Canadian Environmental Law Association
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Submission by the Canadian Environmental Law Association on Canadian Nuclear Laboratories' Application to amend and extend the Chalk River Laboratories nuclear research and test establishment licence for a period of 17 months

Rizwan Khan & Theresa McClenaghan

with file research and analysis by Catherine Bulman

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Canadian Environmental Law Association

T 416 960-2284 • F 416 960-9392 • 130 Spadina Avenue, Suite 301 Toronto, Ontario, M5V 2L4 • cela.ca

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Canadian Nuclear Safety Commission
c/o Louise Levert
Secretariat Canadian Nuclear Safety Commission
280 Slater St., P.O. Box 1046
Ottawa, Ontario K1P 5S9

Submitted by Email: interventions@cnsc-ccsn.gc.ca

Submission by the Canadian Environmental Law Association Re: Hearing Ref. 2016-H-02 - Application from Canadian Nuclear Laboratories (CNL) to amend its nuclear research and test establishment licence for the Chalk River Laboratories site and extend it for a period of 17 months. The Chalk River Laboratories site is located near Chalk River, ON.

The current licence authorizes CNL to operate Chalk River Laboratories until October 31, 2016.

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Summary of Recommendations

RECOMMENDATION 1: The Canadian Environmental Law Association ("CELA") recommends that the Canadian Nuclear Safety Commission ("CNSC") establish a reasonable minimum time between the decision of the Funding Review Committee and the deadline for submitting interventions in order to maximize the ability of eligible members of the public to provide value-added information to the Commission.

RECOMMENDATION 2: CELA recommends that Chalk River Laboratories' ("CRL") Safety and Control Area ("SCA") fitness for service be required by the CNSC to attain a minimum performance rating of satisfactory ("SA") and that the CNSC require Canadian Nuclear Laboratories Limited ("CNL") to develop and implement an aging management program for nuclear and support facilities at the CRL site to identify all aging mechanisms relevant to structures, systems, and components ("SSC") important to safety; to evaluate their possible consequences; and to provide direction for the activities required to safely maintain the operability and reliability of these SSCs along with evidence of their effectiveness as a condition of licensing.

RECOMMENDATION 3: CELA recommends that CNL and the designated municipalities maintain a list of those people who would not be reachable through all of the proposed notification media for whom door-to-door notification would be immediately undertaken. Other emergency personnel should be immediately dispatched to evacuate homeless people and others who are not covered by existing notification systems.

RECOMMENDATION 4: As CELA has recommended in the past, the emergency response plans time-frames should be compressed to alert the public in as short a time frame as possible, preferably less than 30 minutes from the onset of an accident. Methods to compress this time frame should be considered and tested, and their efficacy should be one of the points of evaluation by the CNSC in the licence application by CNL. Reasons for further compression of the time frames for instructions to the public for protective actions are further discussed in the submissions regarding potassium iodide ("KI") distribution, sheltering, and evacuation below.

RECOMMENDATION 5: CELA recommends that the CNSC require that CNL, in conjunction with the designated municipalities, conduct outreach and notification to members of the public resident in the designated municipalities, as to the availability of KI and advice on where it may be obtained. Members of the public should be provided with basic information on the benefits and risks associated with using KI and the importance of having an at-home supply. They should be made aware that KI only protects the thyroid from internal exposure to radioiodine and that it only be taken at the direction of the Province.

RECOMMENDATION 6: CELA recommends that the CNSC require CNL and the designated municipalities, to ensure 100% pre-distribution of KI tablets to the residents in the Primary Zone ("PZ") and that this requirement be included in the licensing conditions for CRL. CNL and the designated municipalities should be required, as a condition of licensing, to systematically evaluate and report back to the CNSC the percentage of households within the 9 km PZ who have obtained KI tablets, as well as the percentage of institutions covered by the plan who have them on hand in sufficient quantities to cover all residents.

RECOMMENDATION 7: CELA recommends that the CNSC require CNL to ensure that stable KI is pre-distributed to all residents within the secondary zone as a condition of licensing.

RECOMMENDATION 8: CELA recommends that the CNSC require CNL, in conjunction with regional emergency response officials, to include in its outreach material to the public, explanations about the capability of sheltering and its limitations as described in the International Atomic Energy Agency ("IAEA") Guide GS-G-2.1 and to reinforce instructions on steps to take for rapid and effective evacuation in the case of a significant emergency.

RECOMMENDATION 9: CELA recommends that the CNSC require that the public clearly understand what plans are in place to assist them with evacuation from the PZ if they do not have their own transportation. What those plans are should be clearly specified in the designated municipalities' emergency plans, and widely communicated to the public in outreach and education.

RECOMMENDATION 10: CELA recommends that the CNSC require the Province and designated municipalities to update their emergency response plans to conform to the requirements under the RHRP for evacuation scenarios that contemplate the needs of vulnerable members of the population.

RECOMMENDATION 11: As CELA has recommended in the past, the CNSC should require the designated municipalities and CNL to communicate to the public in annual outreach and education, the fact that the nuclear emergency response plans expect the public to make their own arrangements in the event of evacuation, and for those who cannot, what is expected to be provided by the municipalities. The appropriateness of this approach should further be discussed with the public in terms of future nuclear emergency planning.

RECOMMENDATION 12: CELA recommends that CNSC should require CNL to conduct studies and to work with offsite emergency responders, the municipalities and the Province to ensure that there are realistic evacuation plans in the case of a severe accident with early large release, as well as in the case of plans for 20 kilometer and 50 kilometer evacuation zones around the CRL.

RECOMMENDATION 13: The CNSC should not grant a licence to CNL beyond the current licence period without verifying "through tests and assessments" the adequacy of the emergency plans in place for CRL, both on-site and off-site, to respond to severe nuclear emergencies.

Introduction

The current CRL operating licence, NRTEOL-01.02/2016, issued by the CNSC is valid until October 31, 2016. CNL has applied for a licence amendment to extend the CRL operating licence period by 17 months to March 31, 2018. CNL's application outlines its intention to continue operation of the National Research Universal ("NRU") reactor with standby production of molybdenum-99 until March 31, 2018, followed by a state of safe shutdown and storage-with-surveillance prior to decommissioning.[1]

CRL is located on the south side of the Ottawa River, 200 km northwest of the City of Ottawa, and 106 km southwest of the Municipality of Campbell's Bay in the Pontiac MRC.[2] 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. [3]

The NRU reactor has the greatest radioactive inventory of the facilities located at CRL. The NRU reactor has no containment and therefore any radioactive release would be prompt with no capability to collect and retain the contamination.[4]

The CRL exclusion zone encompasses a land area with approximately a 6 km radius from the stack at CRL, because of the large exclusion area within the CRL boundary, no Contiguous Zone is designated. The approximate radius of the PZ is 9 km and includes, in Renfrew County, a small portion of the Town of Deep River as far west as Banting Drive and the area of the Town of Laurentian Hills extending to a 9 km radius from the stack of the CRL facility. The PZ further includes the area of the Ottawa River lying within the 9 km radius that also lies within the Province of Ontario. The PZ is the area within which detailed planning and preparedness is carried out for measures against exposure to a radioactive plume. The Secondary Zone encompasses areas of the County of Renfrew and the District of Nipissing (Algonquin Provincial Park) within a 50 km radius of CRL.[5]

