactor facility* and the environment. *Containment* usually refers only to the reactor and vacuum buildings, and integral systems such as dousing.

**Contamination:** Contamination refers to nuclear or hazardous substances on surfaces, or within solids, liquids or gases (including the human body), where their presence is unintended or undesirable, or to the process giving rise to their presence in such places. (Source: CNSC Glossary)

**Contingency Planning Zone (CPZ):** A pre-designated area surrounding a *reactor facility*, beyond the *Detailed Planning Zone*, where contingency planning and arrangements are made in advance, so that during a *nuclear emergency,* protective actions can be extended beyond the *Detailed Planning Zone* as required to reduce potential for *exposure*. (Source: *CSA N1600, General requirements for nuclear emergency management programs*)
Note: The actual CPZ for each *reactor facility* is specified in the relevant implementing plans of the *Provincial Nuclear Emergency Response Plan*.

**Crop Control**: *See* **Produce and Crop Control**.

**Declaration of Emergency:** A signed declaration made in writing by the Head of Council or the Premier of Ontario in accordance with the *Emergency Management and Civil Protection Act.* This declaration is usually based on a situation or an impending situation that threatens public safety, public health, the environment, critical infrastructure, property, and/or economic stability and exceeds the scope of routine *community emergency response*.
Notes:
1 Municipal Declaration of *Emergency*: a declaration of *emergency* made by the Head of Council or a *Municipality*, based on established criteria.
2 Provincial Declaration of *Emergency*: a declaration of *emergency* made by the Lieutenant Governor of Council or the Premier of Ontario, based on established criteria.
(Source: Provincial Glossary)

**Decontamination:** Reduction or removal of radioactive *contamination* in or on materials, persons or the environment.

**Design Basis Accident (DBA):** *Accident* conditions against which a facility is designed according to established design criteria, and for which the damage to the fuel and the *release* of *radioactive material* are kept within authorized limits. (Source: *CSA N1600, General requirements for nuclear emergency management programs*)

**Designated Host Municipality:** The *Municipality* assigned responsibility in the *Provincial Nuclear Emergency Response Plan* for the reception and care of people evacuated from their homes in a *nuclear emergency*.

**Designated Municipality:** A *Municipality* in the vicinity of a *reactor facility* which has been designated under the *Emergency Management and Civil Protection Act*, as one that *shall* have a *nuclear emergency* plan (*for list see* **PNERP Master Plan, Annex A**).

**Detailed Planning Zone:** A pre-designated area surrounding a *reactor facility*, incorporating the *Automatic Action Zone*, where pre-planned protective actions are implemented as needed on the basis of *reactor facility* conditions, *dose* modelling, and environmental monitoring, with the aim of preventing or reducing the occurrence of *stochastic effects*. (Source: Modified from *CSA N1600, General requirements for nuclear emergency management programs*)

**Deterministic Effects:** *Radiation*-induced health effects including changes to cells and tissues that are certain to occur in an individual exposed to a *radiation dose* greater than some threshold *dose*, with a severity that increases with increasing *dose*. Now referred to as tissue reactions. (Source: Health Canada Glossary)

**Disaster:** A serious disruption to an affected area, involving widespread human, property, environmental and / or economic impacts, that exceed the ability of one or more affected communities to cope using their own resources. (Source: Provincial Glossary)

**Dose:** A measure of the *radiation* received or “absorbed” by a target. The quantities termed *absorbed dose*, organ *dose*, equivalent *dose*, effective *dose*, committed equivalent *dose* or committed *effective dose* are used, depending on the context. The modifying terms are often omitted when they are not necessary for defining the quantity of interest.

**Dose Management:** Includes administrative controls to limit *doses*, monitor *doses* and record *doses* received by *emergency workers* while fulfilling their duties related to *nuclear emergency response*.

**Dose Projection:** The calculation of *projected dose* (*see Projected Dose*).

**Dose Rate:** The amount of *radiation dose* which an individual would receive in a unit of time. In the context of this plan, the measurement units are multiples or submultiples of the Sievert (or rem) per hour.

