

# Emergency Planning at Pickering A & B Nuclear Generating Station

## Canadian Environmental Law Association

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CNSC Hearing on  
Emergency Planning at  
Pickering A & B Nuclear  
Generating Station

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Presentation to CNSC Licence Hearing

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Canadian  
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Association

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# About CELA

- CELA was federally incorporated in 1970 as a not for profit organization dedicated to using and improving laws to protect the environment
- CELA is also an Ontario Legal Aid clinic with a mandate for client representation, advice, law reform, public legal education and community outreach
- Our priorities presently focus on environmental equity, environmental health, safe and sustainable energy, safe and sustainable water, community planning and sustainability and local to global issues.

# Context for CELA's submission to CNSC

- OPG is seeking approval for an extension of its licence as a combined five year licence for the Pickering A and B nuclear generating stations. OPG intends thereafter to seek a further licence in 2018.
- In this licence, OPG seeks to operate the plant beyond the design life of the Pickering B reactors' pressure tubes and other components.
- CELA's focus in this presentation is on whether the CNSC should grant the requested licence in light of the question of the adequacy of emergency planning at the Pickering site, and in light of the population size in the vicinity of the site.

# Context for examining emergency planning

- Sufficiently detailed nuclear emergency planning and preparedness is essential to help prevent the widespread health and safety consequences that would otherwise result after a severe or catastrophic accident with widespread release of radioactive substances.
- The aim of emergency planning should be to avoid as many of the health effects as possible. In a catastrophic case this can only happen if emergency planning is sufficiently detailed, implemented and resourced for that type of accident.
- CELA has serious concerns about the sufficiency of emergency planning and preparedness presently in place surrounding the Pickering NGS.

# Methodology

- CELA has built upon work done for the previous Darlington refurbishment EA screening hearing, in which we examined the question of emergency planning in Durham at that plant.
- With assistance from an award from the CNSC's funding panel, CELA retained counsel Kyra Bell-Pasht to systematically research and compile international, federal, provincial and municipal nuclear emergency planning standards, guidelines and requirements. These materials will be housed at the Resource Library for the Environment and the Law, located at CELA's offices following this hearing, and available for researchers and members of the public to access.
- CELA utilized these materials to review the history of the basis of emergency planning in Ontario, and to compare the current state of emergency readiness at Pickering with these inter-jurisdictional standards, guidelines and recommendations.

# Main Conclusions

- The historic emergency planning basis in Ontario was insufficient, in that it planned and prepared for a less severe accident in which there could be one casualty at the plant boundary, but not for severe, multi-unit accidents; nor for other versions of catastrophic nuclear accidents with either early release or widespread release of radioactive contaminants.
- The basis for this approach was a combination of beliefs that more severe accidents were unlikely, as well as that preparing for a more severe accident was too expensive.
- Post Fukushima, this type of approach is no longer publicly acceptable nor rational and detailed preparation for catastrophic type nuclear accidents must be in place in Ontario such that there would be a realistic opportunity to massively prevent serious human health impacts. If this cannot be done, the plants should not operate.

# Decision Requested

- As will be explained in further detail in this presentation, CELA requests that the CNSC deny OPG the requested licence to operate the Pickering A and B plants beyond 2014.
- The reasons for this request include the lack of sufficient emergency preparedness; the incomplete information base for this decision; the increased risks from the aging station and the unacceptability of incurring those risks beyond the design life of the plant in a highly populated region.
- CELA requests that the CNSC ask OPG to prepare and submit an application to close and decommission the Pickering station as of 2014 when the plant reaches its design life of 210,000 “equivalent fuel power hours” at the Pickering B side.

# CNSC authority over emergency planning

- CELA echoes recommendations made by the Fukushima Task Force and the IRSS to the CNSC to improve the regulatory framework for nuclear emergency planning; this should be done forthwith
- However, CELA submits that even now, CNSC has the authority under its Act to impose terms and conditions in respect of emergency planning and preparedness as condition of licensing nuclear plant operations



# Requirements of the NSCA

- The purpose of the Nuclear Safety Control Act is in part:
- to provide for
  - (a) the limitation, to a reasonable level and in a manner that is consistent with Canada's international obligations, of the risks to national security, the health and safety of persons and the environment that are associated with the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information; ...