CNSC's new REGDOC 2.10.1, Nuclear Emergency Preparedness and Response, requires the CNSC to review the sufficiency of nuclear emergency planning before granting a license at new nuclear facilities.[6] REGDOC

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[1] CMD: 16-H2, Submission from CNSC Staff on a Licence Renewal for Canadian Nuclear Laboratories Limited at Chalk River Laboratories, 2016 (e-Doc 4929171). [**CMD:16-H2**]

[2] Ontario, Provincial Nuclear Emergency Response Plan, 2009, Implementing Plan for Chalk River Laboratories, at pg. 4. https://www.emergencymanagementontario.ca/english/beprepared/ontariohazards/nuclear/nuclear_plan_crl.html. [**Implementing Plan for Chalk River Laboratories**]; Pontiac MRC, Regional response plan to the nuclear emergencies for the Chalk River Laboratories of the Atomic Energy Canada Limited (LCR-AECL): Implementation plan for the municipalities of the Pontiac MRC, 2012 (non-official translation), at 13. [**Implementation plan for the municipalities of the Pontiac MRC**]

[3] Implementing Plan for Chalk River, pg. 4.

[4] *Ibid*.

[5] *Ibid.*, at 2.4.3 (pg. 6).

[6] CNSC, REGDOC-2.10.1, Nuclear Emergency Preparedness and Response, 2016, at pg. i. http://www.nuclearsafety.gc.ca/pubs_catalogue/uploads/REGDOC-2-10-1-Nuclear-Emergency-Preparedness-and-Response-v2-eng.pdf [**REGDOC-2.10.1**]

2.10.1 "lists and discusses the requirements and guidance that licence applicants and licensees shall implement and consider in the design of their emergency preparedness program." However, the requirements contained in the document do not apply to existing facilities unless they have been included, in whole or in part, in the licence or licensing basis.[7] Therefore, even if CELA's recommendations may echo some of the requirements already included in REGDOC 2.10.1, they are not binding on the licence holder unless the recommendation is included as a condition under an approved licence.

In this submission, CELA reviews the proposal to extend the CRL operating licence for 17 months. CELA's focus is on the question of whether the CNSC should grant this licence in light of the question of the adequacy of offsite nuclear emergency plans. In particular, CELA will compare the emergency plans to international nuclear standards and guidance, as well as to international experience and independent reviews as to the requirements for emergency planning. Some of the post-Fukushima lessons learned that are so far available will be particularly important in CELA's review.

CELA submits that the CNSC should require and verify that Ontario's nuclear emergency planning and preparedness are in compliance with REGDOC 2.10.1 and will be sufficient to respond to and significantly mitigate the consequences of a catastrophic accident such as those that occurred at Fukushima in 2011 or Chernobyl in 1986. It is important that CNL be able to plan for its response in the case of a catastrophic accident in order to not only undertake significant accident management and mitigation, but also to work with offsite authorities in supporting the offsite emergency response.

Time between PFP application and Intervention Deadlines

CELA is disappointed in the process the CNSC has chosen to undertake in its consideration of input from public participants, particularly Participant Funding Program (PFP) applicants, on CNL's application to extend CRL's licence.

The time allocated between the deadline for submitting a completed PFP application (January 29, 2016) and the deadline for submitting written interventions (March 7, 2016) has meant that any analysis and value-added input from PFP recipients on CNL's application is likely to be only cursory in nature. The abridged time has resulted in PFP applicants being informed of the Funding Review Committee's decision of their funding application only one week prior to the deadline for submitting written interventions.

CELA is aware of at least one organisation, that previously provided value-added interventions to the Commission, that has been precluded from submitting a written intervention as a direct result of the uncertainty in their resources. The week between the funding decision and the deadline for submissions left them unable to engage an expert to assist in their analysis of CNL's application. There are likely a number of other eligible members of the public who were unable to provide valuable information to the Commission in its decision simply because of uncertain resources and insufficient time to draft an intervention. The condensed timeframe also meant that CELA was unable to obtain a number of relevant documents that would have informed this submission. These include, amongst others, the nuclear emergency plans at CRL and the nuclear emergency plan for the Municipality if Sheenboro.

[7] REGDOC-2.10.1, at pg. 2.

According to the PFP Guide, the aim of the PFP is to provide some funding to eligible applicants in order to help bring valuable information to the Commission. "The PFP is intended to improve the regulatory review process for large nuclear projects. Funding is available to enhance participation and to bring value-added information to the CNSC."[8]

It is difficult to see how providing only one week to undertake competent analysis and draft a value-added intervention could improve the regulatory review process.

RECOMMENDATION 1: CELA recommends that the CNSC establish a reasonable minimum time between the decision of the Funding Review Committee and the deadline for submitting interventions in order to maximize the ability of eligible members of the public to provide value-added information to the Commission.

CRL's Fitness for Service is "Below Expectations"

The CNSC's rating for the NRU reactor's fitness for service is a significant concern. The ratings for fitness for service measure the activities of the licensee that impact on the physical condition of systems, components and structures to ensure that they remain effective and operate safely over time. CRL's fitness for service has been consistently rated by the CNSC as being below expectations. Despite this consistently poor rating, the CRL nuclear operating licence has been renewed on a number of occasions.

In CMD 16-H2, the CNSC staff submission on the CNL licence renewal application for CRL, the CNSC staff noted that "CNL is required to develop, implement and maintain an aging management program at CRL. The progress of this initiative is tracked under the IIP (integrated implementation plan) for the NRU reactor. CNSC staff conducted a desktop review of CNL's submissions related to aging management, including: the aging management program documentation, obsolescence management program and the NRU aging management plan and NRU spare parts. CNSC staff conclude that CNL's aging/obsolescence management program and plan comply with regulatory requirements."[9]

Despite declaring the aging management program at CRL to be in compliance with regulatory requirements, in CMD 16-H2, CNSC staff's review of CRL's "Fitness for Service" Safety and Control Area (SCA) found that it warranted a rating of "BE" or below expectations. A rating of BE is described by the CNSC as meaning "Compliance with regulatory requirements falls below expectations. Compliance within the area deviates from requirements or CNSC expectations to the extent that there is a moderate risk of ultimate failure to comply. Improvements are required to address identified weaknesses. The licensee or applicant is taking appropriate corrective action."[10] The fitness for service SCA covers activities that affect the physical condition of SSCs to ensure that they remain effective over time (including aging management). In CMD 16-H2, as part of its ongoing regulatory scrutiny of CRL, CNSC staff noted that they

[8] CNSC, Participant Funding Program Guide, 2011, at pg. 3.
[9] CMD: 16-H2, at pg. 20.
[10] CMD: 16-H2, at pg. 11.

have continually rated CRLs fitness for service as BE since 2011.[11] CNSC staff continue to rate this SCA as BE due to the aging and legacy issues of SSCs at CRL, particularly the NRU reactor.[12]

This is especially troubling because in May 2009, the NRU reactor was shut down due to a power outage subsequent to which a heavy-water leak was discovered that led to tritium air emissions.[13] The investigation into the matter revealed that the cause of the vessel leak was determined to be corrosion from the formation of nitric acid in the annulus. AECL noted that the formation of nitric acid was also the cause of a NRU reactor shutdown in 1972, which resulted in the replacement of the original vessel. AECL stated that this corrosion had been occurring at the bottom of the annulus over the life of the vessel.[14] The corrosion from nitric acid at the base of the vessel was not detected in the 2004/2005 life assessment study for the NRU vessel as part of the 2005-2006 CRL licence renewal application, by AECL or by the CNSC, despite the history of the NRU reactor vessel becoming corroded and requiring replacement.[15]

In its 2011 licence renewal decision to support the operation of the NRU reactor, the CNSC required AECL to monitor future reactor vessel conditions on a continuing basis. AECL stated that they planned on annual four-week maintenance shutdowns for every year thereafter, to ensure continued and on-going fitness for service.[16] This course of action is enforced by licencing conditions 16.1 and 16.2 and allows for more detailed condition assessments of systems structures and components, periodic inspections, preventative and regular maintenance.