**Dosimeter:** An instrument for measuring and registering total accumulated *exposure* to *ionizing radiation*.

**Drill:** supervised instruction intended to test, develop, maintain, and practice the skills required in a particular *emergency response* or *recovery* activity.
Note: A *drill* can be a component of an *exercise*. (Source: *CSA N1600, General requirements for nuclear emergency management programs*)

**Effective Dose (E):** A quantity calculated by multiplying the equivalent *dose* received by irradiated tissues, by a tissue specific weighting factor that reflects the *risk* of *radiation*-induced cancer to that tissue. The effective *doses* can then be summed to obtain the effective *dose* absorbed by the body.

**Emergency:** A situation or an impending situation that constitutes a danger of major proportions that could result in serious harm to persons or substantial damage to property and that is caused by the forces of nature, a disease or other health *risk*, an *accident* or an act whether intentional or otherwise (*EMCPA*). (Source: Provincial Glossary)

**Emergency Action Level:** Pre-determined criteria related to *on-site* conditions (e.g., plant parameters) which trigger the implementation of protective actions, particularly in the *Automatic Action Zone*. (Source: Health Canada Glossary)

**Emergency Bulletin**: Directions to the public on appropriate protective and other measures to be taken during a *nuclear or radiological emergency*, which are issued by the province and broadcast through the media.

**Emergency Information (EI):** Information about an *emergency* that can be disseminated in anticipation of an *emergency* or during an *emergency*. It may provide situational information or directive actions to be taken by the public. (Source: Provincial Glossary)

**Emergency Information Centre (EIC):** A designated facility that is properly equipped to monitor and co-ordinate *emergency* information activities including the dissemination of information to the public. (Source: Provincial Glossary)

**Emergency Response Organization:** A group (public, private or volunteer), trained in *emergency response* that may be called upon to respond to an *emergency* situation. (Source: Provincial Glossary)

**Emergency Worker:** A person performing *emergency* services to support *emergency response*.
Notes**:**
1 *Emergency workers* can include the following: *nuclear emergency workers* required to remain in, or to enter, areas affected or likely to be affected by *radiation* from a *nuclear emergency*, and for whom special safety arrangements are required; *emergency workers* required to provide *response* outside the affected areas.
2 This does not include nuclear energy workers.
3 *Emergency workers* can include police, firefighters, paramedic services and *emergency* social services workers, and other essential services.
(Source: *CSA N1600, General requirements for nuclear emergency management programs*)

**Emergency Worker Centre:** A facility set up to monitor and control *radiation exposure* to *emergency workers*.

**Entry Control:** The *prevention* of non-essential persons from entering a potentially dangerous area.

**Environmental Decontamination:** See *Decontamination*.

**Equivalent Dose:** The *absorbed dose* multiplied by a weighting factor for the type of *radiation* giving the *dose*. Weighting factors for use in Canada are prescribed by the Canadian Nuclear Safety Commission. This term is also sometimes called *weighted dose*. Expressed in terms of Sievert (or rem).

**Evacuation:** A directed protective action for the controlled displacement of the population from an area which has been or might become contaminated by radioactive substances to avoid *exposure*. (Source: *CSA N1600, General requirements for nuclear emergency management programs*)

**Evacuation Centre:** A centre which provides affected people with basic human needs including accommodation, food and water. (Source: Australian Emergency Management Glossary)

**Exclusion Zone:** A parcel of land within or surrounding a *reactor facility* on which there is no permanent dwelling and over which a licensee has the legal authority to exercise control. (Source: CNSC Glossary)

**Exercise:** A simulated *emergency* in which players carry out actions, functions, and responsibilities that would be expected of them in a real *emergency*. *Exercises* can be used to validate plans and procedures, and to practice *prevention*, mitigation, *preparedness*, *response*, and *recovery* capabilities.

**Exposure:** The act or condition of being subject to irradiation. *Exposure* can be either external *exposure* (irradiation by sources outside the body) or internal *exposure* (irradiation by sources inside the body).

**Exposure Control:** *Emergency* operations aimed at reducing or avoiding *exposure* to a *plume* or *puff* of *radioactive material*. Measures to deal with surface *contamination* and re-suspension might also be included.

