Ontario

PROVINCIAL NUCLEAR EMERGENCY RESPONSE PLAN

IMPLEMENTING PLAN

FOR

CHALK RIVER LABORATORIES

May 2011

Prepared by Emergency Management Ontario
Ministry of Community Safety and Correctional Services

Ontario
Executive Council
Conseil exécutif

Order in Council
Décret

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

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

WHEREAS section 8 of the *Emergency Management and Civil Protection A*ct R.S.O. 1990 c. E.9, as amended, requires the Lieutenant Governor in Council to formulate an emergency plan respecting emergencies arising in connection with nuclear facilities;

AND WHEREAS the Provincial Nuclear Emergency response Plan – Master Plan (the "Master Plan") was approved by the Lieutenant Governor in Council by Order in Council 260/2009;

AND WHEREAS the Master Plan provides for the approval of a series of Implementing Plans to directly address emergencies in respect of specific nuclear facilities or radiological issues;

NOW THEREFORE the document entitled "Provincial Nuclear Emergency Response Plan – Implementing Plan for Chalk River Laboratories" and dated May 2011, be approved as an emergency plan under section 8 of the *Emergency Management and Civil Protection Act*.

Recommended _____
Minister of Community Safety and Correctional Services

Concurred _____
Chair of Cabinet

Approved and Ordered JUN 22 2011
Date

_____
Lieutenant Governor

O.C./Décret 1250/2011

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 Chalk River Laboratories are responsible for keeping it updated by incorporating amendments, which may be issued from time to time.

This public document 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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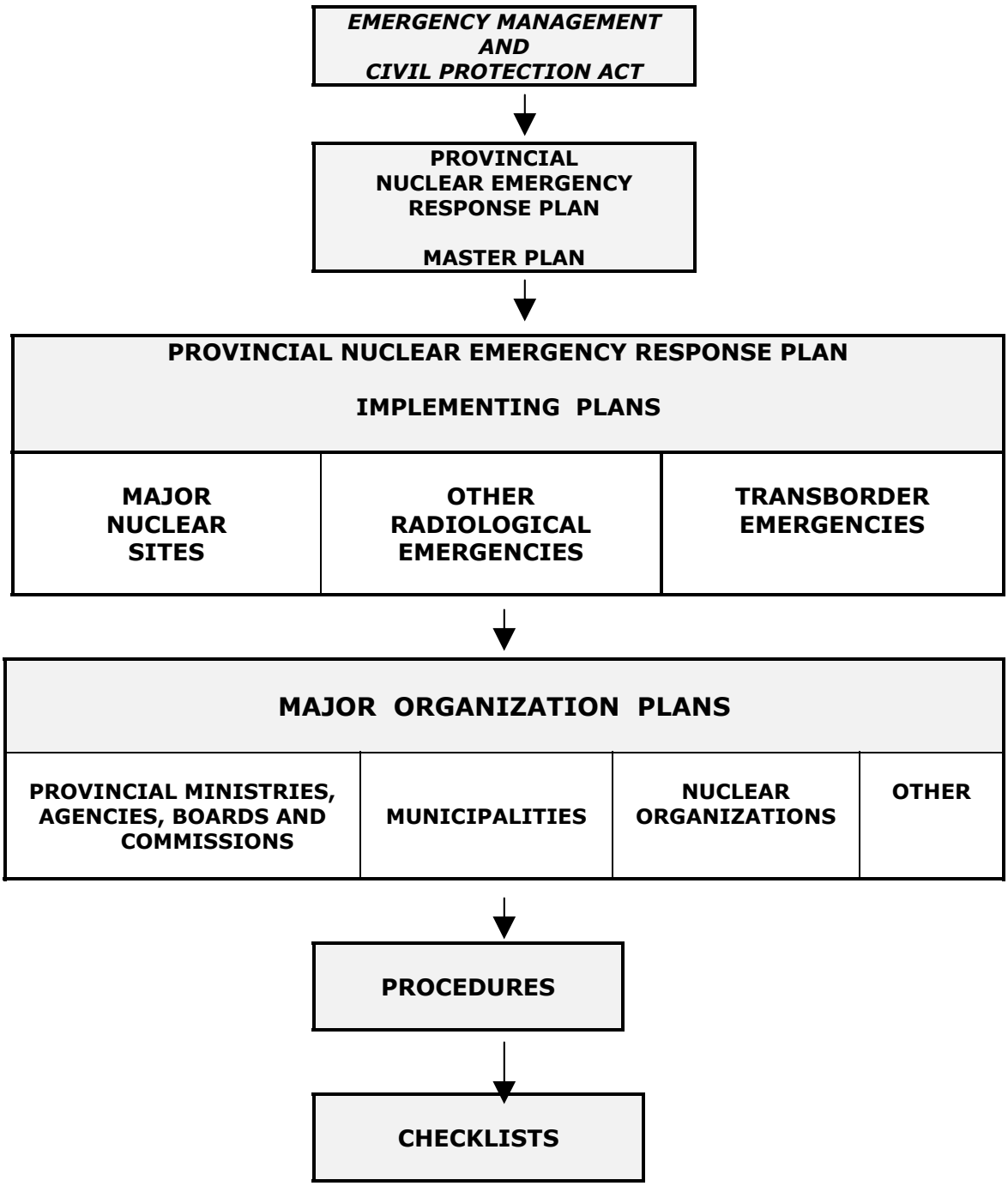

FIGURE I : PROVINCE OF ONTARIO NUCLEAR AND RADIOLOGICAL EMERGENCY RESPONSE PLANNING STRUCTURE

PROVINCE OF ONTARIO NUCLEAR AND RADIOLOGICAL EMERGENCY RESPONSE PLANNING STRUCTURE

The structure for nuclear and radiological emergency response planning in Ontario, which is illustrated in **Figure I** (**page ii**), consists of the following components:

- The ***Emergency Management and Civil Protection Act*** (EMCPA) requires and authorizes the formulation of the plan.

- **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.

- **Major Organization Plans :** Each major organization involved (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.

- **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.

- **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.

It is necessary that everyone involved in the preparation and implementation of the Provincial Nuclear Emergency Response Plan employ common terminology. The terminology contained in the **Glossary**, **Annex C**, should be used for this purpose by all concerned. Further reference information can be found in the Incident Management System (IMS) doctrine at www.ontario.ca/ims.

PROVINCIAL NUCLEAR EMERGENCY RESPONSE PLAN FOR CHALK RIVER LABORATORIES

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ACRONYMS AND ABBREVIATIONS

ADM - Assistant Deputy Minister
AECL - Atomic Energy of Canada Limited
AIM - Abnormal Incident Manual
ALARA - 'As low as reasonably achievable'
AMG - Assurance Monitoring Group
AGPWMGP - Assurance/General Province-Wide Monitoring Group Plan
BWR - Boiling Water (nuclear) Reactor
CANDU - The name of the Canadian developed nuclear power reactor system (from Canada Deuterium Uranium)
CCEM - Cabinet Committee on Emergency Management
CEMC - Community Emergency Management Coordinator
CEM - Commissioner of Emergency Management
CESC - Corporate Emergency Support Centre
CEOC - Community Emergency Operations Centre
CEOF - Corporate Emergency Operations Facility
CNSC - Canadian Nuclear Safety Commission
CRC - Corporate Response Centre
CRL - Chalk River Laboratories
CZ - Contiguous Zone
DNGS - Darlington Nuclear Generating Station
EB - Emergency Bulletin
ECI - Emergency Coolant Injection
EFADS - Emergency Filtered Air Discharge System
EMCPA - Emergency Management and Civil Protection Act
EIC - Emergency Information Centre
EI - Emergency Information
EIS - Emergency Information Section
EMO - Emergency Management Ontario

ENERGY - Ministry of Energy
EOC - Emergency Operations Centre
EPZ - Emergency Planning Zone
ERAP - Emergency Response Assistance Plan
ER - Emergency Response
ERMG - Environmental Radiation Monitoring Group
FADS - Filtered Air Discharge System
FDA - Food and Drug Administration
FNEP - Federal Nuclear Emergency Plan
GOC - Government Operations Centre
Gy - Gray. See definition of Absorbed Dose in **Glossary, Annex C**
HAZMAT - Hazardous Material
HC - Health Canada
IAEA - International Atomic Energy Agency
INES - International Nuclear Event Scale
JTCC - Joint Traffic Control Centre
JTCP - Joint Traffic Control Plan
KI - Potassium Iodide
km - Kilometre
LGIC - Lieutenant Governor In Council
LHDR - Laurentian Hills/Deep River
LHDRNEPC- Laurentian Hills/Deep River Nuclear Emergency Preparedness Committee
LOCA - Loss-of-Coolant Accident
LOECI - Loss of Emergency Coolant Injection
MCSCS - Ministry of Community Safety and Correctional Services
MCSS - Ministry of Community and Social Services
MDU - Monitoring & Decontamination Unit
MEMC - Ministry Emergency Management Coordinator
MEOC - Ministry Emergency Operations Centre

Met - Meteorology, meteorological
MMAH - Ministry of Municipal Affairs and Housing
MNDMF - Ministry of Northern Development Mines and Forestry
MNR - Ministry of Natural Resources
MOE - Ministry of the Environment
MOHLTC - Ministry of Health and Long-Term Care
MOL - Ministry of Labour
mSv - Millisievert
MTO - Ministry of Transportation, Ontario
NIG - Nuclear Incident Group
NEMCC - Nuclear Emergency Management Coordinating Committee
OMAFRA - Ontario Ministry of Agriculture, Food and Rural Affairs
OPG - Ontario Power Generation
OPP - Ontario Provincial Police
PAL - Protective Action Level
PNERP - Provincial Nuclear Emergency Response Plan
PNGS - Pickering Nuclear Generating Station
PWR - Pressurized Water (nuclear) Reactor
PHWR - Pressurized Heavy Water (nuclear) Reactor
PEOC - Provincial Emergency Operations Centre
PZ - Primary Zone
rad - See definition of Absorbed Dose in **Glossary, Annex C**
RAG - Regional Action Group
RD - Radiological Device
RDD - Radiological Dispersal Device
rem - See definition of Equivalent Dose in **Glossary, Annex C**
RHRP - Radiation Health Response Plan
RNEMCC - Regional Nuclear Emergency Management Coordinating Committee
SRP - Site Reference Plan

SMC - Site Management Centre
Sv - Sievert. See definition of Equivalent Dose in **Glossary, Annex C**
SZ - Secondary Zone
TRF - Tritium Removal Facility
TLD - Thermoluminescent Dosimeter
UTM - Universal Transverse Mercator
WHO - World Health Organization

CHAPTER 1

GENERAL AND LEGAL

1.1 Aim of Plan

The aim of the Provincial Nuclear Emergency Response Plan (PNERP) for Chalk River Laboratories is to describe the measures that shall be undertaken to deal with a nuclear emergency caused by an accident/event at the Atomic Energy of Canada Limited-Chalk River Laboratories (AECL-CRL).

1.2 Scope of Plan

1.2.1 This implementing plan should 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 and other plans and procedures (**sections 1.3** to **1.5** below).

1.3 Municipal Plan

1.3.1 The Towns of Laurentian Hills and Deep River are the designated (Primary Zone) municipalities under this plan (**PNERP Master Plan**, **Annex A**).

1.3.2 The Town of Deep River is the designated (Host) municipality under this plan (**PNERP Master Plan, Annex A**).

1.3.3 Municipal Plans for dealing with an AECL-CRL nuclear emergency shall be developed by these designated municipalities, as per the **PNERP Master Plan**, **section 1.8**.

1.3.4 Municipal Plans shall cover the offsite emergency response arrangements and activities of the designated municipalities, municipal departments, boards, and police services and shall assign them roles and responsibilities, consistent with this Plan.

1.3.5 The plans prepared by the designated municipalities and by the other organizations (**1.3.4** above) are collectively referred to as 'municipal plans' in this document.

1.3.6 In this document the terms 'municipal' and 'municipality' shall include, unless the context indicates otherwise, the designated municipality, as well as the local police service and local boards whose area of operation includes the area covered by the municipal plan.

1.4 Joint Traffic Control Plan

1.4.1 A Joint Traffic Control Plan shall be developed by the Laurentian Hills/Deep River Joint Traffic Control Committee for the area likely to be affected by an AECL-CRL nuclear emergency.