(NSCA Section 3(a))

# NSCA cont'd

- The objects of the Canadian Nuclear Safety Commission are in part:
  - (a) to regulate the development, production and use of nuclear energy and the production, possession and use of nuclear substances, prescribed equipment and prescribed information in order to
    - (i) prevent unreasonable risk, to the environment and to the health and safety of persons, associated with that development, production, possession or use,
    - (ii) prevent unreasonable risk to national security associated with that development, production, possession or use, and
    - (iii) achieve conformity with measures of control and international obligations to which Canada has agreed; (NSCA s. 9(a))

# NSCA cont'd

- Among the Commission's powers and responsibilities are those provided in section 24(4) & (5) of the NSCA:
  - (4) No licence shall be issued, renewed, amended or replaced — and no authorization to transfer one given — unless, in the opinion of the Commission, the applicant or, in the case of an application for an authorization to transfer the licence, the transferee
    - (a) is qualified to carry on the activity that the licence will authorize the licensee to carry on; and
    - (b) will, in carrying on that activity, make adequate provision for the protection of the environment, the health and safety of persons and the maintenance of national security and measures required to implement international obligations to which Canada has agreed.
  - (5) A licence may contain any term or condition that the Commission considers necessary for the purposes of this Act, including a condition that the applicant provide a financial guarantee in a form that is acceptable to the Commission.

# Responsibility of CNSC as Regulator in respect of Emergency Planning

- Further reinforcement of the responsibility of the CNSC as regulator is contained in the provisions of the International Atomic Energy Agency's Standards document IAEA GS-R-2, "Preparedness and Response for a Nuclear or Radiological Emergency" (Vienna 2002)
- Extensive requirements are specified for the regulatory body in respect of emergency planning requirements.
- These include requiring arrangements to be in place on-site; that they are integrated with other response organizations; that those arrangements provide a reasonable assurance of an effective response; that they are tested; that there are regulations and guides; that coordinated arrangements are implemented adequately. (page 64 and 74 of CELA submission)

# CNSC responsibilities for emergency planning

- The Fukushima Task Force and the IRSS report also discussed the lack of specific regulatory requirements for operators for emergency planning; and the lack of specific and detailed requirements, as well as lack of sufficient regulatory oversight given what they called a “gap” in the regulatory framework.
- CELA agrees that CNSC documents G-225 and RD-353 provide little specific guidance or content for specific regulatory oversight.
- CNSC should require submission of the offsite nuclear emergency plans for Pickering to it for review before considering this licence.

# Lessons from Fukushima

“The government, the regulators, TEPCO management, and the Kantei lacked the preparation and the mindset to efficiently operate an emergency response to an accident of this scope. None, therefore, were effective in preventing or limiting the consequential damage.”

- A number of credible reviews of the Fukushima accident noted that the consequences of not taking catastrophic accidents seriously, explicitly including lack of emergency preparedness for a large scale accident was a key factor in exacerbating the tragedy.
- An example is the Japanese Diet’s independent commission (at 18).

# Lessons from Fukushima cont`d

- Some areas as far away 50 km also had to be evacuated because of high radiation levels and highest radiation levels were not necessarily where expected
- There were massive “voluntary” evacuations beyond the 20 km zone especially women and children (think Toronto).
- Fukushima demonstrated a need for capacity for independent monitoring following an accident
- Communication and official credibility were major downfalls during the Fukushima events and increased the adverse consequences to the public

# Why does emergency planning matter

- The International Commission on Radiological Protection in Publication 109 states that dose and exposure pathways are likely initially a relatively high dose rate with inhalation of short-lived beta/gamma emitters during dispersion of the plume; followed by days or weeks when I-131 dominates the exposure {I-131 is also important in the early part of a release}; followed by external irradiation from contamination deposited in the environment and ingestion from direct contamination on crops and milk. (See CELA submission at 25)
- Emergency planning aims to avoid or reduce these exposures



# Public Alerting: Current Plans Aren't Even Implemented



**Canadian Nuclear Safety Commission**  
nuclearsafety.gc.ca

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## Spotlight on Ontario public alerting systems

March 20, 2012

Local and provincial authorities have been testing and improving public alerting systems near the Pickering and Darlington nuclear power plants; the Canadian Nuclear Safety Commission (CNSC) is tracking progress towards meeting current provincial standards.