**Exposure Pathways:** The routes by which *radioactive material* can reach or irradiate humans.

**External Notification:** The *notification* of organizations and agencies (not directly part of the *emergency* management organization) which may be affected by a *nuclear emergency*, or which may be required to assist in responding to it.

**Far Incident:** A transborder nuclear *accident* or event anywhere in the world which could affect Ontario, other than a Near Incident (*see Near Incident*).

**Food Control:** Measures taken to prevent the consumption of contaminated *foodstuffs* and control of including the supply of uncontaminated *foodstuffs*. Where appropriate, such control may include *foodstuff* storage to permit *radionuclide* decay, diversion of *foodstuff* to non-human, non-*foodstuff* chain use or disposal of unusable stocks.

**Foodstuff:** Food or drink intended for human consumption, including (a) an ingredient of food or drink intended for human consumption or (b) any animal or plant, or any of its parts, from which food or drink, or an ingredient of food or drink, intended for human consumption may be derived.

**Fuel Failure:** Any rupture of a fuel sheath such that fission products may be *released*. (Source: CNSC Glossary)

**Gamma Radiation:** Penetrating electromagnetic *radiation* emitted from an atom's nucleus. Also called gamma rays. (Source: CNSC Glossary)

**General Emergency:** Events at a nuclear power plant or onboard a nuclear-powered vessel resulting in an actual or substantial *risk* of a *release* of radioactivity or *radiation exposure* which warrants the implementation of protective actions off site. (Source: Health Canada Glossary)

**Generic Criteria:** Expressed as a *projected dose*, over a specified time period, above which protective actions are recommended to reduce the *risk* of *stochastic effects*.

**Government Operations Centre:** The federal government organization located in the National Capital Region which directs the mobilization and delivery of national support to the affected province in the case of an event in or near Canada, or which co-ordinates federal actions in the case of an international event.

**Gray (Gy):** The International System of Units (SI) unit of measurement used to express *absorbed dose*. One gray is defined as the absorption of 1 joule of *ionizing radiation* by 1 kilogram of matter. For *gamma* and beta *radiation*s, the gray is numerically equal to the Sievert. (Source: CNSC Glossary)

**Groundshine:** *Gamma* and/or beta *radiation* from *radioactive material* deposited on the ground.

**Guaranteed Shutdown State:** A reactor is considered to be in this state when there is sufficient negative reactivity to ensure sub-criticality in the event of any process failure, and approved administrative safeguards are in place to prevent net removal of negative reactivity.

**Helper:** Member of the public who willingly and voluntarily helps in the *response* to a *nuclear or radiological emergency*. (Source: *IAEA General Safety Requirements (GSR) Part 7*)

**Hostile Action:** Any deliberate action, or threat of action, which could cause a *nuclear emergency*.

**Imminent Release:** A radioactive emission that will occur in 12 hours or less.

**Ingestion Control:** *Emergency response* operations in which the main aim is to avoid or reduce the *risk* from ingestion of contaminated *foodstuff* and water.

**Ingestion Planning Zone:** A pre-designated area surrounding a *reactor facility* where plans or arrangements are made to:

a) protect the food chain;
b) protect drinking water supplies;
c) restrict consumption and distribution of potentially contaminated produce, wild-grown products, milk from grazing animals, rainwater, animal feed; and
   Note: Wild-grown products can include mushrooms and game.
d) restrict distribution of non-food commodities until further assessments

(Source: *CSA N1600, General requirements for nuclear emergency management programs*)

**Initial Notification:** The *notification* made by a *reactor facility* to Provincial and/or municipal authorities upon the occurrence of an event or condition which has implications for public safety, or could be of concern to these authorities. The criteria and channels for making such *notification* are usually described in *emergency* plans.

**Internal Notification:** The *notification* by an organization to its personnel who are required to respond to an *emergency*.

**Intervention Level:** A *radiation dose* above which a specific protective action is generally justified. (Source: Health Canada Glossary)

**Iodine Thyroid Blocking:** The reduction or *prevention* of the absorption of *radioiodine* by the thyroid gland, which is accomplished by the intake of a stable iodine compound (such as potassium iodide) by people exposed or likely to be exposed to *radioiodine*.