1.4.2 Representatives of MTO, provincial and local police services, municipal road authorities and emergency services who have jurisdiction over the areas and road networks affected should be members of, or cooperate with, the Joint Traffic Control Committee.

1.4.3 During a nuclear emergency, the Joint Traffic Control Plan for an AECL-CRL emergency should be implemented by the representatives at the Joint Traffic Control Centre (JTCC) (**paragraph 2.7.3**) under the guidance and direction of the Municipal Emergency Operations Centre (EOC), and the Provincial Emergency Operations Centre (PEOC).

1.4.4 The JTCC has authority for the management of evacuating traffic in the Primary Zone as well as the traffic impact beyond it, as detailed in the Joint Traffic Control Plan.

1.4.5 The Joint Traffic Control Plan shall be designed to meet the requirements of the provincial and municipal nuclear emergency plans. For specific guidance see the following:

(a) **Paragraph 2.7.3** Joint Traffic Control Centre
(b) **Paragraph 2.10** Telecommunications
(c) **Section 3.3** Internal Notifications
(d) **Paragraph 3.7** Activation of Emergency Plans – Immediate Actions
(e) **Section 4.5** Entry Control
(f) **Section 4.6** Evacuation
(g) **Section 4.8** Traffic Control

1.4.6 The Joint Traffic Control Plan defines the traffic management measures to be undertaken and shall include:

(a) The organizational representatives at the JTCC, their roles, responsibilities, communications and reporting arrangements to their respective organizations.

(b) The lead agency for implementation of the Joint Traffic Control Plan during a nuclear emergency response.

(c) The location of the JTCC and how it is equipped to monitor traffic flows and communicate with other emergency operations centres.

1.5 Other Plans and Procedures

Other jurisdictions and organizations that have, or are assigned, some responsibility for responding to an AECL-CRL emergency should develop appropriate plans/ procedures for carrying out their roles and tasks. They include:

(a) Provincial ministries.

(b) Municipal department, local police services, local boards and other agencies assigned roles and responsibilities in the municipal plan.

(c) Atomic Energy of Canada Ltd. (AECL) - Chalk River Laboratories (CRL).

(d) Host municipality (**paragraph 2.7.6**).

CHAPTER 2

PLAN DATA AND ORGANIZATION

2.1 Atomic Energy of Canada Limited – Chalk River Laboratories (AECL-CRL)

2.1.1 AECL-CRL is located at latitude 46° 3' North and longitude 77° 22' West, on the south side of the Ottawa River, 200 km. northwest of the City of Ottawa.

2.1.2 AECL-CRL houses various licensed nuclear facilities including: research reactors, a molybdenum processing facility, a nuclear fuel fabrication laboratory, shielded facilities, a waste management area, a waste treatment centre, a recycled fuel fabrication laboratory and tritium handling facilities.

2.1.3 The National Research Universal (NRU) reactor has the greatest radioactive inventory of the facilities located at AECL-CRL. The NRU reactor has no containment and therefore any radioactive release would be prompt with no capability to collect and retain the contamination. The NRU reactor functions include:

- Radioisotope production
- Experiments geared towards power reactor research
- Commercial irradiation

2.2 The Potential Hazard

2.2.1 If an accident were to occur at any of the facilities at AECL-CRL, the most probable result would be that any effects, having a potentially significant health and safety impact, would not extend beyond the exclusion zone (see **paragraph 2.4.1**) surrounding the facility.

2.2.2 Less probable is an accident which may cause the "basic offsite effect" – a loss-of-coolant accident (LOCA) with no loss of emergency cooling systems and therefore no fuel failure. The principal characteristics of the offsite effect for an AECL-CRL emergency would be as follows:

(a) A very limited (or no) warning period might be available before offsite effects begin to occur, i.e. the release from the site could begin at the same time, or very soon after, the initiating event.

(b) The duration of the release could be short, e.g. as little as 1 hour.

(c) Doses would be low and are extremely unlikely to exceed 1 mSv (0.1 rem) at the site boundary i.e. the impact would be mainly confined to the exclusion zone (**paragraph 2.4.1**).

(d) Because of (c) above, Protective Action Levels (PALs) would not be exceeded offsite, therefore no protective measures would be required.

(e) Environmental contamination (if any) would be limited to low levels and to the exclusion zone.

Such an accident would likely result in an Enhanced Monitoring response by the Provincial Emergency Operations Centre (PEOC) (see **Chapter 3**).

2.2.3 Even less probable than the above type of accident is a loss of coolant accident (LOCA) combined with a malfunction or failure of the emergency cooling system, leading to a fraction of the fuel inventory being damaged and resulting in a release of radioactivity.

(a) The release could be prompt, i.e. within minutes of the initiating event.

(b) Doses could be such that PALs could be exceeded within the CRL Primary Zone (PZ), requiring public alerting and some protective actions (i.e. sheltering).

(c) A large fraction of fission product particulates and radioiodine would be removed by the emergency filtration system. However, all the noble gases would be immediately discharged through the reactor stack to the atmosphere.

(d) Environmental contamination would be higher than that for the basic offsite effect.

(e) The release duration could be very short, i.e. less than one hour for some emergencies.

Such an accident would likely result in (either a Partial or Full) Activation response by the PEOC (see **Chapter 3**).

2.3 Protective Measures

The protective measures available for minimizing the radiation hazard in a nuclear emergency are listed in **Table 2.1** and are defined in the glossary (**Annex C**). The operational use of these measures is described in appropriate sections of this plan.

2.4 Planning Zones

2.4.1 Exclusion Zone

The AECL-CRL exclusion zone encompasses a land area with approximately a 6 kilometre radius from the stack at AECL-CRL.

2.4.2 Contiguous Zone

Because of the large exclusion area within the AECL-CRL boundary, no Contiguous Zone is designated.

2.4.3 Primary Zone

(a) The Primary Zone for AECL-CRL is shown in **Figure 2.2**.

(b) Its approximate radius is 9 kilometres and includes, in Renfrew County, a small portion of the Town of Deep River as far west as Banting Drive and that area of the Town of Laurentian Hills extending out to a 9 kilometre radius from the stack of the AECL-CRL facility. The Primary Zone further includes the area of the Ottawa River lying within the 9 km radius that also lies within the Province of Ontario. AECL-CRL is not included in the Primary Zone.

(c) For specific boundaries refer to **Annex A**.

(d) The Primary Zone is the area around the nuclear installation within which detailed planning and preparedness is carried out for measures against exposure to a radioactive plume. The approximate radius is 9 km from the stack at AECL-CRL.

2.4.4 Secondary Zone

(a) The Secondary Zone encompasses areas of the County of Renfrew and the District of Nipissing (Algonquin Provincial Park) within a 50 km radius of AECL-CRL. The Secondary Zone is shown in **Figure 2.3** and includes the Primary Zone. **Figure 2.3** also shows the sub-zones and sub-sectors of the Secondary Zone.

(b) The Secondary Zone is the area within which it is necessary to plan and prepare for taking Ingestion Control measures based on monitoring of the food chain for contamination.

2.4.5 The Province of Quebec will respond to the emergency affecting the area within the AECL-CRL Primary and Secondary Zones that lies within Quebec's borders (see **Figures 2.2** and **2.3**).

2.5 Response Sectors

2.5.1 The Primary Zone for AECL-CRL is divided into 11 response sectors as shown in **Figure 2.2** and described in **Annex A**.

2.5.2 Highway 17 is the boundary between the inner (sectors 1-5) and outer rings (sectors 6-10) of the AECL-CRL Primary Zone.

2.5.3 Normally, protective measures apply to properties on both sides of a sector boundary. However, where the inner ring only is under a protective action order (e.g. sheltering), consideration will be given to reopening Highway 17 to traffic as soon as assurances are received that public health and safety will not be compromised.

2.5.4 Sector 11 falls within that portion of the Ottawa River that lies within a 9km radius of AECL-CRL, up to the Ontario-Quebec boundary.

2.6 Planning Data

2.6.1 Planning Times

The licensed nuclear facilities at AECL-CRL, including the NRU reactor, have only a limited containment capability (i.e. vented containment design). Depending on the nature of the accident, radioactivity would be emitted to the atmosphere commencing at the time of the accident, i.e. a prompt release. Radioactive emissions above significant levels could continue anywhere from approximately 1 hour to 24 hours.

2.6.2 Population Data

Estimates of the Primary Zone sector population figures are contained in **Annex B**.

2.7 Emergency Organization

2.7.1 The provincial emergency response organization for dealing with an AECL-CRL emergency is shown in **Figure 2.4**.

Overall coordination is provided by the Provincial Emergency Operations Centre (PEOC). Details on the roles and functions of the various elements of this organization can be found in the **PNERP Master Plan, Chapter 4**.

EXPOSURE CONTROL MEASURES	INGESTION CONTROL MEASURES
• Entry Control • Sheltering • Evacuation • Thyroid Blocking • Use of Protective Equipment • Decontamination	• Milk Control • Water Control • Pasture Control • Produce and Crop Control • Livestock Control • Food Control • Land Control* • Environmental Decontamination*

Table 2.1 : PROTECTIVE MEASURES

Note – These measures are described and discussed in the **PNERP Master Plan**, **Chapter 6** and are defined in the Glossary**, Annex C** of this plan**.**