On March 28, the [CNSC is holding a public meeting \(PDF\)](#), available via webcast, to discuss the status of the public alerting system for the City of Pickering and Durham Region. Representatives from Emergency Management Ontario (EMO) will also be in attendance.

At the last meeting held in September 2011, Commission Tribunal members expressed concern that not all [provincial requirements](#) for nuclear emergency public alerting were met. Requirements mandate that practically 100% of the population in the 3 km radius (Contiguous Zone) from the power plants - both indoor and outdoor - must be warned of an alert within 15 minutes. Specific requirements are also in place for the 10 km zone (Primary Zone).

Following testing in recent years, local authorities confirmed that sirens and phone



The Pickering Nuclear Generation Station is located

- IAEA Safety Guide GS-G-2.1, “Arrangements for Preparedness for Nuclear or Radiological Emergency”, 2007, contains Response Time Objectives for a number of matters including alerting
- The Pickering alerting systems do not yet meet these standards

# Alerting

- The Provincial Nuclear Emergency Response Plan, 2009, contains requirements which could, if effectively implemented, ensure that the IAEA Guide is met in terms of alerting times.
- However, the alerting within 3 km of Pickering is only now apparently meeting the response time of alerting the public to take initial protective measures within 15 minutes of deciding to initiate the alerting system. The 10 km zone around Pickering, which is supposed to be able to be alerted “on an area-wide basis” in that same time frame of 15 minutes is not yet completely in place according to the CMDs.

# Potassium Iodide (KI)

- KI is important because its ingestion helps to block uptake of radioactive iodine in case of a severe offsite accident.
- Health Canada' Guidelines for Intervention during a Nuclear Emergency, 2003, state that “once in the bloodstream, about 20% of the iodine is absorbed by the thyroid...it is particularly susceptible to beta and gamma irradiation from radioisotopes of iodine, especially I-131.” (at 21)
- ICRP states that it is a short-term measure, and IAEA Guide GS-G-2.1 states that it must be taken before or soon after the intake of radioiodine; that its effectiveness diminishes rapidly after the exposure; the ICRP confirms this in its publications.(See CELA submission at 30-33).

# Potassium Iodide Distribution

- CELA calls on the CNSC to require OPG, as a condition of licence, so long as the Pickering plants are operating, to work with the municipalities to ensure 100% **pre-distribution** of KI to all residents in the 10 km zones around Pickering both within the Region of Durham and within the City of Toronto.
- Without pre-distribution, KI stockpiles will effectively be of very little use. KI must be taken just before or in the immediate commencement of a release.
- The CNSC's Fukushima Task Force noted that the current approach of stocking at local pharmacies as opposed to pre-distribution "has not been confirmed".

# KI Distribution cont'd

- The French nuclear regulator's representative to the IAEA nuclear regulator's conference hosted by the CNSC this past April in Ottawa stated that they issued coupons, but on discovering very little uptake, took the step of mailing KI to all households who had not obtained it to ensure essentially 100% coverage.
- CELA also has concerns about the apparent inconsistencies between the Durham and Toronto plans in respect of KI, and in particular the lack of comparable information and protocols in Toronto as outlined in Durham's Annex D to the Durham Nuclear Emergency Response Plan. (CELA submission at pages 32-33.)

# Sheltering in place

- There is a serious lack of clear information on sheltering in the emergency plans applicable to Pickering. This is critical, because IAEA Guide GS-G-2.1 points out that “typical European and North American homes and their basements may not provide adequate protection”.
- ICRP Publication 109 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.”

# Sheltering cont'd

- The publications state that “substantial” shelter may be found in the halls of “large multi-story buildings or large masonry structures away from walls or window”; this is for short periods of time of up to a day subject to monitoring.
- The Durham Nuclear Emergency Plan, 2011, at section 4.7.1 provides for sheltering without acknowledging the types of limitations set out by the IAEA Guide or ICRP publications; there is no discussion of the type of building, time frame or effectiveness. It does provide direction to close doors, dampers and windows and to turn off furnaces and air conditioners and does recommend going to a basement or ground floor room with no windows.