The NRU reactor has been operational at CRL since 1957 and, as a consequence of its age, requires managing the aging of SSCs. According to regulatory document REGDOC-2.6.3, Aging Management, "Managing the aging of a reactor facility means to ensure the availability of required safety functions throughout the facility's service life, with consideration given to changes that occur over time and with use. This requires addressing both physical aging and obsolescence of SSCs where this can, directly or indirectly, have an adverse effect on the safe operation of the reactor facility"[17] The requirements outlined in REGDOC-2.6.3 are consistent with the IAEA guidelines, including Ageing Management for Nuclear Power Plants, Safety Guide NS-G-2.12 and Safe Long Term Operation of Nuclear Power Plants and

[11] CMD: 14-M79, Annual Performance Report AECL's Nuclear Sites and Projects: 2013, 2014 (e-Doc 4528291), at pg. 141; CMD: 16-H2, at pg. 18.

[12] CNSC. CNSC Staff Report on the Performance of CNL's Nuclear Sites and Projects: 2013, 2015, at pg. 15. http://www.nuclearsafety.gc.ca/pubs_catalogue/uploads/CNSC-Staff-Report-on-the-Performance-of-CNL-s-Nuclear-Sites-and-Projects-2013-eng.pdf.

[13] Zakzouk, Mohamed. The 2009–2010 Medical Isotope Shortage: Cause, Effects and Future Considerations. Publication No. 2009-04-E. Parliamentary Information and Research Service, Library of Parliament, Ottawa, 17 November 2010 (archived)., at pg. 1. http://www.lop.parl.gc.ca/content/lop/researchpublications/2009-04-e.pdf.

[14] Record of Proceedings, Including Reasons for Decision, In the Matter of Atomic Energy of Canada Limited Request for the Approval of the Return to Service of the National Research Universal (NRU) Reactor, July 2010, e Doc 3594641, at pg. 3. https://www.cnsc-ccsn.gc.ca/eng/the-commission/pdf/2010-07-05-CompleteDecision-AECL-NRU-e-Edocs3594641.pdf.

[15] *Ibid*. at pgs. 3-4.

[16] *Ibid*. at pgs. 9-10.

[17] CNSC, REGDOC-2.6.3, Aging Management, at pg. 1. http://nuclearsafety.gc.ca/pubs_catalogue/uploads/REGDOC-2-6-3-Fitness-for-Service-Aging-Management-eng.pdf. [**REGDOC-2.6.3**]

Safety Report Series No. 57 as well as the Organisation for Economic Cooperation and Development (OECD), Nuclear Energy Agency, Glossary of Nuclear Power Plant Ageing.[18]

According to Safety Guide NS-G-2.12, nuclear power plants experience two kinds of time dependent changes: (i) Physical aging of SSCs, which results in degradation, i.e. gradual deterioration in their physical characteristics; (ii) Obsolescence of SSCs, i.e. their becoming out of date in comparison with current knowledge, standards and technology. To maintain plant safety, it is very important to detect aging effects of SSCs, to address associated reductions in safety margins and to take corrective actions before loss of integrity or functional capability occurs. Aging of SSCs may increase the probability of common cause failures, i.e. the simultaneous degradation of physical barriers and redundant components, which could result in the impairment of one or more levels of protection provided by the defence in depth concept. Therefore, in the screening of SSCs for aging management, no account is taken of redundancy or diversity among SSCs.[19]

In a 2014 report, R322.3 Incorporating Ageing Effects into PSA Applications, the CNSC commissioned a study to help it in addressing aging effects in the Probabilistic Safety Assessment ("PSA") and in risk-informed decision making in the area of aging management. In the report, the CNSC stated that "[PSA] is one of the most effective tools for the risk-informed decision-making, however, current PSAs do not explicitly account for aging of nuclear power plant ("NPP") components that may be manifested by increasing component failure rates. In order to be more realistic, aging-related models and the effects of test and maintenances in controlling aging degradation of NPP components important to safety should be taken into account in PSAs."[20]

The conclusions of the report with respect to PSA modeling of SSC aging was that: [21]

- the total risk of severe damage frequency ("SCDF") increased by 22% at 10 years and by 47% at 20 years; and
- the total risk of large release frequency ("LRF") increased by 15% at 10 years and by 31% at 20 years.

The report also reached the conclusion that changes in the aging improvement factors and aging acceleration rates could result in an increase to SCDF by an order of magnitude after 20 years.[22] "Therefore, the results are very sensitive to changes in the aging improvement factors and aging acceleration rates, i.e. the effectiveness of aging management." In addition, the study brought up the

[18] *Ibid*. at pg. 2.

[19] IAEA, Safety Standards Series, Safety Guide, No. NS-G 2.12, Ageing Management for Nuclear Power Plants, Vienna, 2009, at pg. 3-4. http://www-pub.iaea.org/MTCD/publications/PDF/pub1373_web.pdf. [**NS-G-2.12**]

[20] R322.3, Incorporating Ageing Effects into PSA Applications, 2014, at pg. iii. [**R322.3**]

[21] *Ibid*. at pg. 185.

[22] *Ibid*. at pg. 184 refers to a related study that considered the impact of aging on the SCDF contribution from a large loss of coolant accident; results indicated an increase of SCDF contribution close to 50% at 20 years and of an order of magnitude at 40 years. See EUR 23930 EN, A. Rodionov, A Case Study on Incorporation of Ageing Effects into the PSA Model. EC JRC Network on Use of Probabilistic Safety Assessments (PSA) for Evaluation of Aging Effects to the Safety of Energy Facilities, DG JRC Institute for Energy, 2009.

point that "residual aging of active SSCs such as valve or pump operators may be an important contributor to the overall aging risk."[23]

RECOMMENDATION 2: CELA recommends that CRL's SCA fitness for service be required by the CNSC to attain a minimum performance rating of satisfactory ("SA") and that the CNSC require CNL to develop and implement an aging management program for nuclear and support facilities at the CRL site to identify all aging mechanisms relevant to SSCs important to safety; to evaluate their possible consequences; and to provide direction for the activities required to safely maintain the operability and reliability of these SSCs along with evidence of their effectiveness as a condition of licensing.