* Normally applicable only to the Recovery Phase

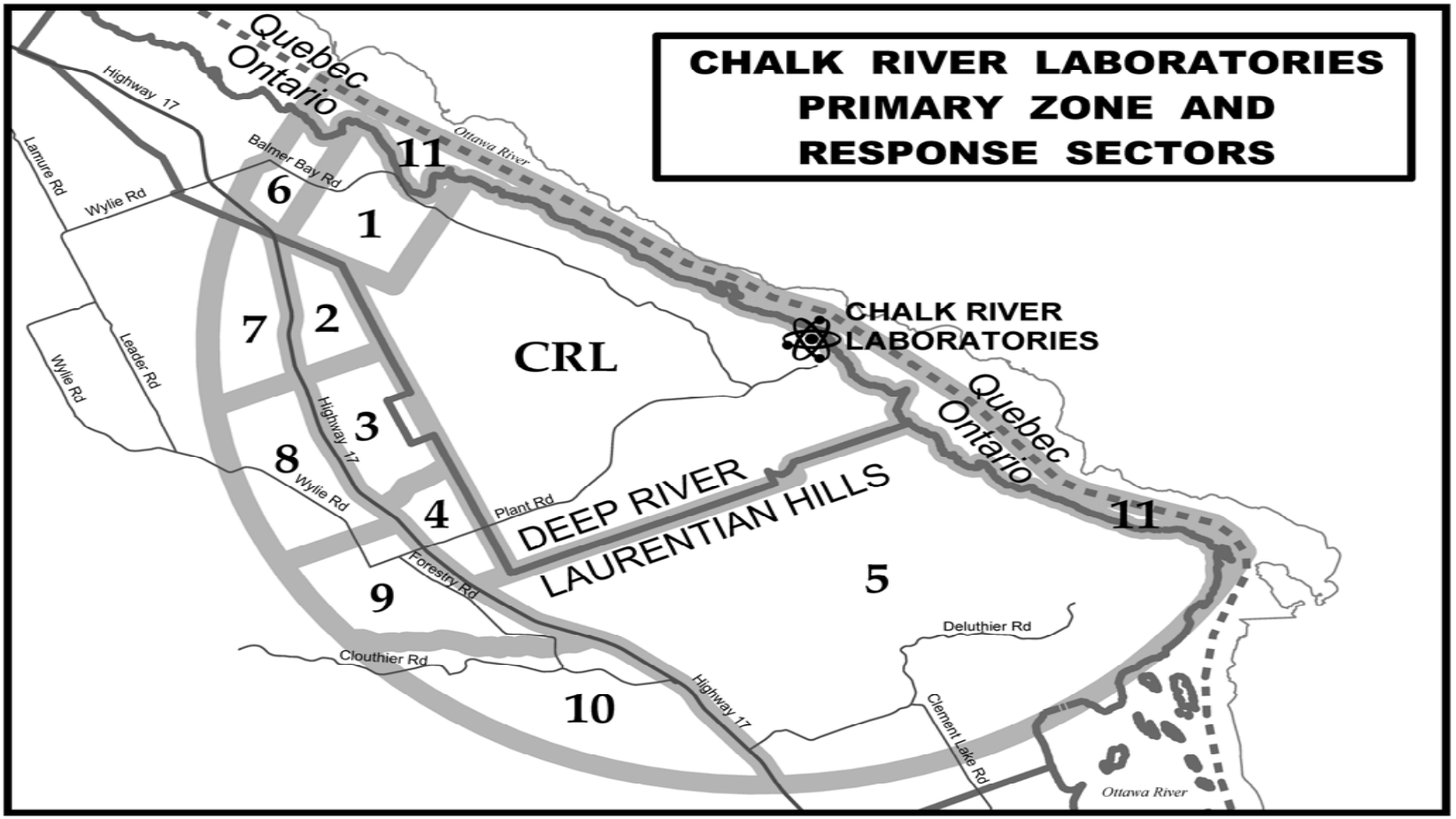

FIGURE 2.2 : PRIMARY ZONE AND RESPONSE SECTORS

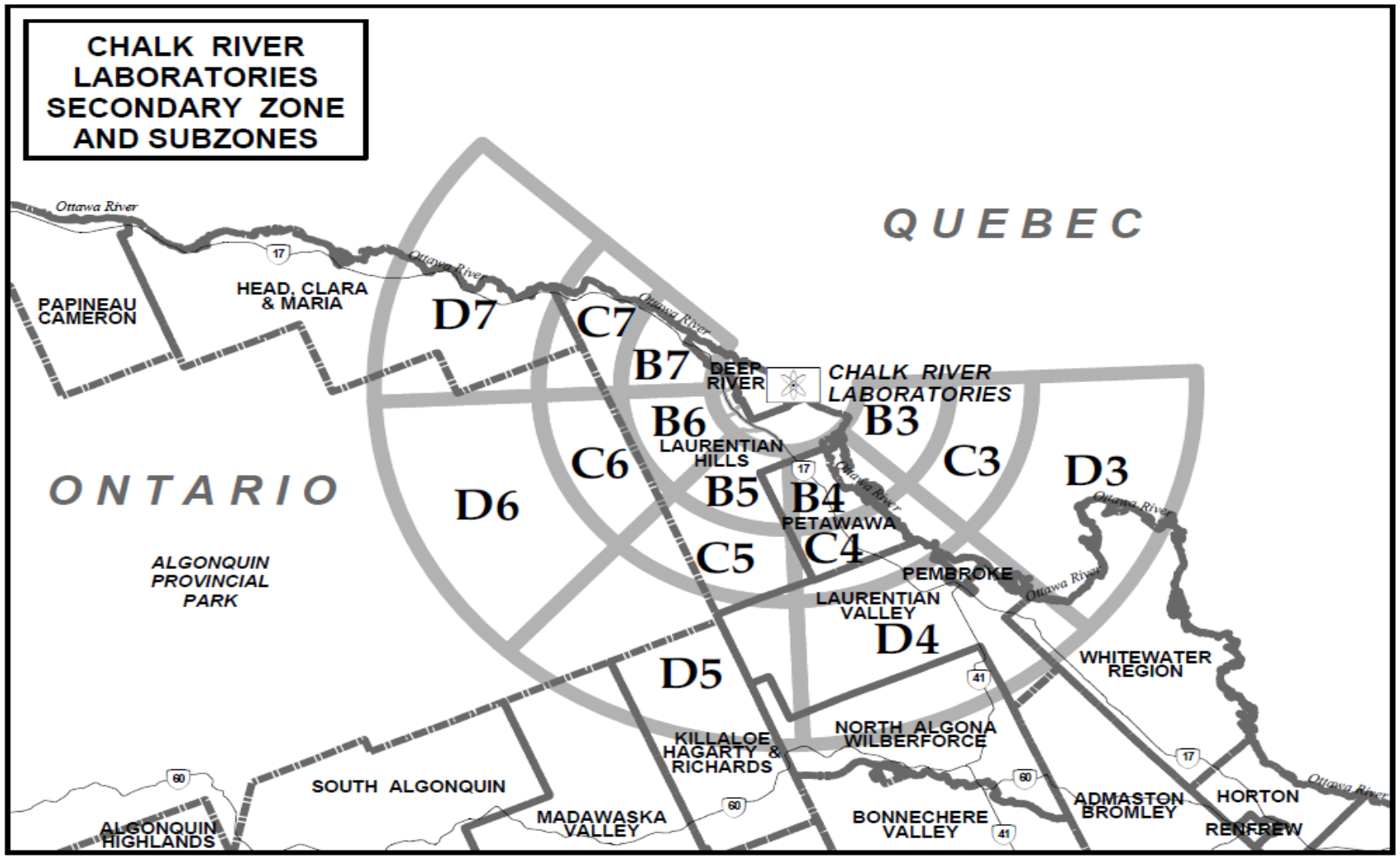

FIGURE 2.3 : SECONDARY ZONE AND SUB-ZONES

2.7.2 Liaison Arrangements

(a) To ensure liaison and coordination between different elements of the emergency response organization, the following arrangements should be made:

(i) To PEOC:

- Each provincial ministry and agency with a role in the emergency response to provide a representative to join the PEOC (see **PNERP Master Plan**, **Annex I**).
- AECL-CRL to provide a representative to the PEOC.
- Provincial staff (PERT) to be deployed to join the Municipal (EOC).
- Federal Liaison representative(s) to join the PEOC.
- CNSC representative to join the PEOC.
- The Province of Quebec to deploy a representative to the PEOC.

(ii) To Municipal EOC:

- AECL-CRL to provide a liaison officer to the Municipal Emergency Operations Centre (EOC).

(b) The role of the AECL-CRL liaison officer at the Municipal EOC will be to act as a link to the appropriate authorities at AECL-CRL for the following types of issues:

(i) AECL-CRL support to the municipalities, e.g. Monitoring & Decontamination Units and Emergency Worker Centres.

(ii) Requests for assistance (e.g., for additional personal monitoring resources, stable iodine tablets, fire or Emergency Medical Services at AECL-CRL).

(iii) Coordination of the evacuation of non-essential AECL-CRL staff, and of the movement of essential staff to and from the site.

(iv) Facilitating the work of the offsite field monitoring teams.

(v) Providing situational updates related to the emergency at the nuclear facility.

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

2.7.3 Joint Traffic Control Centre

A Joint Traffic Control Centre (JTCC) shall be set up and staffed for an AECL-CRL emergency to implement the Joint Traffic Control Plan made under **section 1.4**, upon notification of either a Partial or Full Activation response by the Province.

2.7.4 Municipal Organization

The Towns of Laurentian Hills and Deep River shall set up a municipal emergency response organization as prescribed in the Municipal Plan.

2.7.5 Provincial Ministry Offices

The following regional/district/area offices of Provincial ministries shall be prepared to respond to the emergency and to provide the necessary assistance to the designated municipalities, as required by the **PNERP Master Plan**, **Annex I**, and detailed in the Municipal Plan or, as directed by their respective ministries:

(a) Agriculture , Food & Rural Affairs
Kemptville Area Office

(b) Community & Social Services
Eastern Region

(c) Environment
Eastern Region Office - Kingston
Ottawa District Office

(d) Health and Long-Term Care
Renfrew Central Ambulance Communications Centre.

(e) Labour
Eastern Region Office - Ottawa

(f) Natural Resources
Pembroke District Office
Algonquin Provincial Park
Driftwood Provincial Park

(g) Community Safety and Correctional Services
Central Region HQ, OPP (Orillia)
Eastern Region HQ, OPP (Smiths Falls)
North Eastern Region HQ, OPP (North Bay)
Highway Safety Division, OPP (Aurora)

(h) Transportation
MTO Eastern Region - Kingston
MTO Northeastern Region – North Bay

2.7.6 Host Municipality

(a) Pursuant to subsection 3(4) of the *Emergency Management and Civil Protection Act*, R.S.O. 1990, c.E.9, the Town of Deep River has been designated as a host municipality (see **PNERP Master Plan**, **Annex A**) and, as such must address responsibilities for nuclear emergencies in its municipal emergency plan (formulated under subsection 3(1) of the *Emergency Management and Civil Protection Act*).

(b) The **PNERP Master Plan**, **Annex I** provides details on designated (host) municipality responsibilities, including the appropriate preparations to receive, shelter and care for evacuees.

2.7.7 Support Municipalities

In the event of a declared provincial emergency, the Premier or LGIC may order a municipality to provide support or assistance to the affected, designated municipalities at the time of the emergency (as authorized by sections 7.0.2(4) or 7.0.3 of the *EMPCA*).

2.8 Contingency Provisions

2.8.1 The PEOC shall normally coordinate the emergency management and response organization through the centres in the tier below it (see **Figure 2.4**). However, if for any reason any of these centres are not functioning or are not responsive, the PEOC may issue directions directly to any element of the emergency response organization.

2.8.2 Likewise, in the absence of contact with the PEOC, these organizations are responsible for taking appropriate actions, according to plans, procedures and the requirements of the situation and, as far as possible, in coordination with other responding organizations.

2.9 Emergency Facilities

The location of the various local emergency centres and facilities to be established, pursuant to this plan, are detailed in the Municipal Plan.

2.10 Telecommunications

2.10.1 All emergency centres and facilities are linked through landline phone as well as other systems, which also enable facsimile transmission (fax), email and data transfer.

2.10.2 AECL-CRL should arrange the establishment of reliable contingency communications between and amongst the following centres:

- Provincial Emergency Operations Centre
- AECL-CRL
- Municipal Emergency Operations Centre
- Joint Traffic Control Centre

2.10.3 All organizations and agencies involved in responding to an AECL-CRL nuclear emergency should ensure the availability of backup telecommunications system e.g. cell phones and satellite phones.