# Sheltering recommendation

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



# Medical Treatment and Availability

- The IAEA Safety Guide GS-G-2.1 states that there should be a referral hospital outside of the ``UPZ`` (Urgent Protective Zone – analogous to Ontario`s Primary Zone) that can provide “highly specialized treatment for a limited number of exposed and/or contaminated persons...” (at 4.46)
- It has not been possible for CELA to compare the provisions in place with this requirement since the province`s Radiation Health Response Plan is apparently not yet completed and thus not available to us; similarly this appears to be the case for Toronto and Durham.

# Medical treatment and decontamination

- It is not obvious that there are plans in place to treat members of the public beyond decontamination and assessment centres
- It is not evident as to what numbers of people could be treated at such facilities and whether they would be overwhelmed with more than a few cases
- It is not clear that appropriate and sufficient ambulance transport is in place

# Size of Emergency Planning Zones

- CELA recommends that the sizes of the “Primary Zone” (10 km) and the “Secondary Zone” (50 km primarily for ingestion) should be re-visited in the emergency plan for Pickering as a condition of licence
- These zones have been in place, and not re-visited, since before the unfortunate accidents at Chernobyl and Fukushima
- The Fukushima Task Force report noted that at day 5 after the onset of the Fukushima accident, authorities extended the evacuation zone to 30 km around the plant. One month later, some residents at even greater distances were moved as a result of discovering higher levels of radiation in those areas.

# Size of Emergency Planning Zones

- By way of comparison to Ontario, the Fukushima Task Force Report indicated that Quebec's Ingestion Control Zone is 70 km.
- CELA submits that if emergency planning were undertaken for severe offsite multi-unit accidents, as recommended by the CNSC Fukushima Task Force report (at page 39), it would be evident that emergency planning zones must extend significantly beyond their current limits. CELA submits that the 10 km Primary zone should be extended to 30 km and the 50 km Secondary zone should be extended to 100 km.

# Evacuation

- ICRP Publication 109 indicates that the purpose of evacuation is to provide “rapid, temporary removal of people from an area to avoid or reduce short-term radiation exposure in an emergency exposure situation.”
- It also states that it is “most effective if it can be taken as a precautionary measure before there is any significant release of radioactive material.” (at page 66)

# Evacuation continued

- Health Canada's Guidelines for Intervention indicates that “the goal of evacuation is to avert elevated short-term doses arising mainly from the radioactive plume (external irradiation and inhalation) and from radionuclides deposited on the ground (external irradiation). Evacuation has the potential to avert most or all doses if carried out in the pre-release phase of an accident. Evacuation is effective for reducing exposures in cases where the release is of uncertain size or duration.” (at 18)

# Evacuation at Pickering

- The Pickering A Safety Report noted that a 50 km radius of Pickering includes almost all of Metro Toronto, the southeast part of the Regional Municipality of York and the Regional Municipality of Durham. In 2001, 3.2 million people lived within 40 km of the Pickering plant. (At p. 40)
- The population within the 10 km primary zone for the Pickering NGS totals 256,361 people, (2006 population numbers), approximately 60,000 of whom live within the City of Toronto sectors of the primary zone. When Pickering NGS employees are included, the total is 260,861.

# Pickering evacuation cont'd

- These population figures do not include the 15 km or 20 km population numbers in the event that evacuations were ordered for those distances. Nor do these figures include significant numbers of “shadow evacuations”, meaning people choosing voluntarily to leave the area beyond the officially declared evacuation zone.
- By 2026, the population of Durham Region is projected to be 949,100 according to the Pickering A and B Safety Reports.
- A critical issue to determine, then, in order to evaluate effectiveness of evacuation as a protective measure in various scenarios is the time required for evacuation.



# Evacuation Times

- The Durham Region Nuclear Emergency Evacuation Information, Annex B to the DRNERP sets out calculated evacuation times in various scenarios, by sector. (Annex B is dated 2008.) The highest times to evacuate vary by scenario and range from 4.77 hours up to 36.58 hours in one scenario; several scenarios exceed 20 hours.