**Ionizing Radiation:** For the purposes of *radiation* protection, *radiation* capable of producing ion pairs in biological material(s). *Ionizing radiation* is constantly present in the environment and includes the *radiation* that comes from both natural and artificial sources, such as

cosmic rays, terrestrial sources (radioactive elements in the soil), ambient air (radon), and internal sources (food and drink). (Source: CNSC Glossary)

**Joint Information Centre:** A joint centre for the province, *Designated Municipality*, federal government and the *reactor facility* or *nuclear establishment* that is responsible for providing information on the *emergency* to the media and the public.

**Land Control:** Control on the use of contaminated land for growing food products or animal feed.

**Livestock Control:** Quarantine of livestock in the affected area to prevent movement to other areas. Slaughter of such animals for food may be banned.

**Loss-of-Coolant Accident (LOCA):** A type of reactor *accident* that results from a loss of coolant due to a break in the primary heat transport system. (Source: CNSC Glossary)

**Lower-tier Municipality:** A *Lower-tier Municipality* is the most basic unit of local government and includes townships, towns, and cities within a county or region, but excludes Single-tier *Municipalities*. (Source: Provincial Glossary)

**Malevolent Act:** An illegal action or an action that is committed with the intent of causing wrongful harm. (Source: CNSC Glossary)

**Megabecquerel:** $10^6$ *becquerel*s. (Source: CNSC Glossary)

**Microsievert (µSv):** One-millionth of a sievert. (Source: CNSC Glossary)

**Milk Control:** Preventing the consumption of locally produced milk in the area affected by a *nuclear emergency*, and its export outside the area until it has been monitored. Collection of contaminated milk, its diversion to other uses, or its destruction, may also be involved.

**Millisievert (mSv):** One-thousandth of a sievert. (Source: CNSC Glossary)

**Ministry Action Group (MAG):** The *Ministry Action Group* (MAG) is composed of the deputy minister or designate of the ministry, the senior ministry official appointed to the ministry's emergency management program committee, the ministry's emergency management program coordinator; and such other ministry employees as may be appointed by the minister. The group *shall* direct the ministry's *response* in an *emergency*, including the implementation of the ministry's *emergency* plan. (Source: Provincial Glossary)

**Mitigate:** Actions taken to reduce the adverse impacts of an *emergency* or *disaster*. Such actions may include diversion or *containment* measures to lessen the impacts of a flood or a spill. (Source: Provincial Glossary)

**Municipality:** "*Municipality*" means a geographic area whose inhabitants are incorporated (*Municipal Act*). (Source: Provincial Glossary)

**Near Incident:** A transborder nuclear *accident* or event at a site within 80 km of Ontario.

**Notification:** Conveying to a person or an organization, by means of a message, warning of the occurrence or imminence of a *nuclear emergency*, usually includes some indication of the measures being taken or to be taken to respond to it.

**Nuclear Emergency:** An *emergency* that has led to or could lead to the *release* of *radioactive material*, or *exposures* to uncontrolled sources of *radiation*, which pose, or could pose, a threat to health and safety, property, and the environment. (Source: *CSA N1600, General requirements for nuclear emergency management programs*)

**Nuclear Establishment:** A facility that uses, produces, processes, stores or disposes of a *nuclear substance*, but does not include a *reactor facility*. It includes, where applicable, any land, building, structures or equipment located at or forming part of the facility, and, depending on the context, the management and staff of the facility.

**Nuclear Facility:** A generic term covering both *nuclear establishments* and *reactor facilities*.

**Nuclear Substance:** As defined in the (Federal) *Nuclear Safety and Control Act*.

**Off-site:** *Off-site* refers to the area outside the boundary (fence) of a *reactor facility*.

**On-site:** *On-site* refers to the area inside the boundary (fence) of a *reactor facility*.

**Operational Directive:** Direction given by the *Emergency Response Organization* to implement *operational measures*.

**Operational Intervention Level (OIL):** A calculated value, measured by instruments or determined by laboratory analysis that corresponds to an *intervention level*.

Notes**:**
1 *OILs* are typically expressed in terms of *dose rates* or of activity of *radioactive material released*, time integrated air concentrations, ground or surface concentrations, or activity concentrations of *radionuclides* in environmental, food, or water samples.
2 An *OIL* is a type of action level that can be used immediately by default and directly (without further assessment) to determine the appropriate protective actions and other *response* actions on the basis of an environmental measurement.