Public Alerting

One of the earliest steps in a nuclear or radiological emergency with the potential for or actual release of radionuclides to the environment will be the necessity of alerting the public. The provisions of IAEA International Safety Guide GS-G-2.1, Arrangements for Preparedness for a Nuclear or Radiological Emergency, provides the following objectives relevant to alerting:[24]

- Classify/Declare the emergency and notify local authorities – within 15 minutes of the time at which conditions indicating that emergency conditions exist are detected
- Recommend urgent protection action to the public on the basis of the emergency classification – within 30 minutes of the time at which the emergency is classified / declared
- Initially warn and inform the public within the precautionary action zone (PAZ) and the urgent protective action planning zone (UPZ) of urgent protective actions required – less than 1 hour from the time at which initial notification to local authorities was given by the facility

The PNERP, 2009 contains requirements which would ensure that the alerting times stipulated by the IAEA GS-G-2.1 are met. The PNERP, 2009 requires that the operator notify the offsite authorities within 15 minutes "of the requirement for notification being recognized".[25] The PNERP, 2009, also requires that the alerting systems must be such as to ensure that "the Primary Zone population that may be required to undertake the initial protective measure of sheltering, evacuation, and/or ingestion of potassium iodide (KI) can be alerted within 15 minutes of initiation of the system."[26] Similarly, the Implementing Plan for Chalk River under the PNERP, 2009 requires that the Towns of Laurentian Hills and Deep River, as the designated (Primary Zone) municipalities, make provisions in their Municipal Plan for a public alerting system which shall ensure that the PZ population, can be alerted within 15 minutes of initiation.[27]

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[23] R322.3, at pg. 187.

[24] IAEA, International Safety Guide, GS-G-2.1, Arrangements for Preparedness for a Nuclear or Radiological Emergency, 2007, Table 12, Response Time Objectives. http://www-pub.iaea.org/MTCD/publications/PDF/Pub1265web.pdf.

[25] Ontario. Provincial Nuclear Emergency Response Plan, 2009, 4.1. https://www.emergencymanagementontario.ca/english/emcommunity/response_resources/plans/provincial_nuclear_emergency_response_plan.html. [**PNERP, 2009**]

[26] *Ibid*. 5.7.1.a.

[27] Implementing Plan for Chalk River Laboratories, at 3.5.1.

As to the question of how much time might elapse between the operator notification of offsite authorities and a decision to "initiate" the system for alerting, the LH-DR Emergency Response Plan indicates that CRL determines the notification category, and within 15 minutes, makes the initial notification to the Provincial Emergency Operations Centre ("PEOC") and the Municipal Contact Point (Deep River Police Service). Within 15 minutes of being notified, the PEOC will decide on the response level to be adopted and will contact the Municipal Contact Point. If CRL has notified the Municipal Contact Point of a General Emergency, then the Municipal Contact Point will automatically adopt a Full Activation response and order public alerting to direct sheltering, without reference to the PEOC.

The Implementing Plan for Chalk River also requires that the operator (CNL) provide resources to the municipalities to establish and maintain a primary public alerting system in the PZ. It further requires that the public alerting system in the PZ 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."[28]

According to the Implementing Plan for Chalk River, for indoor alerting, "the municipalities will use an automated telephone alerting system which is able to call all phone numbers in the PZ or in selected response sectors within 15 minutes of initiation of the alerting system." For outdoor alerting, the municipalities will make use of "loud hailers and sirens/yelpers on municipal fire, police, and utility service vehicles as available." Both the "indoor and outdoor alerting systems will be used simultaneously to alert part or all of the PZ as appropriate. Public alerting will be used only when there is an urgent need to warn the PZ population and to direct the public to take specific actions."[29]

As CELA has noted in previous submissions, some people will be unable to use certain communications media because of their location, status, or physical disability. For instance, people who are hearing-impaired will not be alerted by the auditory warnings. Some people do not have cellphones, or have cellphones but not landlines. Also, cellphone service can be lost or obstructed depending upon an individual's location. Further, like any communication device, phones require individuals to be present and able to use them; they also need to be powered up. Any auditory communication will also need to account for non-English speakers. Homeless people are particularly vulnerable as they do not have ready access to communication devices.

RECOMMENDATION 3: CELA recommends that CNL and the designated municipalities maintain a list of those people who would not be reachable through all of the proposed notification media for whom door-to-door notification would be immediately undertaken. Other emergency personnel should be immediately dispatched to evacuate homeless people and others who are not covered by existing notification systems.

RECOMMENDATION 4: As CELA has recommended in the past, the emergency response plans time-frames should be compressed to alert the public in as short a time frame as possible, preferably less than 30 minutes from the onset of an accident. Methods to compress this time frame should be considered and tested, and their efficacy should be one of the points of evaluation by the CNSC in the licence

[28] *Ibid*.

[29] Laurentian Hills – Deep River Nuclear Emergency Preparedness Committee, Laurentian Hills – Deep River Nuclear Emergency Plan, 2012, pg. 25. [**LH-DR Nuclear Emergency Plan**]

application by CNL. Reasons for further compression of the time frames for instructions to the public for protective actions are further discussed in the submissions regarding KI distribution, sheltering, and evacuation below.

Insufficient Stable Potassium Iodide Pre-Distribution

Iodine thyroid blocking (ITB) is the method by which the thyroid gland's ability to absorb radioiodine is prevented or reduced through the ingestion of KI before or shortly after exposure to radioiodine.[30] According to the Ministry of Health and Long Term Care (MOHLTC), Potassium Iodide Guidelines (KI Guidelines), numerous governments and agencies including the World Health Organization, the U.S. Food and Drug Administration, and Health Canada have concluded that short-term administration of KI is considered a low-risk protective measure for populations with normal thyroid function. Most importantly, it can provide protective benefits for those who are vulnerable to thyroid disease such as pregnant and nursing women, newborns and children.[31]

The IAEA recommends that ITB should be implemented if the projected equivalent dose to the thyroid exceeds 50 millisieverts (mSv) in the first seven days of a nuclear emergency.[32] Therefore, the KI Guidelines stipulate the same intervention threshold for administration of KI in Ontario. In addition, ITB should always be accompanied by sheltering or evacuation.[33]

Ideally, ITB should commence prior to radioiodine exposure. The optimum time is two to six hours earlier. However, if that is not possible, ITB with KI tablets should commence as soon as possible following first exposure, ideally within three hours. After four hours, effectiveness is reduced by half, while no benefit is gained after a delay of 24 hours. A single dose of KI protects the thyroid gland for 24 hours.[34]

When developing a KI distribution strategy, the KI Guidelines suggest that consideration should be given to the following scenarios for precautionary and protective measures:[35]

- **Delayed Emission** - if an evacuation can be completed before the emission is released, then ITB would not be required.

[30] Ontario. Emergency Management Branch, Ministry of Health and Long Term Care, Radiation Health Response Plan, 2014, pg. 62. http://www.health.gov.on.ca/en/pro/programs/emb/rhrp/docs/radiation_health_response_plan.pdf. [**RHRP**]

[31] Ontario. Emergency Management Branch, Ministry of Health and Long Term Care, Potassium Iodide (KI) Guidelines, at pg.4. http://www.health.gov.on.ca/en/pro/programs/emb/rhrp/docs/ki_guidelines.pdf. [**KI Guidelines**]

[32] IAEA, IAEA Safety Standards, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency, Series No. GSG-2, (Vienna, 2011). http://www-pub.iaea.org/MTCD/publications/PDF/Pub1467_web.pdf [**GSG-2**]

[33] KI Guidelines, at pg. 12.