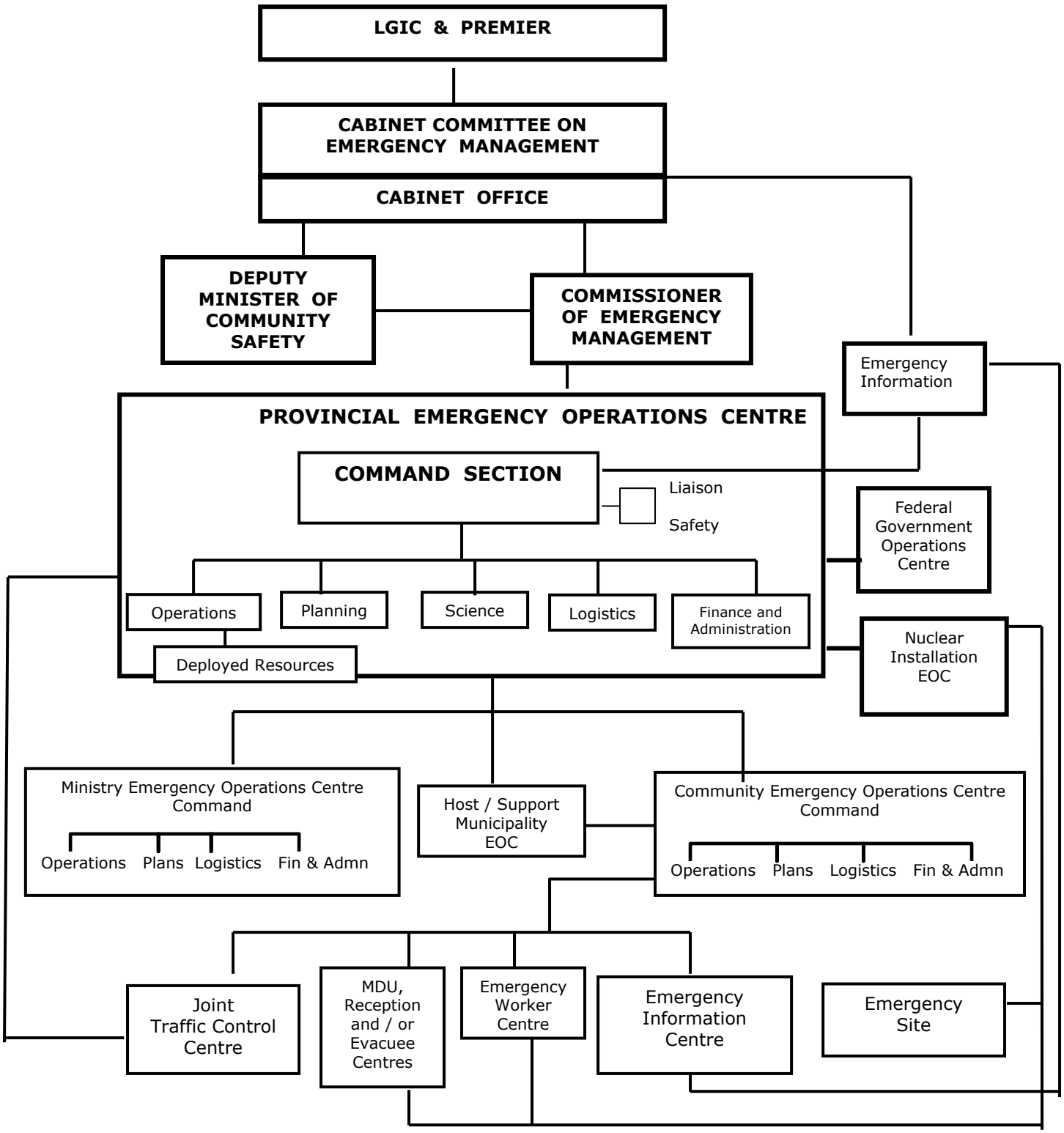

FIGURE 2.4 : PROVINCIAL NUCLEAR AND RADIOLOGICAL EMERGENCY RESPONSE ORGANIZATION

CHAPTER 3

NOTIFICATION AND INITIAL RESPONSE

3.1 Initial Notification

3.1.1 According to responsibilities under federal legislation (see **PNERP Master Plan, paragraph 5.5.1**) and regulations and/or under its agreement with the provincial government, AECL-CRL shall notify the pre-designated contact points (**paragraph 3.1.6** below) in the provincial and municipal emergency organizations as soon as conditions arise at the facility which require such initial notification under the criteria prescribed in **Table 3.1** and, as incorporated in facility procedures.

3.1.2 AECL-CRL will complete this initial notification to the provincial contact point **within 15 minutes** of the requirement for notification being recognized.

3.1.3 The form and content of the initial notification shall be determined by the Chief, Emergency Management Ontario. The notification shall always contain the highest applicable category. In the case of a GENERAL EMERGENCY or ONSITE 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.

3.1.4 If the assessment of the onsite situation changes to warrant a different category from the one initially notified, AECL-CRL shall immediately make a report of its new assessment to the provincial contact point. This can be done up to four hours after the initial notification. However, once ongoing reporting by AECL-CRL to the Scientific Section of the PEOC is established, there is no longer a requirement for any change in the category to be reported by the nuclear facility staff.

3.1.5 AECL-CRL cannot terminate or cancel an initial notification once it has been made. Such a notification will automatically lapse when the provincial response to it is formally terminated (**paragraph 3.2.3** below).

3.1.6 <u>Contact Points</u>

(a) The Provincial contact point shall be the PEOC.

(b) The following municipal contact point shall be set out in the Municipal Plan (**Section 1.3**):

- A notification contact point for the receipt of initial notifications on a 24 hour/day, 7 day/week basis.

- A municipal emergency response staff person who can be contacted on a 24 hour/day, 7 day/week basis for passage of information and monitoring of the situation, following the initiation of a notification.

3.2 Initial Provincial and Municipal Response

3.2.1 The **initial** provincial response to a notification from AECL-CRL shall depend on the category (and other relevant information) contained in the notification message.

3.2.2 Within **15 minutes** of the receipt of an initial notification, the PEOC shall decide on the initial response level to be adopted, and inform the municipal contact point. This level will normally be the one linked to the category of the notification received (see **Table 3.1** below) unless another level is judged to be more appropriate.

3.2.3 The provincial response level initially adopted can be changed to another level, if considered appropriate, by the PEOC. Such a change can include termination of the provincial response. All concerned shall be notified of any such change (see **sections 3.3** and **3.4**).

3.2.4 The initial (and any subsequent) response level to be adopted by the municipalities and other organizations shall be communicated by the PEOC (**paragraphs 3.2.2** and **3.2.3** above). The general nature of the municipal response for each level is outlined in **Table 3.2**; the specific response shall be prescribed in the municipal plan.

3.3 Internal Notifications

3.3.1 If the PNERP is to be activated (whether fully or partially), the PEOC shall issue an appropriate notification (including an indication of the level of activation) to its staff as well as to the provincial staff of the Emergency Information Section and to at least one pre-designated contact point in each of the following jurisdictions and organizations:

- Laurentian Hills and Deep River
- The Province of Quebec
- Host municipality - Town of Deep River
- Each Provincial-level organization required to respond to the emergency
- AECL-CRL - EOC

3.3.2 <u>Other Organizations</u>

Each jurisdiction/organization receiving notification of an Activation Response (either Partial or Full) should 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.

3.3.3 Notification Procedures and Lists

The PEOC and each jurisdiction/organization required to issue an internal or external notification (**section 3.4** below) should prepare a procedure and lists of recipients.

3.4 External Notifications

3.4.1 Upon adoption of an Activation Response (Partial or Full), external notifications will be carried out as detailed below. The notification should indicate the level of activation being adopted.

3.4.2 The PEOC shall notify:

- The Federal government
- The Province of Quebec
- The State of New York
- The State of Ohio
- The State of Michigan
- Canadian News Wire and/or Ontario Newsroom

3.4.3 The Federal government will, in turn, notify the U.S. government and the International Atomic Energy Agency (IAEA) under existing agreements and conventions.

3.4.4 Certain other agencies/organizations shall be notified by the following:

(a) Ministry of Agriculture, Food and Rural Affairs shall notify:
Dairy Farmers of Ontario

(b) Ministry of Community & Social Services shall notify:
Red Cross, Ontario Zone

(c) Ministry of Natural Resources shall notify:
Algonquin Provincial Park

(d) The PEOC shall notify:
National Transportation Agency - Emergency Alert
Air Traffic Control
CN Rail
CP Rail
VIA Rail

(e) The Municipal Plan shall provide for the following external notifications:

- Local Utilities (Hydro, Gas, Water)
- Local Branches of Voluntary Organizations
- Ottawa Valley Rail Link

- Appropriate School Boards
- Emergency Medical Services

3.5 Public Alerting

3.5.1 Public alerting systems developed under the PNERP shall conform to the following principles:

(a) The Towns of Laurentian Hills and Deep River, as the designated (Primary Zone) municipalities (see **PNERP Master Plan, Annex A**), shall make provisions, in their Municipal Plan, for a public alerting system which shall ensure that the Primary Zone population, that may be required to undertake the initial protective measures of sheltering, evacuation, and/or ingestion of KI, can be alerted within 15 minutes of initiation.

(b) The Municipal Plan shall detail how this requirement will be met.

(c) The nuclear emergency response plan for the Towns of Laurentian Hills and Deep River and for the Province shall include provisions to coordinate the timing of public alerting, public direction and emergency information. This will ensure that the population will have timely and accurate information on what protective measures to take once they have been alerted of an emergency.

(d) The Towns of Laurentian Hills and Deep River shall undertake an initial evaluation of any new system to ensure that the requirements under this policy have been met. Further, they shall integrate regular testing of existing public alerting systems, as a component of their standard exercise program.

3.5.2 The public alerting system for an AECL-CRL emergency shall, in addition to adhering to the principles in **paragraph 3.5.1** above, meet the following requirements:

(a) AECL-CRL shall provide the resources and assistance to the Towns of Laurentian Hills and Deep River to enable them to establish and maintain a public alerting system. The public alerting system selected must be subject to consultation amongst the province, AECL-CRL, and the designated (Primary Zone) municipalities.

(b) The public alerting system must provide, within 15 minutes of initiation, warning to the population in the Primary Zone whether they be indoors or outdoors, and irrespective of the time of day or year.

(c) Such a public alerting system, coupled together with emergency bulletins, will ensure that the population within the Primary Zone will be notified in an effective and timely manner.

3.5.3 Implementation

(a) In case of a General Emergency notification from AECL-CRL, the municipal contact point should immediately initiate the public alerting system without reference to any other authority.

(b) In all other cases, the decision as to when the public alerting system is to be initiated will be made following discussion between the Municipal EOC and the PEOC.

3.6 Emergency Bulletins

3.6.1 Whenever the public alerting system is initiated, the PEOC will issue an Emergency Bulletin to the media. The bulletin will contain specific instructions on what actions the public should take and should be continuously repeated for an adequate period of time.

3.6.2 Marine Notification and Public Direction

(a) The Municipal Plan shall detail how notification and evacuation assistance will be provided to marine craft (with and without radios) on the Ottawa River.

(b) The OPP Marine Unit will assist in the notification and evacuation of marine craft:

(i) Ottawa Valley detachment response (with Eastern Region marine resources).
(ii) Support from North Eastern Region, as required.

3.7 Activation of Emergency Plans – Immediate Actions

3.7.1 All jurisdictions and organizations identified in this Plan, which receive a notification of plan activation, should immediately activate their own plans for dealing with an AECL-CRL emergency. These plans should be fully or partially activated as indicated in the notification received.

3.7.2 **Table 3.2** outlines the immediate provincial and municipal response actions to be undertaken for each response level.

CATEGORY	CRITERIA	EXAMPLES
REPORTABLE EVENT	1. Any event or condition that reduces the nuclear facility's capability to deal with an emergency onsite, and which persists for longer than eight hours.	1. Failure/loss unavailability of the emergency core cooling system or the emergency filtration system, except when the reactor is shut down.
	2. Any event or condition that reduces the nuclear facility's capability to provide the agreed offsite emergency support, and which is expected to persist for over eight hours, or actually does so.	2. Reduced ability to : 2A. Carry out offsite field monitoring. 2B Provide source term data. 2C. Provide required personnel to the offsite emergency response organization.
	3. Activation of the emergency cooling injection system.	3. Testing excluded.
	4. Any credible publicly announced threat to, or attempted or actual breach of, the facility's security.	4A. A publicized bomb threat. 4B. A breach or attempted breach of the perimeter.
	5. Any event that has a reasonable potential to escalate into an abnormal incident.	5A. Fire/explosion in non-nuclear facility. 5B. Forest fire in exclusion zone. 5C. Earthquake
	6. An incident which arises or is likely to arouse public concern or media interest.	6A. If a news release is to be issued. 6B. If media or public phone in queries. 6C. If event likely to become widely known.
ABNORMAL INCIDENT	1. A large* spill/loss of reactor or loop cooling water with no fuel failures (actual or likely). 2. Loss of multiple safety systems or safety related system barriers. 3. Natural, toxic, flammable, destructive or other phenomena which have the potential to threaten the physical integrity of the heat transfer boundary or the moderator system. 4. Activation of a Stay-In alert or Site Evacuation signal due to an occurrence which has the potential to result in radiation health effects.	3A. Extreme environmental conditions eg. flood, tornado. 3B. Earthquake damage. 3C. Fire or explosion.

TABLE 3.1 : INITIAL NOTIFICATION CATEGORIES AND CRITERIA

CATEGORY	CRITERIA	EXAMPLES
ONSITE EMERGENCY	1. A loss of coolant accident (LOCA)involving fuel failure, with actual or potential emission of radioactive material to the atmosphere that may result in an effective dose at the CRL boundary of less than 1 mSv (100 mrem) within four hours. 2. An emission of radioactive material to the atmosphere from any source that may result in an effective dose at the CRL site boundary of less than 1 mSv (100 mrem) within 4 hours. 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. 4. Hostile action resulting in actual or potential loss of control over a facility, **but excluding NRU**.	3A. Loss of all classes of power. 3B. Extreme environmental conditions e.g. flood, tornado. 3C. Earthquake damage. 3D. Fire or explosion.
GENERAL EMERGENCY	1. Severe damage to reactor fuel leading to an emission of radioactivity to the atmosphere that may result in a dose at the CRL site boundary of, or exceeding 1 mSv (100 mrem) within four hrs. 2. A significant emission of radioactive material to the atmosphere from any source that may result in a dose at the CRL site boundary of, or exceeding 1 mSv (100 mrem) within 4 hours. 3. Hostile action resulting in actual or imminent loss of the ability to achieve and maintain the NRU reactor in a shutdown state.	1. LOCA with significant fuel failures/core damage. 3. Sabotage or threat of sabotage of critical reactor systems.