(Source: Based on *CSA N1600, General requirements for nuclear emergency management programs*)

**Operational Measures:** Measures undertaken by the *Emergency Response Organization* to deal with the *emergency*, including measures to enable or facilitate protective action for the public, e.g., *public alerting*, public direction, *activation* of plans, traffic control, *emergency* information, etc.

**Operator:** Holder of a subsisting licence issued pursuant to the *Nuclear Safety and Control Act* for the operation of a *reactor facility*.

**Optimization:** The process of determining a level of protection and safety that makes *exposures* and the *probability* and magnitude of potential *exposures* as low as reasonably achievable, with economic and social factors being taken into account.

**Pasture Control:** Removing milk- and meat-producing animals from pasture and from access to open water sources, and supplying them with uncontaminated feed and water.

**Personal Monitoring:** The use of *radiation* monitoring devices to assess whether persons, and their belongings, including vehicles, are contaminated or not, and, if contaminated, the type and level of *contamination*.

**Personal Protective Equipment:** Clothing or other specialized equipment provided to an *off-site emergency worker* to prevent or reduce their *exposure* to *radioactive material*. (Source: Health Canada Glossary)

**Planning Zone:** The area in which implementation of operational and protective actions are or might be required during a *nuclear emergency*, in order to protect public health, safety, and the environment.
Note**:** See definitions for *Automatic Action Zone*, *Detailed Planning Zone*, *Contingency Planning Zone*, and *Ingestion Planning Zone*.
(Source: *CSA N1600, General requirements for nuclear emergency management programs*)

**Plume:** A cloud of airborne *radioactive material* that is transported in the direction of the prevailing wind from a *reactor facility*. A *plume* results from a continuing *release* of radioactive gases or particles. (This term may also be used for waterborne *radioactive material* resulting from a liquid emission. Where the context does not make it clear, this will be referred to as a waterborne *plume*).

**Population Monitoring and Medical Management:** The protective action strategy which includes population screening, *decontamination*, internal *contamination* assessment and medical follow-up. The purpose of this Protective Action Strategy is to reduce *exposures* to individuals. (Source: Health Canada Glossary)

**Precautionary Measures:** Measures which will facilitate the application and effectiveness of *protective measures*.

**Preparedness:** Actions taken prior to an *emergency* or *disaster* to ensure an effective *response*. These actions include the formulation of *emergency response* plans, business continuity/continuity of operations plans, training, *exercises*, and public awareness and education. (Source: Provincial Glossary)

**Prevention:** Actions taken to stop an *emergency* or *disaster* from occurring. Such actions may include legislative controls, zoning restrictions, improved operating standards/procedures or critical infrastructure management. (Source: Provincial Glossary)

**Probability:** The likelihood of an event occurring that may result in an *emergency*, *disaster* or service disruption. (Source: Health Canada Glossary)

**Produce and Crop Control:** Restrictions on the harvesting or processing of potentially or actually contaminated crops, vegetables and fruits. Measures include: embargoing export outside the affected area; storage to allow *radionuclide* decay; diversion to non-food chain use; destruction and disposal of contaminated produce.

**Projected Dose:** The highest committed effective equivalent *dose*, or committed equivalent *dose* to a specified organ or tissue, likely to be received through all applicable *exposure pathways* by the most exposed member of the *critical group* in the area for which the projection is being made.

**Protective Measures:** Measures designed to protect against *exposure* to *radiation* during a *nuclear emergency*.

**Provincial Emergency Operations Centre (PEOC**): A fully equipped facility maintained by the Office of the Fire Marshal and Emergency Management (OFMEM) that can be activated in *response* to, or in anticipation of, emergencies. The PEOC is staffed with appropriate representatives from ministries that have been delegated responsibilities for specified emergencies as well as OFMEM staff, and other *stakeholders*/partners in *emergency* management. It serves as a coordinating point-of-contact for the affected *Municipality*, provincial, and federal interests. (Source: Provincial Glossary)

**Provincial Nuclear Emergency Response Plan** (**PNERP):** A Cabinet approved *emergency response* plan for *reactor facility* emergencies mandated under the *Emergency Management and Civil Protection Act* and maintained by the province of Ontario. (Source: Provincial Glossary)

**Public Alerting:** See *Alerting*.

**Public Awareness and Education Program:** A program that provides focused information to a target audience to educate about protective actions to reduce the *risk* of life and property damage, in the event of an *emergency*. (Source: Provincial Glossary)

**Puff:** A *plume* of short duration. The distinction between a *puff* and a *plume* is a matter of time. The upper limit on the duration of a *puff* is half an hour (*See also* **Plume**).