[34] *Ibid*. at pg. 14.

[35] *Ibid*. at pg. 6.

- **Imminent or Ongoing Emission** - In the event of a severe accident, where emission release is either imminent or ongoing, immediate implementation of protective measures would be required in the PZ including ingesting KI for ITB, in conjunction with evacuation and/or sheltering.
- **Persons Unable to Evacuate** - In such a situation, direction would be given to shelter, and if appropriate, consume an appropriate KI dose every 24 hours for the duration of the exposure until evacuation is possible. The maximum time that sheltering would be implemented is two days.

REGDOC 2.10.1 requires that licensees provide the required resources to provincial and municipal authorities in implementing their nuclear emergency plans to ensure that, or that the licensee will ensure that:[36]

1. sufficient ITB agents are pre-distributed, to all residences, businesses and institutions within the PZ, together with instructions on their proper administration
2. sufficient ITB agents are pre-stocked and ready for immediate and efficient distribution to the public within the secondary zone
3. ITB agents can be obtained by residents of secondary zone at any time
4. sensitive populations such as children and pregnant women within the secondary zone are given special consideration
5. All ITB agents are maintained within expiry date
6. the pre-distribution plans are supported by a robust, ongoing, and cyclical public education program
7. all residences, businesses and institutions within the PZ are provided with public emergency preparedness information detailing how they should prepare for a nuclear emergency and what they should do or expect during a nuclear emergency; this information will reinforce the public education program designed to support the pre-distribution of ITB agents
8. this public emergency preparedness information is readily available to the public

As CELA previously submitted in the Pickering relicensing hearing (2013), the Bruce A & B relicensing hearing (2015), and the Darlington relicensing hearing (2015), KI must be pre-distributed because it would not be reasonably feasible to quickly obtain KI after a severe accident. In the event of a severe accident, people will likely be required to shelter in place and/or evacuate making it impossible to visit pharmacies. It would also not be practical to have extensive ITB agent distribution at that time.[37] In any event, there is little possibility this could happen on time for the affected population if there was not adequate pre-distribution. The IAEA Guide GS-G-2.1 stresses that other organs (bone marrow, lungs and other organs) are not protected by KI and therefore "sheltering or evacuation of people at risk of life threatening doses should not be delayed for the provision of stable iodine prophylaxis."[38]

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[36] REGDOC 2.10.1, pg 22.

[37] Working Group #8, at pg. 19. Emergency Planning Ontario considered the lower Protection Action Level for thyroid blocking to be "only for advising persons already in possession of potassium iodide pills to ingest them." at pg. 19

[38] IAEA, IAEA Safety Standards, Arrangements for Preparedness for a Nuclear or Radiological Emergency, Safety Guide GS-G-2.1, (Vienna, 2007), at V. 21. http://www-pub.iaea.org/MTCD/publications/PDF/Pub1265web.pdf [**Safety Guide GS-G-2.1**]

The KI Guidelines stipulate specific functions related to KI that should occur during nuclear emergency planning and response phases. During the planning phase, the focus should be on the availability of KI to the general public and on pre-distribution to selected institutions within the PZ. This includes determining the number of KI doses required. The responsible organizations should also provide information on proper storage and general information on KI.[39] The KI Guidelines go on to require KI distribution "to children at schools and daycares in the Primary Zone by those facilities' staff members. To avoid confusion, schools in the Primary Zone should annually send a letter to parents/guardians requesting consent to distribute KI to their children if required in an emergency".[40] The KI Guidelines indicate that once the direction to take KI is provided, it must be made available to the public in order to maximize effectiveness. "Therefore, the distribution strategy should strive for availability of KI in as many locations as possible." [41] The KI Guidelines require municipalities to ensure that KI is made available to all residents, businesses, and institutions in the PZ who wish to possess a supply as part of their preparation for a nuclear emergency and that "clear instructions should be issued with the tablets, and the public should be made aware on a regular basis of their importance and how to obtain them." The KI Guidelines also suggest that "Residents of the Primary Zone should be encouraged to have a supply of KI for their family at home" and that "[h]aving an at-home supply can facilitate timely administration."[42]

Finally, the KI Guidelines indicate that KI tablets should be pre-distributed by the municipality to the following types of institutions within the PZ in quantities sufficient for people who live or work in this zone for the indicated number of days (in parentheses): [43]

- Schools (one day)
- Daycares (one day)
- Nursing homes and Long-Term Care Homes (three days)
- Hospitals (three days)
- Prisons and Detention Centres (three days)
- Police and Fire Departments, Emergency Medical Services (three days)

RECOMMENDATION 5: CELA recommends that the CNSC require that CNL, in conjunction with the designated municipalities, conduct outreach and notification to members of the public resident in the designated municipalities, as to the availability of KI and advice on where it may be obtained. Members of the public should be provided with basic information on the benefits and risks associated with using KI and the importance of having an at-home supply. They should be made aware that KI only protects the thyroid from internal exposure to radioiodine and that it only be taken at the direction of the Province.

CELA is further concerned with the extent of stable KI pre-distribution beyond the PZ. There is currently no national standard in Canada for the pre-distribution of KI tablets. For instance, KI pills are pre-distributed to all residences (about 4,000 households) in the 20 km emergency planning zone around the Point Lepreau NPP in New Brunswick. to all residences (about 14,000 households) in the 8 km emergency

[39] KI Guidelines, at pgs. 7-8.
[40] *Ibid*. at pg. 8.
[41] *Ibid*. at pgs. 9-10.
[42] *Ibid*. at pg. 10.
[43] *Ibid*.

planning zone around the Gentilly-2 NPP (when operational) in Quebec[44], and in Ontario KI pills are pre-distributed to all residences within the 10 km PZ[45] around the Bruce, Darlington, and Pickering NPPs, and within the 9 km PZ of CRL.[46] Examples of KI pre-distribution in international jurisdictions include 50 km for Switzerland and Belgium, 15 km for Sweden, 10 km for France, and between 1-4 km in the United Kingdom.

Germany is a notable example of a jurisdiction that is modernizing its nuclear emergency response plans. At this time in Germany, KI tablets are pre-distributed in some planning areas and only stocked in others. In 2014, the German Commission on Radiological Protection ("SSK") recommended that iodide tablets be pre-distributed to households within 0-5km of a NPP that included persons under 45; for locations 5-10 km from a NPP, KI should be pre-distributed to households or held in stock at several points in the communities; for 10-25km from a NPP, SKK recommended iodide tablets to stock and; for 25-100 km from a NPP, iodide tablets for children and pregnant women should be held in stock in 8 central stores.[47] Theses recommendations are currently being implemented.