TABLE 3.1 : INITIAL NOTIFICATION CATEGORIES AND CRITERIA (contd.)

* To be quantitatively defined in facility procedures.

INITIAL NOTIFICATION	INITIAL PROVINCIAL RESPONSE	MUNICIPAL RESPONSE
REPORTABLE EVENT	1. PEOC shall notify the municipal contact point, AECL-CRL, the Province of Quebec and others as appropriate, and shall monitor the situation. 2. Scientific staff is consulted, if appropriate. 3. If and when appropriate, PEOC Emergency Information (EI) staff issues news release(s).	Emergency response staff remain in contact with the PEOC and monitor event.
ABNORMAL INCIDENT	<u>ENHANCED MONITORING</u> 1. PEOC shall adopt Enhanced Monitoring, and shall so inform the municipal contact point(s), AECL-CRL, Province of Quebec, and any other organizations affected. 2. External notifications to Michigan, New York and Ohio are made. 3. PEOC to set up a duty team consisting of operations staff, scientific staff, AECL-CRL representative, EI staff and others as required. 4. If and when appropriate, PEOC EI staff issue news release(s). 5. Provincial staff is notified to remain available to report in for duty.	Emergency response staff monitor event, preferably from the Municipal EOC (MEOC).
ONSITE EMERGENCY (*No significant emission occurring*)	<u>PARTIAL ACTIVATION</u> 1. PEOC shall adopt a Partial Activation response (for details, see **section 3.7.3**), and shall initiate the appropriate internal and external notifications (see **sections 3.3** and **3.4** respectively), including the municipal contact point and the host community. 2. PEOC shall be fully staffed. Considerations shall be given to issuing an Emergency Bulletin and/or news release (see **sections 4.13**). 3. PEOC to discuss option of activating public alerting system with municipal officials. 4. Ministry EOCs and Joint Traffic Control Centre (JTCC) to be established and appropriately staffed. 5. Ongoing assessments conducted to determine need for protective actions.	1. Issue notification placing municipal emergency response organization on standby. 2. Municipal EOC fully staffed 3. Discuss option of activating public alerting system with PEOC 4. Emergency Information Centre (EIC) to be established 5. Other emergency centres readied to become operational without undue delay
GENERAL EMERGENCY	<u>FULL ACTIVATION</u> 1. PEOC shall notify and ensure that the municipal contact point has activated the public alerting system (**section 3.5**). 2. PEOC shall adopt Full Activation (for details, see **paragraph 3.7.4**), and shall issue the appropriate Emergency Bulletin (see **section 3.6 and section 4.12**). 3. PEOC shall issue operational directives implementing the following operational measures unless there are good reasons for modifying this response: (a) suspension of road and rail traffic through the Primary Zone. (b) sheltering of the Primary Zone. (c) clearance of boaters in Sector 11. 4. PEOC shall initiate the appropriate internal and external notifications (see **sections 3.3** and **3.4** respectively), including the host community. 5. PEOC shall assess the situation for further action (see **section 4.4**). 6. PEOC shall issue further emergency bulletins, as appropriate (**section 4.12**). 7. PEOC EI section shall issue news releases, as appropriate (**section 4.13**). 8. Ministry EOCs and JTCC to be established.	1. Initiate public alerting. 2. Issue notification activating municipal emergency response organization. 3. Municipal EOC, EIC and EWC activated and fully staffed 4. Reception/MDU and Evacuee Centres readied to become operational without undue delay. 5. Implement operational directives issued by the PEOC.

TABLE 3.2 - INITIAL PROVINCIAL AND MUNICIPAL RESPONSE

3.7.3 Partial Activation

(a) Emergency plans are partially activated when it is anticipated that protective and/or operational measures (other than monitoring and assessment of the situation) are not likely to be immediately required.

(b) When the PNERP and other emergency plans are partially activated, the following actions shall be provided for in plans and procedures:

(i) Activation and full staffing of the PEOC and the Municipal EOC so as to monitor and assess the situation on a continuous basis.

(ii) PEOC and Municipal EOC to discuss option of activating public alerting system.

(iii) Activation of the Ministry EOCs and Joint Traffic Control Centre and staffing as appropriate.

(iv) Activation of the Emergency Information Centre (EIC) with staffing at an appropriate level. Provincial staff to be dispatched, as appropriate.

(v) All emergency response personnel not immediately required should be placed on standby. This status should ensure that they can be quickly contacted when needed to report to their duty stations.

(vi) Other emergency centres should be readied to a level where they can become fully operational without undue delay, when required. Specific levels shall be prescribed in the Municipal Plan.

3.7.4 Full Activation

(a) A Full Activation response will be adopted by the PEOC when it is expected that protective and/or operational measures to deal with the emergency are necessary.

(b) Major organization plans under this PNERP (municipal, nuclear facility, ministry) should provide for the following actions upon adoption of a Full Activation response:

(i) All emergency operations centres and the emergency information centre, to be fully staffed and operational.

(ii) The municipal reception centre(s), evacuee centres(s) and monitoring and decontamination units should be readied to a level where they can become fully operational without undue delay when required.

(iii) All emergency response personnel to immediately report to their places of duty (unless specifically exempted – see (ii) above).

(iv) The field elements under the Scientific Section's monitoring groups to be placed on standby.

3.7.5 Assurance /General Province-wide Monitoring Group Plan

(a) Upon adoption of either Partial or Full Activation, the Assurance/General Province-Wide Monitoring Group Plan should be partially activated (**paragraph 3.7.3** above).

(b) The Plan would be fully activated when it appears likely that radioactive contamination will occur in Ontario or some part thereof. Such activation should be done early enough to enable baseline data, at locations additional to those in the MOL Nuclear Reactor Surveillance Program, to be accumulated.

(c) The decision to fully activate this Plan will be made by the PEOC.

3.7.6 Radiation Health Response Plan

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

(b) The RHRP describes how Ontario's health care system will respond to a radiological/nuclear event of a malicious or accidental nature. The RHRP sets out a comprehensive province-wide approach to health preparedness and response planning, and provides information to guide local radiological/nuclear planning groups.

(c) The RHRP will be fully activated through the MOHLTC EOC when it seems likely that the incident may result in high radiation exposures to some persons and/or when Thyroid Blocking is contemplated.

3.7.7 Coordination of the Response to a Liquid Emission at AECL-Chalk River Laboratories

(a) A liquid emission is a waterborne release from a nuclear facility resulting in discharges with above normal levels of radioactivity.

(b) The main radiation exposure pathway for a liquid emission from AECL-CRL is through contamination of the water supply, with the resulting hazard being the subsequent ingestion of such contaminated water or species living in the contaminated water.

(c) Because of the limited hazard posed by a liquid emission, it is dealt with differently from an atmospheric emission of radioactivity, through the Coordination of the Response to a Liquid Emission at Chalk River Laboratories. It prescribes the organization, operating procedures, linkages, notification criteria, response measures, criteria for their application, etc. for undertaking a provincial response to a liquid emission

(d) A liquid emission response undertaken pursuant to the Coordination of the Response to a Liquid Emission at Chalk River Laboratories, may shift to a PNERP response should events escalate to a magnitude where it is deemed appropriate.

(e) Further, if the PEOC is functioning as a result of the activation of the PNERP, any liquid emission from AECL-CRL will be dealt with under the PNERP, irrespective of whether the original activation of the PEOC was for an AECL-CRL or any other nuclear emergency.

CHAPTER 4

OPERATIONAL RESPONSE

4.1 General

4.1.1 Operational response activities depend on the notification category received from AECL-CRL:

(a) Upon receiving notification of a Reportable Event, the Provincial Emergency Operations Centre (PEOC) will monitor the situation as Routine Monitoring.

(b) Upon receiving notification of an Abnormal Incident, the PEOC will adopt Enhanced Monitoring.

No activation response is required for the above two notification categories unless an escalation of the emergency occurs.

4.1.2 This chapter deals with emergency response operations for an accident at AECL-CRL which results in, or has the potential to result in, an emission of radioactive material to the atmosphere, and therefore a Partial or Full Activation response is deemed necessary.

4.1.3 An outline of the operational response for an AECL-CRL emergency is given in **Figures 4.1** (Onsite Emergency) and **4.2** (General Emergency) and an overview of the operational actions required for Activation (Partial and Full) is given in **sections 4.3** and **4.4** below.

4.1.4 Principles of other operational response measures are provided in **sections 4.5** through **4.13**.

4.2 Overview of Operations – Activation Response

4.2.1 The PEOC receives notification of an emergency from AECL-CRL.

4.2.2 The PEOC notifies the municipal and other contact points and passes on the initial provincial response, based on the notification category received.

4.2.3 If an Onsite Emergency notification is received, the response will be Partial Activation. No immediate protective measures are required.