# Evacuation times cont'd

- There are discrepancies between the DRNERP estimates and OPG's Evacuation Time Estimates Technical Support Document for the Pickering B Refurbishment application (2008) which calculated much lower times; meanwhile CNSC staff submission CMD 13-H2 indicated that CNSC obtained an independent expert review of the 2008 study and based on that review, "it can be conservatively estimated that the 10 km zone could be evacuated in less than 13.5 hours using projected regional data."
- It is far from transparent to what degree non-car owning residents were included in the OPG and CNSC peer review calculations.

# Evacuation logistics

- The ability of people without cars to evacuate is a significant concern.
- The U.S. Nuclear Regulatory Commission requires explicit calculation of numbers of households with no vehicles; with unsupervised latchkey children; with one vehicle at work that would not return; with residents who have limitations on driving such as elderly who do not drive at night; with 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, and people with accessibility needs must be done.

# Evacuation logistics cont'd

- The Pickering Implementation Plan under the PNERP provides that both Toronto and Durham are to provide for mass transportation.
- The TNERP states that evacuees who require transportation to leave the Primary Zone will be assisted “according to the Mass Evacuation Transportation OSF” operational support function.
- CELA has not yet been able to obtain this Plan under the TNERP and presumes that it is not ready yet since Toronto EMO sent CELA the available Operational Support Function plans and Annexes in April, 2013, along with the advice that the rest of them are not yet ready.

# Evacuation logistics cont'd

- Similarly, the DNERP, 2011 states that “Durham Region must have a plan for the pickup of people without vehicles and their transportation out of the PZ.” It is not evident in the Durham Plan what those plans are or where those plans would be located by members of the public.
- CELA recommends that the public should clearly understand what plans are in place to assist them with evacuation from the Primary Zone if they do not have their own transportation. What those plans are should be clearly specified in the Durham and Toronto Nuclear Emergency Plans, and widely communicated to the public in outreach and education.

# Evacuation logistics cont'd

- In the Durham Region Nuclear Evacuation Information Annex B, Jan. 2008, lists for each sector, the special care facilities (child cares, retirement homes), schools, (all with numbers of residents, students, staff,) as well as recreation centres, parks, and locations of emergency services, works, services, and vital services such as health centres. It also notes motels and hotels when present in the sector.

# Toronto evacuation plans

- It is not apparent that the Toronto Nuclear Emergency Response Plan has collected comparable information for these populations of vulnerable residents, and this should be done.
- The Toronto NERP states that the City is to assist the School Boards to develop their emergency plans for movement of students to pre-arranged host schools and if necessary to Monitoring and Decontamination Units; and that Long Term Care Facilities are to have pre-arranged reciprocal arrangements with like facilities outside the “Hot Zone” to accommodate their residents. (at 4.7.3)

# School evacuation in Toronto

- Students are to be the responsibility of their school staff until collected from the host school by their guardians / parents.
- CELA questions whether parents in the Primary Zone are aware of these arrangements, and reminded of them periodically. Questions as to methods of transportation for those lacking personal vehicles, or whose household vehicles cannot return due to the evacuation should be answered clearly, to provide advance information to parents as to how they will be able to collect their children. It is not evident in the Toronto NERP if all of these arrangements are currently in place; CELA was advised that a number of Appendices were still in preparation.



# Traffic routes in evacuation

- The Durham Emergency Evacuation Information, Appendix A, notes an optimal evacuation route for each sector.
- The Toronto Emergency Response Plan states that there is to be a Joint Traffic Control Plan developed by a Joint Traffic Control Committee as provided for in the Pickering Implementation Plan under the PNERP, 2009 (referenced at 4.6.3 of the Toronto plan.) However, it is not apparent whether the Joint Traffic Control Plan is completed yet as it was not among the TNERP documents sent to CELA by Toronto EMO in April, 2013. It is supposed to provide for priority evacuation of any Response Sectors and timing and order of sector evacuations is to be determined by the PEOC in conjunction with the Joint Traffic Control Committee. (4.9.3, 4.9.4 of the Toronto Plan).