In addition, at a joint meeting in Stockholm in 2014, Western European Nuclear Regulators Association ("WENRA") and the Heads of the European Radiological protection Competent Authorities ("HERCA") agreed on a common European emergency preparedness and response ("EP&R") approach on coordination for the early phase of a nuclear accident.[48] According to HERCA-WENRA agreement, current studies and international standards used for EP&R, "an accident comparable to Fukushima would require protective actions such as evacuation up to 20 km and sheltering up to 100 km. These actions would be combined with the intake of stable iodine." In this framework the national nuclear and radiation safety regulators propose a methodology for these actions:[49]

- evacuation should be prepared up to 5 km around a NPP, and sheltering and ITB up to 20 km;
- a general strategy should be defined in order to be able to extend evacuation up to 20 km, and sheltering and ITB up to 100 km.

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[44]CNSC. Potassium Iodide Pills, 2014. http://www.nuclearsafety.gc.ca/eng/resources/educational-resources/feature-articles/potassium-iodide-pills.cfm.

[45]Ontario. Emergency Management Branch, Ministry of Health and Long Term Care, Potassium Iodide Tablets (KI) Fact Sheet. http://www.health.gov.on.ca/en/pro/programs/emb/rhrp/docs/ki_fs.pdf

[46]Canadian Nuclear Laboratories, Potassium Iodide (KI) Tablet Distribution, 2016. http://www.cnl.ca/en/home/about/emergency-preparedness/ki.aspx.

[47] Germany. Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), Convention on Nuclear Safety Report by the Government of the Federal Republic of Germany for the Sixth Review Meeting in March/April 2014, the Commission on Radiological Protection, 2013, at pg. 126. http://www.bmub.bund.de/fileadmin/Daten_BMU/Pools/Broschueren/bericht_uebereinkommen_nukl_sicherheit_en_bf.pdf.

[48] Western European Nuclear Regulators Association and Heads of the European Radiological protection Competent Authorities, General Presentation of the HERCA-WENRA Approach for a better cross-border coordination of protective actions during the early phase of a nuclear accident, 2014. http://www.wenra.org/media/filer_public/2014/11/21/herca-wenra_approach_for_better_cross-border_coordination_of_protective_actions_during_the_early_phase_of_a_nuclear_accident.pdf.

[49] *Ibid*. at pg. 9

Stable KI is available to the public at certain locations beyond the range of PZ pre-distribution. In Ontario, KI tablets are stocked and available throughout the 50 km secondary zone around a NPP. At CRL in particular, for residents outside of the PZ, KI tablets are only available at the PHARMASAVE Cahoon's Pharmacy in Deep River. Unfortunately, the CNSC Fukushima Task Force Report, 2011 noted that the effectiveness of the approach of stocking KI tablets at local pharmacies, as opposed to pre-distribution to all households "has not been confirmed."[50]

RECOMMENDATION 6: CELA recommends that the CNSC require CNL and the designated municipalities, to ensure 100% pre-distribution of KI tablets to the residents in the PZ and that this requirement be included in the licensing conditions for CRL. CNL and the designated municipalities should be required, as a condition of licensing, to systematically evaluate and report back to the CNSC the percentage of households within the 9 km PZ who have obtained KI tablets, as well as the percentage of institutions covered by the plan who have them on hand in sufficient quantities to cover all residents.

RECOMMENDATION 7: CELA recommends that the CNSC require CNL to ensure that stable KI is pre-distributed to all residents within the secondary zone as a condition of licensing.

The Limitations of Sheltering

Sheltering is defined by the PNERP, 2009, as "a protective measure which uses the shielding properties of buildings and their potential for ventilation control to reduce the radiation dose to people inside." According to the MOHLTC Radiation Health Response Plan ("RHRP"), "sheltering is the protective measure of remaining inside solidly constructed, reasonably airtight buildings with doors and windows closed and ventilation systems turned off. The restriction of airflow into the building during the passage of a radioactive plume reduces inhalation exposure, while the solid construction of the walls reduces external exposure from radioactive material outside the building."[51]

The IAEA Safety Guide GS-G-2.1 describes sheltering as an urgent protective measure to consider following a nuclear emergency. The Guide states that "substantial sheltering is provided by large multi-story structures without any special features." and that sheltering will provide "some protection against all of the major exposure pathways during the early phase of an emergency"; but that the "effectiveness of sheltering varies greatly."[52] Variables that impact the effectiveness of sheltering include, the type of release, the type of construction of the building, and the exposure pathway. However, it also notes that after a few hours the reductions in doses are no longer evident and after that time, doses may become greater indoors, than those outside, if some of the contaminants are "trapped in the shelter"; once the emission plume passes, the Guide suggests that shelters may then need to be aired out.[53]

The Guide indicates that "typical European and North American homes and their basements" "may not provide adequate protection" and that sheltering in this type of structure should be used if evacuation is

[50] CNSC, CNSC Fukushima Task Force Report, 2011 (INFO-0824), at pg. 52. http://nuclearsafety.gc.ca/pubs_catalogue/uploads/October-2011-CNSC-Fukushima-Task-Force-Report_e.pdf.
[51] RHRP, at pg. 57.
[52] Safety Guide GS-G-2.1
[53] *Ibid*. at Appendix V, V.3.

impossible or while preparing to evacuate. "Substantial" shelter may be provided inside the halls of "large multi-storey buildings or large masonry structures away from walls or windows" which may provide a ten-fold reduction in external and inhalation dose. The Guide states this type of protection can be used for short periods, for up to a day, subject to monitoring. "Special shelters" are defined as those designed specifically to provide dose reduction "by a factor of more than 100".[54]

According to the RHRP, sheltering is most effective if a plume emission is of short duration, specifically less than 24 hours. The effectiveness of sheltering decreases with time for most structures, and it is difficult to keep people sheltered in place for a long time.[55] ICRP Publication 109 also states that buildings constructed of wood or metal (as opposed to solidly constructed buildings) "are not generally suitable for use as protective shelters against external radiation, and buildings that cannot be made substantially airtight are not effective in protecting against any exposures." Accordingly, ICRP Publication 109 implies that for these types of buildings the main utility is to advise people to "go inside and listen to their radios for further instructions."[56] Health Canada's Guidelines for Intervention During a Nuclear Emergency state that sheltering should only be used for one day and should not extend beyond two days.[57]

As observed in CELA's previous submissions on NPP relicensing hearings, given the significant limitations of sheltering, there must be significant planning, attention, and resources in order to ensure rapid, timely evacuation. In the time frames required for evacuation there may nevertheless be significant exposures to the public. This is further discussed in our comments on evacuation. It is very important that emergency planning officials and the public understand that, for example, in large early release scenarios, it may not be possible to prevent all of the exposures to the public from those releases because sheltering will not be fully effective and evacuation takes time.

The LH-DR Nuclear Emergency Plan provides for sheltering at section 7.4 without acknowledging the limitations set out by the IAEA Guide or the ICRP Publications reviewed above. On the contrary, the description implies that sheltering will be effective without any discussion as to the type of building, or to close doors, dampers and windows and to turn off furnaces and air conditioners, and does not recommend going to a basement or ground floor room with no windows. It does however, stipulate that evacuation should be considered in the event sheltering might be required for more than 24 hours. In addition, section 4.4.4 does provide direction to campers, boaters and other recreationalists who should be evacuated from recreational areas in the event of an operational directive for sheltering for that area. The Implementation plan for the municipalities of the Pontiac MRC is essentially silent on the matter of sheltering except to say that it "will probably be recommended after full activation of the intervention in the primary zone."[58]

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[54] *Ibid*. at Table 11, pg. 97.