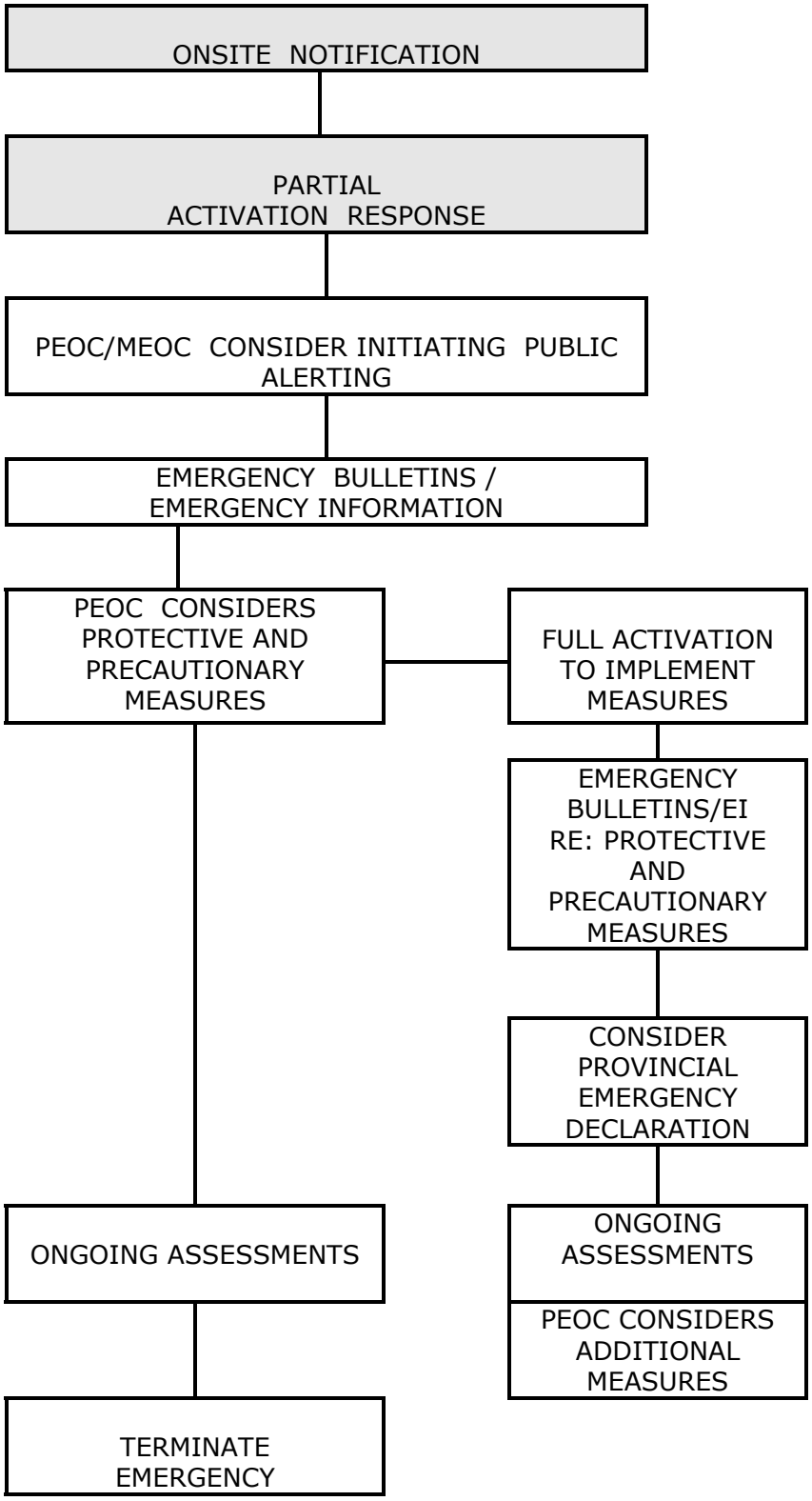

FIGURE 4.1 : INITIAL PROVINCIAL RESPONSE ONSITE EMERGENCY

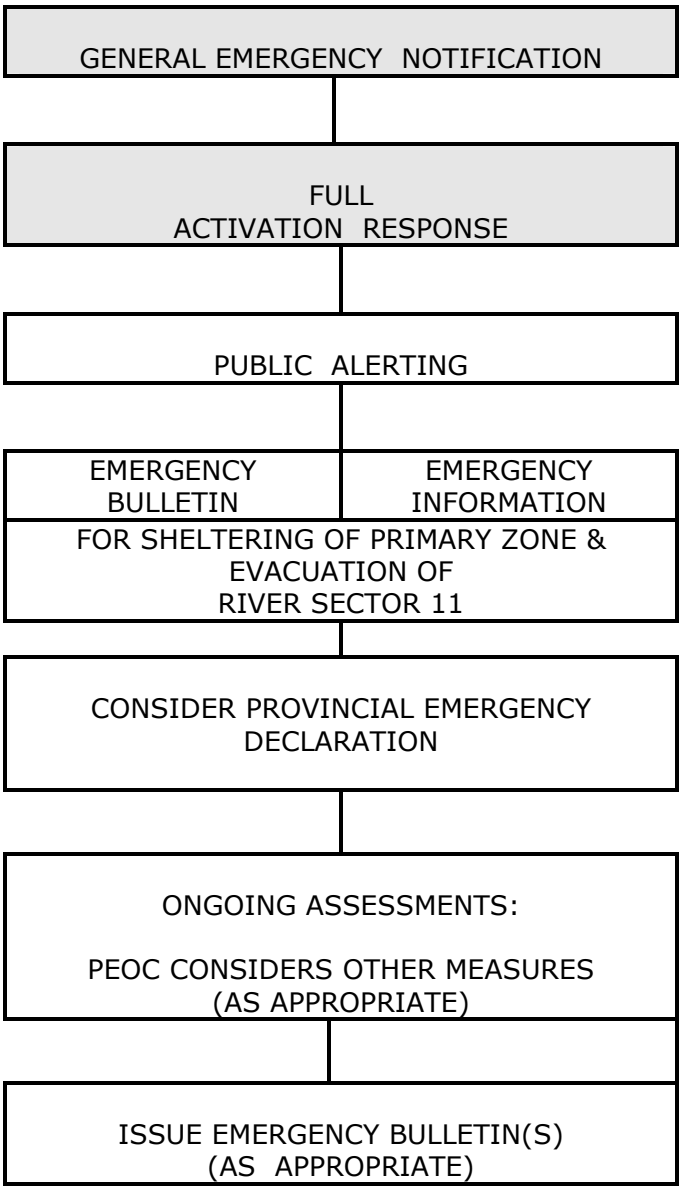

FIGURE 4.2 : INITIAL PROVINCIAL RESPONSE GENERAL EMERGENCY

4.2.4 If a General Emergency notification is received, the response adopted will be Full Activation, public alerting will be initiated and sheltering of the Primary Zone and clearance of River Sector 11 will be required as immediate protective measures.

4.2.5 In the event of a Full Activation response, the PEOC will advise government whether declaration of a provincial emergency is warranted.

4.2.6 The initial actions to be undertaken depend on whether the response initiated is Partial Activation (**section 4.3**) or Full Activation (**section 4.4** below).

4.3 Partial Activation

4.3.1 The general sequence of actions required to be taken by the PEOC for a Partial Activation response is likely to be as follows:

(a) Notification of the emergency management organization and set up and full staffing of emergency operations centres (**paragraph 3.7.3**).

(b) Technical assessments of the accident situation and its projected effects as described in **paragraph 4.3.2** below.

(c) Consideration and discussion with the municipal EOC, of the advisability of initiating the public alerting system

(d) Taking into consideration the results of (c) above, assess the need to issue an Emergency Bulletin.

(e) Decisions on precautionary and protective measures and implementation as described in **paragraph 4.3.3** below.

4.3.2 Technical Assessments

The Scientific Section of the PEOC shall undertake the following assessment for input into the Command Section decision making process:

(a) The Accident and its Prognosis

As soon as possible, an evaluation shall be made by the Scientific Section's Nuclear Incident Group, of the initiating accident/event and the status of relevant facility systems. Based on this, an assessment shall then be made of the likely development of the situation in respect of both positive and negative outcomes. This shall continue as an ongoing process.

4.3.3 Implementation of Protective Measures

(a) The PEOC will upgrade to a Full Activation response prior to directing the implementation of protective measures.

(b) Assessment of Protective Measures

(i) Based on the information received from the CRL Environmental Group, the Scientific Section will prepare on assessment regarding the need to implement protective measures.

(ii) The PEOC, through the Command Section, shall provide directions, regarding the operational directives (or, in the event of a declared emergency, shall advise that such orders have been made) to the designated municipality, host and support municipalities and the nuclear facility.

(c) Emergency Bulletins – Protective Measures

Once all relevant stakeholders have been informed and implementation of the necessary actions may begin, the PEOC shall issue an Emergency Bulletin informing the affected public.

(d) Precautionary Measures

The PEOC shall consider the advisability of issuing operational directives (or, in the event of a declared emergency, advising that such orders have been made) for any or all of the following precautionary measures in the Primary Zone (or part thereof) and adjacent areas:

(i) Closing of beaches, parks, recreation areas, etc.
(ii) Closing of workplaces and schools
(iii) Suspension of admissions of non-critical patients in hospitals
(iv) Entry control (**section 4.5**)
(v) Clearing the milk storage of dairy farms
(vi) Banning consumption of any item of food or water that may have been exposed outdoors
(vii) Banning consumption and export of locally produced milk, meat, produce, milk-and meat-producing animals
(viii) Removing milk- and meat-producing animals from outside pasture and exposed water sources.

4.4 Full Activation

4.4.1 A Full Activation response will be considered or initiated under the following circumstances:

(a) Automatically upon receipt of a General Emergency notification

(b) At a later stage of an emergency due to a sudden deterioration.

4.4.2 For a situation such as **paragraph 4.4.1 (a)** there will be an urgent need for the affected public to take protective measures. It is unlikely that there will be time to assemble adequate information and carry out a detailed assessment. Action shall be taken based on the best information readily available, and according to the guidelines given below:

Sequence of Action

(a) If the PEOC receives a General Emergency notification from AECL-CRL (and time is not available for an initial scientific assessment) the Duty Operations Chief shall take the following immediate actions:

(i) Initiate a Full Activation provincial response

(ii) Direct public alerting to be initiated and inform the designated municipality of the operational directives being issued (or, in the event of a declared emergency advise of such orders being made) as per (iii) below.

(iii) Issue the relevant Emergency Bulletin to the broadcast media for sheltering of the Primary Zone and clearance of River Sector 11.

(iv) As soon as the Scientific Section is assembled, it shall undertake a rapid technical assessment to determine what further protective measures are required (**paragraph 4.4.4** below).

(v) Technical assessments shall be repeated on a continuous basis and further operational directives will be issued (or, in the event of a declared emergency, it shall be advised that such orders have been made) as appropriate.

(b) If the Full Activation response is initiated as a result of an escalation of an event in progress, the sequence of action will be as per **paragraph 4.4.2 (a)** with the exception being that the operational directives being issued (or, in the event of a declared

emergency, advice that such orders have been made) will be based on the ongoing technical assessments of the Scientific Section.

4.4.3 Technical Assessments

(a) Main Issues to be Assessed

The main issues arising at the commencement of this scenario are:

(i) If an emission is not occurring, when is it likely to commence?

(ii) Which response sectors are likely to be affected by the ongoing or imminent emission, and thus may require the application of immediate protective measures?

The Scientific Section procedures shall detail how these assessments will be made.

(b) Condition of Facility Systems

Table 4.3 gives two main categories for the condition of facility systems.

Based on the information available, the Scientific Section shall make the following assessments:

(i) Which set of baseline protective measures in **Table 4.3** best matches the current conditions.

(ii) Whether current meteorological conditions warrant any change to the distance out to which protective measures are advised under **Table 4.3**.

(iii) Which are the sectors likely to be affected by the plume.

(iv) **Table 4.3 Guidelines** provide a baseline for making appropriate judgements. However, if time and adequate information are not available, they may be used as default measures.

(c) Variation in Conditions

In an actual event the estimate of facility conditions may not conform exactly to the conditions given in **Table 4.3**. In such a case the baseline/default protective measures area, given in the table, may be appropriately modified.

(d) Exposure Levels

(i). The Scientific Section shall make an estimate as to whether the dose in any sector(s) is likely to require the activation of the Radiation Health Response Plan (**paragraph 4.4.5** below).

(ii). The decision to activate the MOHLTC Radiation Health Response Plan will be made by the MOHLTC in coordination with the PEOC.

(e) Subsequent Technical Assessments

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

4.4.4 Immediate Protective Measures

(a) Decision-making

(i) The Command Section, PEOC will consider the implementation of appropriate immediate precautionary and protective measures and the appropriate operational directives (or, in the event of a declared emergency, advice of such orders) will be communicated via Emergency Bulletin.

(ii) Command Section decisions taken will be based on advice from the Scientific Section (**paragraph 4.4.2** above) as well as on operational and public policy consideration.

Some guidance on the implementation of these measures is given below.

(b) Precautionary Measures
See **paragraph 4.3.3** (**d**).

(c) Evacuation and Personal Monitoring and Decontamination

(i) If evacuations are being undertaken **during an emission**, the first priority shall be to leave the affected area as quickly as possible. If conditions permit, evacuees will be advised (via Emergency Bulletin) to go to a facility for monitoring and decontamination. However, if that is not possible, evacuees should be advised to go to a destination of their own choice and once there, decontaminate themselves by

bagging their old clothes, showering, washing their hair, and putting on a fresh change of clothes.

(ii) Details for decontamination shall be provided through the Emergency Bulletins as will the location of facilities where evacuees may go for follow-up assurance monitoring for radioactive contamination.

(d) Thyroid Blocking

(i) The decision to issue an operational directive for thyroid blocking will be made by the Chief Medical Officer of Health, in coordination with the PEOC.

(ii) Details regarding thyroid blocking are provided in the MOHLTC's Radiation Health Response Plan.

(e) Sheltering

(i) Sheltering will likely be directed upon a Full Activation Response for the entire Primary Zone land sectors (1-10).

(ii) If, however, only the inner ring (sectors 1-5) is directed to shelter, consultation shall be undertaken between the PEOC and Municipal EOC to consider the advisability of opening Highway 17 in that area to traffic. Such considerations shall include assurances that public health and safety will not be compromised by such an action.

(iii) If the need for sheltering is likely to be required for more than 24 hours, consideration will be given to evacuating those sectors under the operational directive for sheltering.

(iv) Campers, boaters and other recreationalists should be evacuated from recreational areas in the event of an operational directive for sheltering for that area.

4.4.5 Radiation Health Response Plan

If it is estimated that the radiation dose in any sector is likely to be significant, as determined by the Scientific Section in consultation with the MOHLTC EOC, the appropriate provisions of the Radiation Health Response Plan shall be implemented by the MOHLTC.

4.4.6 Subsequent Measures

Technical and operational assessments shall be repeated on a continuous basis and additional protective, precautionary and operational measures shall be considered by the PEOC, and implemented as appropriate via operational directive (or, in the event of a declared emergency, shall advise that such orders have been made). (See **sections 4.5 – 4.13** for guidance).

4.5 Entry Control

4.5.1 Management of the main traffic 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 Joint Traffic Control Centre (JTCC) via the MCSCS representative in the PEOC. If required, an OPP representative will also be provided.