# Evacuation routes cont'd

- In the event of Full Activation of the emergency plans, both the Toronto and Durham plans note that the main road and rail routes through the Primary Zone will be closed to through traffic: Highway 401, Highway 2, CN Rail and CP Rail. (TNERP at 4.6)
- In addition the Lake Sectors in the Primary Zone will be cleared of boats through Canadian Coast Guard and Toronto and Durham Police marine units.
- It is not clear that members of the public know in general that in the event of an evacuation they are expected to “make their own arrangements for food and lodging” and that the host communities will make arrangements for those “without resources”. (DNERP, 2011 at 4.8.4 and 4.8.7; TNERP, 2012, at 4. 7.1 (e)).

# Evacuation arrangements

- CELA recommends that the CNSC should require OPG 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.

# Early release and evacuation

- 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 OPG in its CMD13-H2.1 in which it states that the time estimates are “well within the anticipated “hold-up” of radio-nuclides within station containment following a nuclear event.” (at 65)
- CNSC should require OPG 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.

# Shadow Evacuation

- “Shadow evacuation” refers to the people who voluntarily leave the area following a nuclear incident or accident, beyond those who are asked by the authorities to do so. In the Fukushima accident, for example, there were considerable “shadow evacuation” populations, especially women and children.

# Shadow evacuation cont'd

- The U.S. Nuclear Regulatory Commission requires its licensees to include a shadow evacuation of twenty percent of the public to a distance of 15 miles from the Nuclear Power Plant in its traffic estimates and planning.
- The U.S. General Accounting Office has just released a report (March 2013) in which it reviewed, among other things, the extent to which the U.S. regulator, the NRC understands public awareness as to how to respond in case of a nuclear power plant emergency. It found that there had not been an evaluation of people's understanding beyond the established 10 mile emergency planning zone.

# Shadow evacuation cont'd

- The TNERP, 2012 comments that shadow evacuations may occur and contribute to evacuation times. Specific areas next to the Primary Zone are identified in the Plan. (at 4.7.1) A similar comment is included in the DNERP, 2011 (at 4.8.2).
- The Toronto plan indicates that traffic control will be initiated when the emergency requires evacuation, or “when spontaneous evacuations begin to occur.” (at 4.9)
- The 2008 OPG report on evacuation done for the Pickering refurbishment stated that it included a factor for “some portion” of shadow evacuations out to a 15 km radius from the plant. (at ES-2)

# Shadow evacuation around Pickering

- It can be expected that there could be considerable populations of people involved in shadow evacuations given the population numbers located adjacent to the 10 km Primary Zone. Another five kilometers into the City of Toronto extends even further into the former City of Scarborough, extends to approximately to Brimley Ave. and encompasses the neighbourhoods of Guildwood and Scarborough Junction. Five more km to a radius of 20 km west from the Pickering NGS extends to Toronto's Woodbine Ave. and the Don Valley Parkway north of that. It is also reasonable to assume that people will voluntarily evacuate even in greater distances throughout at least the eastern side of the City of Toronto in case of a general emergency at Pickering.



# Evaluating increased shadow evacuation

- Like the recommendation by the U.S. General Accounting Office to the U.S. Nuclear Regulatory Commission the CNSC should require the applicant to conduct a study as to the likely response of people beyond the Primary Zone at Pickering in the event that a general emergency is declared and the Primary Zone is evacuated.
- The CNSC should require OPG to evaluate the impact of increased evacuation zones of twenty and fifty kilometers on evacuation time estimates, as well as any other needed adjustments locations of Emergency Workers Centres, numbers of emergency workers required for evacuation management, traffic routes, size of evacuation centres, and locations and capacity of Decontamination and Monitoring Units, and to report its findings to the CNSC and to the provincial EMO, the City of Toronto, and the Region of Durham.

# Family reunification

- Family reunification would be one of the most significant issues that people are concerned with following an evacuation. This is recognized in the TNERP, 2012, but no provisions are included about how reunification will be accomplished other than that there will be a number of factors affecting reunification. (at 4.7.1 (d)) A similar treatment is included in the DNERP, 2011 (at 4.8.3).
- CELA recommends that CNSC direct the applicant to work with the municipalities to consult with the surrounding communities on specific plans for family reunification following evacuation in the event of a severe nuclear emergency.