**Radiation:** The emission by a *nuclear substance*, the production using a *nuclear substance*, or the production at a *reactor facility* of, an atomic or subatomic particle or electromagnetic wave with sufficient energy for ionization. (Source: Health Canada Glossary)

**Radioactive Material:** For purposes of nuclear security, any material that emits one or more types of *ionizing radiation*, such as alpha or beta particles, neutrons or *gamma* rays. (Source: CNSC Glossary)

**Radioiodine:** A substance containing radioactive iodine in a chemical form that has a metabolic pathway similar to iodide, such as inorganic compounds and metabolic forms of organic iodine that are broken down in a living organism. Some examples are the *radioisotopes* iodine-125 and iodine-131. (Source: CNSC Glossary)

**Radioisotope:** A variation in the form of atoms, of the same chemical element, which are distinguished by the number of neutrons in the nucleus. The number of protons remains the same, but the number of neutrons differs. For example, uranium has 16 different isotopes. (Source: CNSC Glossary)

**Radiological Emergency:** *Emergency* caused by an actual or environmental hazard from *ionizing radiation* emitted by a source other than a *reactor facility*.

**Radiological Device (RDs):** Could be lost or stolen radioactive sources which may be in locations resulting in *radiation exposure* and/or *contamination* of the public, *contamination* of a site and/or *contamination* of *foodstuff* and water supplies.

**Radiological Dispersal Device (RDDs):** A device that causes the dissemination of *radioactive material*.

**Radionuclide** (or radioactive isotope or *radioisotope*): A naturally occurring or artificially created isotope of a chemical element having an unstable nucleus that decays, emitting alpha, beta and/or *gamma* rays until stability is reached.

**Reactor Facility:** A facility producing greater than 10 megawatts gross thermal energy from nuclear fuel and consisting of one or more reactor units.
Note: This includes nuclear power plants and research reactors greater than 10 megawatts gross thermal energy.

**Reception Centre:** Locations for the initial reception, monitoring, *decontamination*, and registration of evacuated members of the public, which provides or arranges for further *emergency* social services, humanitarian assessments and support.
Notes:
1) A public *Reception Centre* is typically located in an existing facility, such as a *community* centre. Public *Reception Centres should* be beyond the *Detailed Planning Zone* boundary.
2) Examples of *emergency* social services include *emergency* shelter, food, clothing, victim registration and inquiry and personal services.
3) Examples of humanitarian support include, but are not limited to housing and family reunification. (Source: Modified IAEA Safety Guide GS-G-2.1.)

**Recovery:** The short-term and long-term actions taken in order to restore, to an acceptable level, both the organizations involved in, and the communities affected by, the *nuclear emergency* and the associated *response* activities. (Source: *CSA N1600, General requirements for nuclear emergency management programs*)

**Release:** In the context of this plan, *release* refers to the emission of *radioactive material* to the environment from a *reactor facility* in the form of either an airborne or a liquid emission.

**Representative Individual:** An individual that due to his/her characteristics, habits and location of residence, is representative of the more highly exposed individuals in the population. May also be referred to as Representative Person. (Source Health Canada Glossary)

**Response:** The actions taken during a *nuclear emergency* to reduce the magnitude of the hazard and manage its consequences, including the impact of the hazard on people, property, and the environment. (Source: *CSA N1600, General requirements for nuclear emergency management programs*)

**Response Sectors:** The *Detailed Planning Zone* is subdivided into *Response Sectors* to facilitate the planning and implementation of *protective measures*.