4.5.2 In the event of an emission, the PEOC should consider the following entry control measures and notify the proper authority(ies) for implementation as appropriate:

(a) Suspension of through traffic on main road and rail routes going through the Primary Zone (Ottawa Valley Rail Link and Highway. 17).

(b) Suspension of marine traffic in Sector 11 (Ottawa River).

(c) Aircraft should be kept clear of the Primary Zone. A wider area may need to be closed to air traffic if there is widespread dispersion of radioactivity.

Once it is established that no significant radiation dose or contamination would be incurred while traversing these areas, these measures can be lifted.

4.5.3 Joint Traffic Control Plan

(a) This plan shall include provisions for preventing traffic on Highway 17 from entering the Primary Zone whenever Stage 2 of the plan is put into effect.

(b) Such through traffic shall be diverted around the Primary Zone via a pre-designated diversion route.

(c) Entry to emergency workers (who have tasks in the zone) shall be permitted on these routes.

CONDITION OF FACILITY SYSTEM	BASELINE / DEFAULT PROTECTIVE MEASURES
A. Intermediate to severe* NRU core damage with emission via the fully functioning Emergency Filtration System.	Shelter Primary Zone Land Sectors; Evacuate River Sector
B. All other events or conditions likely to lead to an emission from any source, resulting in an abnormal, elevated source term.	No protective measures required.

* To be defined in the Scientific Section Procedures.

TABLE 4.3 : PROTECTIVE MEASURES GUIDELINES – MAJOR / SIGNIFICANT EMISSION

(For application, see **paragraph 4.4.3**)

(d) If main traffic routes are likely to remain closed for an extended period, the Joint Traffic Control Centre, under the guidance of the PEOC, shall implement alternative routing arrangements established prior to an event. Prior planning for this eventuality will minimize the disruption created by such closures.

(e) Full entry control should be implemented for sectors that are undergoing sheltering or that have been evacuated. However, access will be allowed to emergency workers who have tasks to perform in these sectors.

4.6 Evacuation

While evacuation is not specifically foreseen as an initial protective measure under the scenarios anticipated by this plan, guidance is provided below in the event that this measure becomes necessary e.g., if sheltering is required beyond a reasonable time period or, if subsequent monitoring indicates the presence of appreciable ground contamination.

4.6.1 Directing Evacuations

(a) The Province will direct evacuations by response sector, groups of sectors, or rings detailing the boundaries of the evacuation area.

(b) If evacuees from a sector are evacuating from a contaminated area, they will be directed to proceed to a Monitoring and Decontamination Unit or to self-decontaminate upon reaching their destination. Information on locations for monitoring shall be provided.

(c) The Joint Traffic Control Centre will monitor the evacuating traffic and all concerned will be informed if certain routes should not be taken. See **section 4.8**.

(d) If only the inner ring (sectors 1-5) is required to evacuate or, if the evacuation order has been lifted from the outer ring, consultation will be undertaken between the PEOC and the Municipal EOC to consider the advisability of opening Highway 17 in that area to regular traffic. Such considerations will include assurances that public health and safety will not be compromised by such an action.

4.6.2 Evacuation Arrangements

(a) The Laurentian Hills/Deep River Municipal Plan shall include arrangements for mass evacuation transportation and/ or medical transfers.

(b) Medical assistance required during an evacuation is the responsibility of the emergency medical services and hospitals under municipal arrangements or mutual aid agreements and should be detailed in the Municipal Plan.

(c) The Municipal Plans of designated (Primary Zone and Host) municipalities, shall include details for the reception and care of evacuees.

(d) AECL-CRL will provide details regarding the monitoring and decontamination of evacuees in its emergency plan and associated procedures (**see 4.6.3 below**).

(e) Emergency plans of the schools in the Primary 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/parents.

(f) Emergency plans of hospitals, nursing homes, and other institutions in the Primary Zone should include provisions for the transfer of staff/residents/patients to an appropriate facility outside the Primary 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.

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 Plan.

4.6.3 AECL-CRL - Evacuation

AECL-CRL prepares its own evacuation plans for non-essential onsite personnel. The PEOC and MEOC will be advised by when an evacuation of the CRL site is deemed necessary.

4.7 Thyroid Blocking

4.7.1 It is the responsibility of AECL-CRL to procure adequate quantities of KI pills for the Primary Zone population (**PNERP Master Plan, paragraph 5.11.1 and Annex I Appendix 13**).

4.7.2 Thyroid blocking is not foreseen as an initial protective action under the scenarios anticipated. However, in the event that this measure does become necessary as the response unfolds, designated municipalities shall detail in their plans the means by which they will facilitate:

(a) Availability of KI pills for Primary Zone institutions and for emergency centres (Emergency Worker, Reception and Evacuee Centres and MDUs).

(b) Availability of KI pills for any members of the Primary Zone population who may wish to possess a supply.

4.7.3 Other operational responsibilities regarding Thyroid Blocking (stocking, distribution and administration) are prescribed in the Radiation Health Response Plan, as prepared by MOHLTC.

4.7.4 The decision to implement the administration of KI will be taken by the Chief Medical Officer of Health.

4.8 Traffic Control

4.8.1 A Joint Traffic Control Plan shall be developed for the Primary Zone as well as the main roads entering it. During an emergency, the Joint Traffic Control Centre (JTCC) (**paragraph 2.7.3**) shall be responsible for implementing the Joint Traffic Control Plan (**section 1.4**).

4.8.2 The traffic control plan shall be designed to allow implementation in three incremental stages:

(a) Stage 1. Automatically initiated as soon as the traffic control plan is activated. The aim in this stage shall be to keep traffic flowing smoothly on the main evacuation routes and, to ensure that these routes remain open.

(b) Stage 2. Initiated when it appears likely that the emergency may require evacuations or, when spontaneous evacuations begin to occur. Traffic shall be prevented from entering the Primary Zone on the main evacuation routes and shall instead be diverted around it (local traffic can still enter the Primary Zone on other routes). However, access should be allowed to emergency workers who have tasks to perform in the Primary Zone. Stage 1 measures will continue.

(c) Stage 3. Initiated when it appears that particular sectors are likely to be evacuated. Additional resources shall be deployed to ensure that evacuations proceed smoothly beyond the Primary Zone boundary. Stages 1 and 2 measures will continue.

4.8.3 The timing and order of sector evacuations will be determined by the PEOC, in coordination with the Municipal EOC and the JTCC.

4.8.4 The traffic control plan shall provide, where applicable, for the priority evacuation of any Response Sector(s) (**paragraph 4.6.2**), if and when ordered.

4.8.5 Operational directives implementing evacuations (or emergency orders issued in the event of a declared emergency) will be accompanied by emergency bulletins issued by the PEOC.

4.9 Radiation Monitoring

4.9.1 Radiation monitoring surveys shall be carried out, under the direction of the Scientific Section of the PEOC, in order to determine the following information:

(a) Exposure rates and contamination levels

(b) Identification of radionuclides

(c) Appropriate sampling locations

4.9.2 Monitoring and data analysis details shall be provided in the operating procedures of the Scientific Section and the groups operating under it (Nuclear Incident, Environmental Radiation Monitoring, Assurance Monitoring, and General Province-Wide Monitoring Groups).

4.9.3 Field Monitoring Resources

Upon request from the PEOC's Scientific Section, **Environmental Radiation Monitoring Group**, Health Canada will arrange aerial monitoring to determine the path of the radioactive plume and the location of ground contamination. This will support ground monitoring positioning and deployment.

4.9.4 Nuclear Facility Off-Site Monitoring

(a) AECL-CRL teams will carry out ground monitoring for plume exposure control purposes in the Primary Zone:

(b) The **Nuclear Incident Group** of the Scientific Section will be responsible for the analysis of the data resulting from these surveys.

4.9.5 Provincial Agencies

(a) Assurance Monitoring Group

Headed by the Radiation Protection Service of the Ministry of Labour, this group implements monitoring programs in areas adjacent to a radioactive release which do not require protective measures against radiation. The Programs are aimed at assuring the public that air, food and water are safe (refer to MOL Assurance/General Province-Wide Monitoring Group Plan).

(b) General Province-Wide Monitoring Group

Headed by the Radiation Protection Service of the Ministry of Labour, this group monitors province-wide sampling to determine the extent of radionuclide dispositions and foodstuff contamination (refer to MOL Assurance/General Province-Wide Monitoring Group Plan).

4.10 Ingestion Control Measures

4.10.1 Before an emission commences, appropriate ingestion control measures will be directed as a precaution within and, if necessary, adjacent to the Primary Zone (**paragraph 4.3.3**).

4.10.2 If general province-wide monitoring indicates the need, appropriate ingestion control measures will be considered in areas known or suspected to be contaminated.

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

4.11 Emergency Worker Safety

4.11.1 At the commencement of an emergency resulting in the full activation of this plan, the Response Sectors in the Primary Zone will be assumed to carry the following safety status (**PNERP Master Plan**, **Annex H**), based on the category of the notification initiated by AECL-CRL:

All sectors - ORANGE

4.11.2 As soon as relevant data is available, the PEOC will reassign safety status to all the sectors and will update them periodically.

4.11.3 During the course of an emission over the land areas of the Primary Zone this updating will be done on an hourly basis. The safety status of sectors should be promptly communicated by the PEOC to all concerned.

4.11.4 It is the responsibility of each organization with emergency workers operating or required to operate in the Primary Zone to ensure that they are kept apprised of the latest/current safety status of Response Sectors.

4.11.5 The Municipal Plan shall provide for the setting up of Emergency Worker Centres (EWCs), as appropriate (see **PNERP Master Plan**, **section 5.13 and paragraph 6.7.8**).

4.11.6 AECL-CRL is responsible for the monitoring and decontamination aspect of EWCs, the relevant details of which will be provided in their plans/procedures.

4.11.7 Emergency workers who need to enter a sector assigned a safety status other than GREEN should first report to an EWC, where they will be provided with personal monitoring devices and briefed on the precautions they should observe and any maximum time limit on their stay in the sector (see **paragraph 4.11.1** above).

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

(i) Dosimetry
(ii) Stable iodine (KI)
(iii) A card listing the default safety status of sectors (**paragraph 4.11.1** above) and the precautions to be taken for each safety status (**PNERP Master Plan, Annex H**).

The Municipal Plan shall detail how these emergency services will obtain these items, appropriately store them, and maintain such equipment so that it is readily available when needed. AECL-CRL is to provide assistance in obtaining and maintaining (i) and (ii) above.

4.12 Public Direction

4.12.1 Directions to the public on the measures they should take to ensure their safety and welfare during the emergency should be issued only by the PEOC. All other jurisdictions/organizations which have a need to issue any such directives/ advisories should forward them to the PEOC, and **not** issue them directly to the public.

4.12.2 Emergency Bulletins

(a) For public purposes, the PEOC will issue its operational directives in the form of Emergency Bulletins.

(b) To the extent possible, Emergency Bulletins should be prepared in advance of an emergency.

(c) Emergency Bulletins will be issued to the broadcast media. Copies will also be sent to the principal elements of the emergency response organization that may be affected by them.

(d) It shall be the responsibility of the PEOC Emergency Information Section to monitor the broadcast of the Emergency Bulletins and confirm that they have been correctly transmitted.

4.13 Emergency Information

4.13.1 Lower Level Response

When the offsite response adopted is Routine Monitoring or Enhanced Monitoring (**Table 3.2**) all news releases on the event, 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).

4.13.2 Higher Level Response

(a) When the offsite response adopted is Partial or Full Activation, (**Table 3.2**), the Director of Communications Branch, MCSCS, assumes his/her role as PCEIO, establishing the Provincial Emergency Information Section (EIS), on behalf of the Province.

(b) The designated municipalities, the nuclear operator and the federal government will each have their own emergency information operation.

(c) In order to ensure the coordination and consistency of all emergency information issued to the public, these other jurisdictions or organizations should inform the Provincial EIS if they plan to issue news releases or other emergency information materials. Conversely, the PEIS will liaise with these organizations regarding the materials being issued by them.

4.13.3 The Provincial Emergency Information Section (EIS)

(a) The Provincial EIS is responsible for ensuring 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) In that regard, wherever possible and practicable, information will be shared amongst all partners prior to release

(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 the Municipal EIC 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, when possible.