# Decontamination

- IAEA Guide GS-G-2.1 outlines some approaches to radioactive decontamination. Apart from people who have been heavily contaminated, such as potentially some of those on-site, it recommends that changing clothes, showering and washing exposed skin will reduce levels of contamination and prevent further spread of contamination in a nuclear emergency. (2.2.4)
- In terms of personal monitoring and decontamination, the PNERP states that “evacuees **who are not likely to be contaminated** will be advised to evacuate...undertake self-decontamination.” Self-decontamination is described consistently with the IAEA guide.

# Decontamination cont'd

- The TNERP, 2012 states that when evacuations are underway during an emission, the first priority is to “leave the affected area as quickly as possible.”
- It states that evacuees will be advised “via an operational directive” to go to a facility for monitoring and decontamination or to self decontaminate, and that details will be provided through emergency bulletins along with advice as to where to go for follow-up “assurance monitoring”.
- The TNERP, 2012 states that “given the population density, self-decontamination may be the primary means of decontamination, if required.” (At 4.7.1 (b)).
- However, it does not contain the explanation about what self-decontamination means and how to carry it out.

# Decontamination

- The DRNERP considers the potential for contamination from loose particulate on people in the event of an ongoing emission; and also the possibility of internal contamination. (At Para. 4.10). It states that “if evacuees cannot clear the affected area before an emission, they may be directed to proceed for monitoring and decontamination.” If units for monitoring and decontamination are not yet set up, they will be advised to “go to a destination of their choice, shower and bag their clothes.” Further details and direction will be provided through the Provincial Emergency Operations Centre; the priority is to ensure people leave the affected area as soon as possible. (At Para. 4.10.4)

# Decontamination cont'd

- CELA submits that CNSC should request that OPG work with the City of Toronto to provide explanations about what “self-decontamination” means; how to do so; and recommends a statement as to its effectiveness should be included in the Toronto Nuclear Emergency Response Plan and in outreach and education to the public about implementation of the plan.

# Monitoring

- CELA recommends that the automatic “near boundary” gamma monitoring data, now apparently in place at Pickering, should be set up so as to provide automatic data exchange with the CNSC as regulator, as recommended by the IRSS and Fukushima Task Force reports.

# Control of agricultural products

- IAEA Safety Guide GS-G-2.1 outlines expectations for including arrangements to ensure that the public will be instructed not to eat or drink potentially contaminated food, milk and water in the event of a major release. It noted that radiation induced thyroid cancers following the Chernobyl accident occurred mainly **at distances more than 50 km** from the plant, and that “the most effective protective action to prevent or reduce these thyroid cancers would have been to restrict the consumption of potentially contaminated food and milk.” (At V.24)
- Similarly based on the Fukushima experience, ingestion control at distances exceeding 50 km are required.



# Control of food, water, milk after an accident

- ICRP Publication 109 outlines the preventive agricultural actions that would reduce or prevent doses from ingestion: banning consumption of locally grown food; covering open wells; sheltering animals and animal feed; control of milk; avoiding drinking of milk from animals grazing on potentially contaminated pasture; not eating fresh vegetables, fruit or other food that may have been outside during the release; monitoring of drinking water particularly in case of run-off; and continuing restrictions until sampling shows return to established limits. (at 67)

# Control of ingestion of food, water, milk cont'd

- The PNERP, 2009, includes Protection Action Levels (PALS) for ingestion control (food and water) at Annex E; and sets out the levels for foods for general consumption, milk, infant foods and drinking water at which items would be banned. It states that these effective dose PALS were “adopted by the Province in 1984 upon the recommendation of Provincial Working Group #3 and are generally consistent with Health Canada Intervention levels (2003) and IAEA Safety Series No. 115 (2004).

# Control of food, water, milk, cont'd

- The TNERP, 2012 contains an outline under both the Partial Activation and Full activation sections of the plan, with a list of potential precautionary measures to be considered by the PEOC and lists “clearing the milk storage of dairy farms; banning consumption of any item of food or water that may have been exposed outdoors; banning consumption and export of locally-produced milk, meat, produce, milk-and-meat producing animals” among the precautionary measures that may be indicated.