**Restoration:** Operations to restore conditions to normal after a *nuclear emergency*.

**Restricted Zone:** The area, within which *exposure control* measures are likely to be needed, based on the results of field monitoring. (Source: Provincial Glossary)

**Risk:** The product of the *probability* of the occurrence of a hazard and its consequences. (Source: Provincial Glossary)

**Severe Accident:** A *beyond design basis accident* involving fuel degradation in the reactor core or wet storage bay.

**Shall:** Is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to conform to the **PNERP**.

**Shelter-in-place:** A directed protective action to take immediate refuge in an enclosed structure for protection from an airborne *plume*, deposited *radionuclides*, or both.
Notes**:**
1) *Shelter-in-place* is a protective action which uses the shielding properties of buildings and their potential for ventilation control to reduce the *radiation dose* to people inside. *Shelter-in-place* has varying degrees of effectiveness depending on the type of building construction.
2) *Shelter-in-place should* typically not extend beyond two days.
3) *Shelter-in-place* is utilized as a protective action if there is insufficient time to safely evacuate an area; if the *dose* projected for an area is so low that *evacuation* is not required; or the *risks* of *evacuation* are higher than *shelter-in-place* (e.g., severe weather inhibits safe *evacuation*).

(Source: *CSA N1600, General requirements for nuclear emergency management programs*)

**Should:** Is used to express a recommendation or that which is advised but not required in order to conform to the **PNERP**.

**Shutdown State:** A subcritical reactor state with a defined margin to prevent a return to criticality without external actions. (Source: CNSC Glossary)

**SI:** International System of Units. (Source: CNSC Glossary)

**Sievert:** The International System of Units (SI) unit of equivalent *dose* and effective *dose*, equal to 1 joule/ kilogram. (Source: CNSC Glossary)

**Source Term**: A generic term applied to the *radioactive material released* from a *reactor facility*. It includes the quantity and type of material *released* as well as the timing and rate of its *release*. It could apply to a *release* that was currently occurring, or one which had ended, or one which could take place in the future.

**Special Group**: A group for which special constraints arise in the application of a protective measure, such as intensive care patients in hospitals and institutions, bedridden patients in long-term care homes, people with disabilities and/or special needs and inmates.

**Stakeholder:** A person, group, *community*, or organization that has a role in the management of a *nuclear emergency.* (Source: Based on *CSA N1600, General requirements for nuclear emergency management programs*)

**Stochastic Effects:** *Radiation*-induced health effects, such as cancer and heritable diseases, which are associated with a statistical *risk* and where no threshold has been established. The *probability* of occurrence is proportional to the *dose* (the higher the *dose* the higher the *probability* of occurrence) but the severity of the effect is independent of *dose*. (Source: Health Canada Glossary)

**Support Municipality:** Pursuant to **Section 7.0.2 (4)** of the EMPCA, the LGIC may, by order, specify a *Municipality* to act in a support capacity to provide assistance to *Designated Municipalities*.

**Transborder Emergency:** A *nuclear emergency* involving a *reactor facility* or nuclear *accident* or event outside the borders of Ontario that might affect people and property in the province.

**Upper-tier Municipality:** An upper-tier *Municipality* is a county or region. Upper-tier *Municipality* means a *Municipality* of which two or more *Lower-tier Municipalities* form part for municipal purposes (*Municipal Act*). (Source: Provincial Glossary)

**Venting:** The *release* to the atmosphere of *radioactive material* from the *containment* of a *reactor facility* through systems designed for this purpose.

**Vulnerable populations:** Members of the public who have additional needs before, during, and after a *nuclear emergency* in one or more functional areas.
Notes**:**
1) Functional areas can include, but are not limited to, the following:
    a) maintaining independence;
    b) communication;
    c) transportation;
    d) supervision; or
    e) medical care
2) Individuals in need of additional assistance could include those who:
    a) have disabilities;
    b) are from diverse cultures;
    c) have limited to no proficiency in the local official language; or
    d) are transportation disadvantaged

(Source: *CSA N1600, General requirements for nuclear emergency management programs*)

**Water Control:** Measures taken to avoid the *contamination* of drinking water supplies and sources, and to prevent or reduce the consumption of contaminated water.

**Weighted Dose:** See *Equivalent Dose*. Expressed in terms of Sievert (or rem).