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

4.13.4 Municipal Emergency Information Centre (EIC)

(a) The designated (Primary Zone) municipality will establish an EIC 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 (Primary Zone) municipality may invite the nuclear operator, neighbouring municipalities, federal and/or 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 informed regarding the development and distribution of news releases and other public information documents to local residents and media;

(iii) Keeping the PEIS 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; and

(vi) Arranging media briefings as required to communicate "key messages" to the public.

4.13.5 Public Inquiry

(a) Provincial public inquiry lines, using the Ontario Shared Services (OSS) call centre, will be coordinated by the Provincial Emergency Information Section (PEIS) in conjunction with the PEOC.

(b) The designated municipalities will be responsible for establishing their own public inquiry operation.

4.14 Transition to the Recovery Phase

4.14.1 Criteria

The PEOC can end the Response Phase of the emergency at any time after *both* the following conditions are met:

(a) The nuclear reactor that had the accident is in a guaranteed shutdown state.

(b) No further controlled or uncontrolled emissions at significant levels are anticipated. Generally, emissions shall be considered below a significant level if:

(i) They do not warrant the taking of any exposure control protective measures, *and*

(ii) They do not adversely affect public safety.

The recovery phase is prescribed separately.

ANNEXES

ANNEX A : RESPONSE SECTOR BOUNDARIES

ANNEX B : PLANNING DATA

ANNEX C : NUCLEAR PLANNING GLOSSARY

ANNEX A
(Ref : **Section 2.5**)

RESPONSE SECTOR BOUNDARIES

SECTOR	BOUNDARIES
Primary Zone	Within the Province of Ontario, the Primary Zone generally is the area bounded by an arc 9 km. radius from the stack at AECL-CRL and bounded on the north by the Quebec shore of the Ottawa River.
1	Balmer's Bay Area The area north of Highway 17, west of the CRL Exclusion Area, south of the Ottawa River, and east of a north-south line following the lot line from the junction of Legere Drive and Highway 17.
2	Town of Laurentian Hills The area north of Highway 17, west of Miller Road, south of the CRL Exclusion Area, and east of the line from the junction of Legere Drive and Highway 17 along the lot line to the SW corner of the AECL Exclusion Area; includes all properties on the north side of Highway 17, Mountainview Subdivision, and all properties on Miller Road.
3	Town of Laurentian Hills The area north of Highway 17, west of Mill Yard Road, south of the CRL Exclusion Area, and east of Miller Road; excludes all properties on Miller Road and Mill Yard Road, but includes all properties on the north side of Highway 17
4	Town of Laurentian Hills The area north of Highway 17, east of Mill Yard Road, south of the CRL Exclusion Area, and west of a line following the lot line from the SE corner of the CRL Exclusion Area to Highway 17; includes all properties on Mill Yard Road and properties on the north side of Highway 17
5	CFB Petawawa The area north of Highway 17, east of the CRL Exclusion Area and of a line following the lot line from the SE corner of the CRL Exclusion Area to Highway 17, south of the Ottawa River, and delineated on the east by the defining 9 km. arc approximately to the mouth of Chalk Bay and the mouth of Downey Bay.

SECTOR	BOUNDARIES
6	Town of Deep River The area north of Highway 17, west of a north-south line following the lot line from the junction of Legere Drive and Highway 17, south of the Ottawa River, east of Banting Drive, and following a straight line from the north end of Banting Drive to the Ottawa River; includes all properties on the east side of Banting Drive and all properties on the north side of Highway 17.
7	Town of Laurentian Hills The area south of Highway 17, west of Beladair Road and a southward extension of Beladair Road, and north of the defining 9 km. arc to the intersection of Wylie Road, Banting Drive & Hwy 17, includes Highway 17 and all properties on the south side of Highway 17, on Beladair Road and Gutzman Road.
8	Town of Laurentian Hills The area south of Highway 17, east of Beladair Road and a southward extension of Beladair Road, west of Law Road and a southward extension of Law Road, and north of the defining 9 km. arc; excludes all properties on Law Road and Beladair Road, but includes the Highway and all properties on the south side of the Highway.
9	Chalk River Village The area south of Highway 17, east of Law Road and an extension of Law Road, west of Corry Lake, and north of the defining 9 km. arc; includes the part of Chalk River Village and all properties lying on the south side of the Highway and on Law Road.
10	Petawawa Research Forest Centre The area south of Highway 17, east of Corry Lake, and north of the defining 9 km. arc.
11	Ottawa River The portion of the Ottawa River bounded on the north by the Quebec shore and on the south by the Ontario shore; from an extension of Banting Road in the west to the mouth of Chalk Bay and the mouth of Downey Bay in the east.

ANNEX B
(Ref : **Section 2.6**)

PLANNING DATA

SECTOR	POPULATION*	DAY CARE FACILITY / NURSERY SCHOOLS▽	SCHOOLS (ENROLMENT)	HOSPITAL	OTHER^	TOTAL
1	95					95
2	440					440
3	148					148
4	500					500
5♣	9				20	29
6	20			1 (113)	30	163
7	100					100
8	68					68
9	700	35	1 (102)			837
10♣	3				30	33
11					15	15
Total	**2083**	**35**	**1 (102)**	**1 (113)**	**95**	**2428**

* The estimated population for each sector is given.
▽ Private daycare is not accounted for in this data
^ This includes people who might live outside the sector but are present for recreational purposes.
♣ Canadian Forces Base Petawawa training area. No residential population, although there may be training exercises in the area at any time.

ANNEX C
(Ref: **Section 2.3**)

NUCLEAR / RADIOLOGICAL GLOSSARY

Absorbed Dose: The amount of energy absorbed in the body, or in an organ or tissue of the body, due to exposure to ionizing radiation, divided by the respective mass of the body, organ or tissue. Expressed in terms of gray (rad).

Acute Radiation Syndrome: An acute illness caused by irradiation of the entire body (or most of the body) by a high dose of penetrating radiation in a very short period of time.

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

Collective (Equivalent) Dose: An expression for the total radiation dose incurred by a population, defined as the product of the average radiation dose to a group of exposed persons and the number of persons in the group. Generally expressed in terms of person-sievert (or person-rem).

Committed (Equivalent) Dose: The radiation dose that will be received over a period of 50 years (for adults) or 70 years (for children) after a person takes in a quantity of radioactive material (by ingestion, absorption or inhalation). The dose is expressed in terms of sievert (or rem).

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

Contamination: The unwanted presence of radioactive material in water or air, or on the surfaces of structures, areas, objects or people.

Contiguous Zone: The zone immediately surrounding a nuclear installation. An increased level of emergency planning and preparedness is undertaken within this area because of its proximity to the potential hazard. The actual Contiguous Zone for each designated nuclear installation is specified in the relevant Implementing plans of the Provincial Nuclear Emergency Response Plan.

Critical Group: A particular group among the relevant population which, by virtue of age, sex or dietary habits, is expected to receive the highest dose from a stated radiation source or exposure pathway.

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

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

Derived Emission Limits: Limits for radioactive emissions to air and water from a nuclear facility which ensure that, under normal operating conditions, Canadian Nuclear Safety Commission dose limits for members of the public are not exceeded by persons exposed to those emissions.

Designated Municipality: A municipality in the vicinity of a nuclear 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**).

Designated Nuclear Installation: A nuclear installation designated under the *Emergency Management and Civil Protection Act*, as one to which the specific and detailed provisions of the Provincial Nuclear Emergency Response Plan apply (*for list see* **PNERP Master Plan**, **Annex A**).

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 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.

Effective (Equivalent) Dose: The sum of the weighted equivalent doses received by the organs and tissues of the body, where the weighted equivalent dose is the equivalent dose to an organ or tissue of the body multiplied by the appropriate weighting factor laid down in the Nuclear Safety and Control Act and Regulations promulgated by the Canadian Nuclear Safety Commission. Expressed in terms of sievert (or rem). See Weighted Dose.

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 Workers: A person who assists in connection with an emergency that has been declared by the Lieutenant Governor in Council or the Premier, under 5.7.0.1 of the EMPCA or by the head of council of a municipality under section 4 of the EMCPA. This may include persons who are required to remain in, or to enter, offsite areas affected or likely to be affected by radiation from an accident, and for whom special safety arrangements are required. Examples of emergency workers

include police, fire fighters, ambulance and personnel from the Canadian Armed Forces, and other essential services. They shall not include nuclear energy workers (pursuant to the Nuclear Safety and Control Act) or assurance (ingestion) monitoring field staff.

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

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

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

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: The process of leaving a potentially dangerous area.

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: *See* **Plume Exposure Control**.

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**).

Field Monitoring: The assessment of the magnitude, type and extent of radiation in the environment during an emergency by such means as field surveys and field sampling.

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 food storage to permit radionuclide decay, diversion of food to non-human, non-food chain use or disposal of unusable stocks.

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 coordinates federal actions in the case of an international event.

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.

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

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.

Imminent Emission: 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 food and water.

Initial Notification: The notification made by a nuclear 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 prescribed in emergency plans.

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

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.

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.

Near Incident : A transborder nuclear accident or event at a site within the states and provinces adjacent to 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 caused by an actual or potential hazard to public health and property or the environment as a result of ionizing radiation from a nuclear installation.

Nuclear Establishment: A facility that uses, produces, processes, stores or disposes of a nuclear substance, but does not include a nuclear installation. 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 nuclear installations.

Nuclear Installation: A facility or a vehicle (operating in any media) containing a nuclear fission or fusion reactor (including critical and sub-critical assemblies). It includes, where applicable, any land, buildings, structures or equipment located at or forming part of the facility, and, depending on the context, the management and staff of the facility.

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

Offsite: Offsite refers to the area outside the boundary (fence) of a nuclear facility.

Onsite: Onsite refers to the area inside the boundary (fence) of a nuclear facility.

Operational Directives: Direction given by the emergency response organization to implement operational measures.

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 nuclear installation.

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.

Plume: A cloud of airborne radioactive material that is transported in the direction of the prevailing wind from a nuclear 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**). (*See also* **Puff**).

Plume 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.

Precautionary Measures: Measures which will facilitate the application and effectiveness of protective measures. (For a list of some of these, see **PNERP Master Plan**, **paragraph 2.2.7**).

Primary Zone: The zone around a nuclear installation within which planning and preparedness is carried out for measures against exposure to a radioactive plume. (The Primary Zone includes the Contiguous Zone). The actual Primary Zone for each designated nuclear installation is specified in the relevant Implementing Plans of the Provincial Nuclear Emergency Response Plan.

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 Action Levels (PALs): Projected dose levels which provide technical guidance on the need to take certain protective measures. For values, see **PNERP**, **Annex E**.

Protective Measures: Measures designed to protect against exposure to radiation during a nuclear emergency. (see **Table 2.1**).

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: In the context of this Plan, radiation means ionizing radiation (i.e. radiation with the potential to harm human tissue or cells produced by a nuclear substance or a nuclear facility.

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.

Radiological Emergency: Emergency caused by an actual or environmental hazard from ionizing radiation emitted by a source other than a nuclear installation.

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 food and water supplies.

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

Response Sectors: The Primary 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/radiological emergency.

Secondary Zone: The zone around a nuclear installation within which it is necessary to plan and prepare measures against exposure from the ingestion of radioactive material. (The Secondary Zone includes both the Primary and Contiguous Zones). The actual Secondary Zone for each designated nuclear installation is specified in the relevant site-specific part of the Provincial Nuclear Emergency Plan.

Selective Evacuation: The evacuation of a specified group of people, such as seriously ill patients in hospitals, bedridden residents of nursing homes, or disabled residents.

Sheltering: A protective measure which uses the shielding properties of buildings and their potential for ventilation control to reduce the radiation dose to people inside. (For details, see **PNERP Master Plan**, **section 2.2**).

Source Term: A generic term applied to the radioactive material released from a nuclear facility. It includes the quantity and type of material released as well as the timing and rate of its release. It could apply to an emission 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 nursing homes, handicapped persons and prison inmates.

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 municipality(ies).

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.

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

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

Vulnerable Group: A group which, because it is more vulnerable to radiation, may require protective measures not considered necessary for the general population, such as pregnant women and, in some cases, children.

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. Expressed in terms of sievert (or rem). See Effective (Equivalent) Dose.