[55] RHRP, at pg. 58.

[56] ICRP, 2009. Application of the Commission's Recommendations for the Protection of People in Emergency Exposure Situations. ICRP Publication 109. Ann. ICRP 39 (1), at pgs. 65-66. [**ICRP Publication 109**]

[57] Health Canada's Guidelines for Intervention During a Nuclear Emergency (H46-2/03-326E, 2003), at pg. 18.

[58] Pontiac MRC, Regional response plan to the nuclear emergencies for the Chalk River Laboratories of the Atomic Energy Canada Limited (LCR-AECL): Implementation plan for the municipalities of the Pontiac MRC, 2012 (non-official translation), at 3.3.2 (pg. 25). [**Implementation plan for the municipalities of the Pontiac MRC**]

RECOMMENDATION 8: CELA recommends that the CNSC require CNL, in conjunction with regional emergency response officials, to include in its outreach material to the public, explanations about the capability of sheltering and its limitations as described in the IAEA Guide GS-G-2.1 and to reinforce instructions on steps to take for rapid and effective evacuation in the case of a significant emergency.

Realistic Plans for Evacuation

According to the RHRP, evacuation is the controlled removal of people from an identified area to avoid or reduce exposure to a hazard. Evacuation before emissions have started is the most effective protective measure in the event of a nuclear emergency because it protects the whole body from all radionuclides through all exposure pathways.[59]

The Canadian Guidelines for Intervention during a Nuclear Emergency describe evacuation as having the "potential to avert most or all doses if carried out in the pre-release phase of an accident" and "is effective for reducing exposures in cases where the release is of uncertain size or duration."[60] Zones where " the lack of time available in which to make decisions and implement them successfully, may make it necessary to take prompt precautionary actions, even when there is only limited information about the accident. Consequently, evacuation may be initiated in conjunction with preventative sheltering and iodine prophylaxis, even when there is a mere threat of release."[61]

Even though the LH-DR Emergency Plan describes the possibility of conditions that would warrant an evacuation as extremely unlikely, the plan does provide some guidance in the event monitoring indicates significant ground contamination or if prolonged sheltering is expected.[62]

Deep River shall ensure the availability of Reception and Evacuee centres under the LH-DR Emergency Plan, while the Municipality of Sheenboro shall do so under the Implementation plan for the municipalities of the Pontiac MRC.[63] Evacuation of schools in Ontario will proceed to the Reception/Evacuee centres, where the students will remain the responsibility of school staff until such time as they are released to their parents or guardians. Health care facilities will be evacuated to prearranged health care facilities outside the PZ. In Ontario, where assistance is needed, both Laurentian Hills and Deep River will make available medical transfer services for residents requiring special transportation. The rest of the population within the PZ is expected to evacuate under their own arrangements. The Ontario municipalities will advise residents through public education efforts that they should make arrangements for sharing transportation and will endeavour to make arrangements for additional transportation if necessary.[64]

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[59] RHRP, at pg. 58; KI Guidelines, at pg. 4.

[60] Health Canada, Canadian Guidelines for Intervention During a Nuclear Emergency, 2003, at pg. 18. http://www.hc-sc.gc.ca/ewh-semt/alt_formats/hecs-sesc/pdf/pubs/radiation/guide-03/interventions-eng.pdf

[61] *Ibid*. at pg. 18.

[62] LH-DR Nuclear Emergency Plan, pg. 43; Implementing Plan for Chalk River Laboratories, pg. 29.

[63] Implementation plan for the municipalities of the Pontiac MRC, at 3.3.3 (pg. 26).

[64] LH/DR Nuclear Emergency Plan, pg. 43; Implementing Plan for Chalk River Laboratories, pgs. 29-30.

A public education poster for PZ residents in Ontario provides the following additional information with respect to evacuating:[65]

- Leave your furnace on (if it is safe to do so) in the winter months.
- If you take pets with you, ensue you have a leash, muzzle, harness, cage, etc
- Lock all doors and windows.
- Take personal items: cash, credit cards, clothing, medical supplies etc.
- Drive to the Reception Centre (Deep River Arena). Police will provide direction.
- If you do not have a ride, ask a neighbor or friend.

CELA notes that it is not evident from either the Implementing Plan for Chalk River, the LH-DR Emergency Plan, or the disseminated public information what the plans are for "medical transfer services" and "additional transportation if necessary", and where those plans would be located by members of the public.

RECOMMENDATION 9: CELA recommends that the CNSC require that the public clearly understand what plans are in place to assist them with evacuation from the PZ if they do not have their own transportation. What those plans are should be clearly specified in the designated municipalities' emergency plans, and widely communicated to the public in outreach and education.

CELA is concerned with the ability of people without cars to evacuate. The U.S. Nuclear Regulatory Commission, in its Criteria for Development of Evacuation Time Estimate Studies, requires explicit calculation of numbers of people who would need to be evacuated. This includes population estimates of:[66]

1. Permanent Residents and Transient Population – Permanent residents include all people having a residence in the area. The transient population includes tourists, shoppers, employees, etc., who visit but do not reside in the area.
2. Transit Dependent Permanent Residents – Permanent residents who do not have access to a vehicle or are dependent upon help from outside the home to evacuate.
3. Special Facility Residents – Residents of nursing homes, assisted living centers, and those confined to hospitals, jails, prisons, etc.
4. Schools – All private and public educational facilities within the EPZ. Colleges and universities should be assessed on a case-by-case basis, recognizing that college students typically have access to a vehicle.

Transit Dependent Permanent Residents include households with: [67]

- no vehicles;
- unsupervised latchkey children;
- one vehicle at work that would not return;

[65] Laurentian Hills – Deep River Nuclear Emergency Preparedness Committee, Responding to a Nuclear Emergency (Poster), 2014.
[66] U.S. Nuclear Regulatory Commission, Criteria for Development of Evacuation Time Estimate Studies, NUREG/CR-7002, 2011, at pg. 11. http://pbadupws.nrc.gov/docs/ML1130/ML113010515.pdf [**NUREG/CR-7002**]
[67] *Ibid*. at pgs. 13-14.

- residents who have limitations on driving such as the elderly who do not drive at night;
- specialized transportation needs such as wheelchair vans or ambulances.

It also specifies that a summary of the total number of vehicles available to support evacuation of transit dependent residents, as well as people with disabilities and those with access and functional needs, not residing in special facilities should be provided.

REGDOC 2.10.2 requires the licensee to "collaborate with the municipal or regional authorities to develop and maintain public evacuation time estimates based on current census data, and future population growth projections on a per-decade estimation until end of life of the facility."[68]

While the Implementing Plan for Chalk River Laboratories and the LH-DR Emergency Plan do provide a breakdown of the population for each sector (it is 4 years old and should be updated),[69] the breakdown does not include numbers of transit dependent residents. A related question is the sufficiency of arrangements for transportation of residents of special facilities and schools during an evacuation. The Criteria for Development of Evacuation Time Estimate Studies provides that the numbers of residents and students should be calculated and numbers of bus runs should be calculated in evacuation time estimates.[70]

The Implementing Plan for Chalk River Laboratories and the LH-DR Emergency plan states that the School Boards are to develop their emergency plans for movement of students to pre-arranged host schools and if necessary to Monitoring and Decontamination Units; and that hospitals, nursing homes, and other institutions are to have pre-arranged reciprocal arrangements with like facilities outside the PZ to accommodate their residents.[71] Students are to be the responsibility of their school staff until collected from the host school by their guardians / parents. CELA questions whether guardians or parents in the PZ are aware of these arrangements, and are reminded of them periodically. Questions of modes of transportation for those lacking personal vehicles should be answered clearly, to provide advance information to parents on how to collect their children. It is not evident in the LH-DR Emergency plan if all of these arrangements are currently in place.

The RHRP states that the "health system of the communities and surrounding regions hosting evacuees may be greatly impacted by the influx of evacuees." As a consequence, the host communities and surrounding regions will require health surge capacity management plans when it comes to planning for health care services at reception and evacuee centres.[72] Neither the Implementing Plan for Chalk River Laboratories, the Implementation plan for the municipalities of the Pontiac MRC, nor the LH-DR Emergency plan require the development of health surge capacity management plans at reception and evacuee centres.

Finally, the RHRP's direction on evacuation contemplates two possible scenarios: General Evacuation and Selective Evacuation. A general evacuation would require all persons in the designated area to evacuate

[68] REGDOC 2.10.1, at pg. 11.
[69] LH-DR Nuclear Emergency Plan, pg. 43; Implementing Plan for Chalk River Laboratories, pg. 50.
[70] NUREG/CR-7002, at pg. 14.
[71] LH-DR Nuclear Emergency Plan, pg. 30; Implementing Plan for Chalk River Laboratories, pg. 39.
[72] RHRP, at pg. 37.

immediately. This situation could occur if the event is sudden; such as an unexpected emission from a nuclear facility. Selective evacuation involves specific population groups being evacuated in anticipation of a general evacuation later, e.g., seriously ill patients in hospitals, bedridden residents of nursing homes, or residents/persons with disabilities. These evacuees may need to be evacuated directly to an appropriate facility outside the affected area [73] Neither the Implementing Plan for Chalk River Laboratories, the Implementation plan for the municipalities of the Pontiac MRC, nor the LH-DR Emergency plan account for evacuation scenarios that involve evacuees that may require selective evacuation.

RECOMMENDATION 10: CELA recommends that the CNSC require the Province and designated municipalities to update their emergency response plans to conform to the requirements under the RHRP for evacuation scenarios that contemplate the needs of vulnerable members of the population.

RECOMMENDATION 11: As CELA has recommended in the past, the CNSC should require the designated municipalities and CNL to communicate to the public in annual outreach and education, the fact that the nuclear emergency response plans expect the public to make their own arrangements in the event of evacuation, and for those who cannot, what is expected to be provided by the municipalities. The appropriateness of this approach should further be discussed with the public in terms of future nuclear emergency planning.

As noted earlier under the topic of sheltering, a significant issue of ongoing concern with all of the evacuation time estimates is that in the event of an early release, there would be considerable periods of exposure to the evacuating public. This is not acknowledged by CNL in its submissions. This is no doubt due to CNL's assumption that there will not be a severe catastrophic accident with early release and it does not use such an accident in its emergency planning basis.

RECOMMENDATION 12: CELA recommends that CNSC should require CNL to conduct studies and to work with offsite emergency responders, the municipalities and the Province to ensure that there are realistic evacuation plans in the case of a severe accident with early large release, as well as in the case of plans for 20 kilometer and 50 kilometer evacuation zones around the CRL.

Regulatory Oversight Includes Assessment of Emergency Preparedness

CELA urges the CNSC to exercise its role as regulator in respect of emergency planning in response to nuclear accident threats at CRL. CELA urges the CNSC to exercise a stringent oversight role as to whether emergency planning and preparedness have been proven prior to exercising its discretion to amend and provide an extension to the operating licence for CRL.

[73] *Ibid*. at pgs. 58-59.

The IAEA Standard, Preparedness and Response for a Nuclear or Radiological Emergency, Series No. GS-R-2, Safety Standards sets out expectations as to the responsibility of the regulator. It is the regulator's responsibility, among other things, to do the following:[74]

- The regulatory body shall require that arrangements for preparedness and response be in place for the on-site area for any practice or source that could necessitate an emergency intervention.
- The regulatory body shall ensure that such emergency arrangements are integrated with those of other response organizations.
- The regulatory body shall ensure that such emergency arrangements provide a reasonable assurance of an effective response, in compliance with these requirements, in the case of a nuclear or radiological emergency.
- The regulatory body shall require that the emergency arrangements "shall be tested in an exercise before the commencement of operation [of a new practice]. There shall thereafter at suitable intervals be exercises of the emergency [arrangements], some of which shall be witnessed by the regulatory body."
- In fulfilling its statutory obligations, the regulatory body… shall establish, promote or adopt regulations and guides upon which its regulatory actions are based… shall provide for issuing, amending, suspending or revoking authorizations, subject to any necessary conditions, that are clear and unambiguous and which shall specify (unless elsewhere specified) … the requirements for incident reporting…and emergency preparedness arrangements.
- In planning for, and in the event of [a nuclear or radiological emergency], the regulatory body shall act as an adviser to the government.
- The regulatory body shall ensure that the co-ordinated arrangements are implemented adequately by the operators.

The IAEA Integrated Regulatory Review Service noted that there are a multiplicity of agencies and levels of government with responsibilities in nuclear emergency planning in Canada and recommended that the CNSC should "verify the requirements and standards described in the offsite emergency plans are met, through tests and assessments."[75]

RECOMMENDATION 13: The CNSC should not grant the licence to CNL beyond the current licence period without verifying "through tests and assessments" the adequacy of the emergency plans in place for CRL, both on-site and off-site, to respond to severe nuclear emergencies.

Conclusion

The adequacy of emergency planning preparedness and readiness is one of the most fundamental issues to be assessed by the CNSC in deciding the outcome of this application. Based on the issues reviewed

[74] IAEA, IAEA Safety Standards, Preparedness and Response for a Nuclear or Radiological Emergency, Series No. GS-R-2, (Vienna, 2002), at paras. 3.8 to 3.12. http://www-pub.iaea.org/MTCD/publications/PDF/Pub1133_scr.pdf

[75] IAEA, Report of Integrated Regulatory Review Service (IRRS) Follow Up Mission to Canada, November 28 – December 9, 2011 (IAEA-NS-IRRS-2011/08), at pgs. 58-59. http://nuclearsafety.gc.ca/eng/pdfs/irrs/2011-IRRS-Follow-up-Mission-to-Canada-Report-IAEA-NS-IRRS-2011-08-eng.pdf

herein, CELA submits that the application for an extension of its nuclear research and test establishment licence should be denied at this hearing until the recommendations in this submission are implemented to the standards required by REGDOC 2.10.1, current scientific studies, and international standards; and that the nuclear research and test establishment licence should be restricted to October 31, 2016. CELA further submits that CNL's request to remove licence condition 16.1 be denied until all SCAs attain a minimum performance rating of SA.