# Control of food, water, milk, cont'd

- The DNERP, 2011 has a brief reference to banning consumption of local water, milk, meat and produce in the section dealing with Partial Activation of the Plan, as a Precautionary Measure. It indicates that the PEOC would discuss with the Regional Emergency Operations Centre the implementation of precautionary measures and communicate them to the public by emergency bulletins issued by the PEOC. There is no mention of food and water bans in the Full Activation section of the DNERP, 2011.

# Food, Water, Milk recommendations

- CELA recommends that the CNSC request that the Provincial Nuclear Emergency Plan expand its monitoring provisions and ingestion control zones to a distance of 100 km from the NGS, and that it undertake appropriate measures to ensure that monitoring can be done following an accident within that 100 km zone for agricultural produce, foodstuffs, milk and water.
- CELA recommends that the DNERP, 2011 should explicitly outline the measures in respect of controlling ingestion food and water that may be required in the case of a severe nuclear emergency of the type outlined in ICRP Publication 109.

# Worker Safety during emergencies

- Annex C to the Durham plan states that the maximum exposure limit “may only be exceeded in cases of extreme necessity (e.g. to save life or prevent serious injury) by **volunteers** who clearly understand the level of risk they will be facing. (Annex C at 3.1.3) It is not evident how volunteers will be obtained and how their understanding of the level of risk and consent to same is to be assured. Approval from the Regional Emergency Operations Centre must be obtained before emergency workers may be dispatched into a sector where the dose is likely above 50 mSv. (Annex C at 3.1.3)

# Worker Safety during Emergencies

- The IRSS report (page 58) referenced and encouraged implementation of the Fukushima Task Force report recommendation that there be additional dose limits established for workers both during and following emergencies in Canada.
- The Fukushima Task Force, 2011 also recommended (at 54) that the CNSC review the *Radiation Protection Regulations*, section 15 as to potential revisions to “ensure consistency with international guidance.” (Section 15 provides for the exceeding of applicable dose limits during control of emergencies, and these limits are ten times higher than the limits otherwise applicable to workers as provided elsewhere in those *Regulations*.)

# Worker safety during emergencies

- The CNSC should require OPG to discuss risks of exceeding maximum exposure limits with workers in advance of any accident and report to the CNSC as to these discussions.
- Methods to review risks and obtain consent to exceed those limits should be explicitly clarified in the Durham Plan; in the meantime OPG should report to CNSC as to how it intends to explain those risks and obtain consent.
- CNSC should also require off-site emergency response organizations to conduct similar discussions with all off-site emergency responders.
- Similar provisions must be included in the Toronto Plan if it is intended that there may be emergency or other workers who volunteer to exceed maximum exposure limits.



# Worker safety during emergencies cont'd

- While not limited to the Pickering NGS, the CNSC should implement the Fukushima Task Force / IRSS recommendations to establish additional dose limits for workers during and following nuclear emergencies in Canada as soon as possible. The CNSC should consult on and propose interim worker emergency exposure limits specific to the Pickering stations in the meantime.

# Frequency scale of nuclear emergency preparedness drills

- The IAEA's IRSS Report to Canada (November – December 2011) recommended that Canada “conduct full scale emergency exercises on a periodic basis” (at pages 10 and 70.) The Fukushima Task Force Report, 2011, it noted that “the last full scale nuclear exercise in Ontario was in 2007.” (at 46)
- The Task Force further stated that “federal and provincial nuclear emergency planning authorities are not making regularly scheduled full scale NPP exercises a priority.” (At 52). This was echoed by the IRSS report which also called for full scale nuclear emergency planning drills to be conducted regularly. It indicated that this should include federal, provincial, municipal and licensee. (IRSS, Recommendation RF8)

# Frequency and scale of nuclear emergency preparedness drills

- The CNSC's Fukushima Task Force Report, 2011, found that, "Emergency response organizations are capable of responding to single-unit, beyond-design-basis events. Evaluation and revision of emergency plans in regard to multi-unit accidents and severe external events, including an assessment of the minimum complement requirements, have not been performed. As a result, it has not been conclusively demonstrated that emergency response organizations will be capable of responding effectively in a severe event and/or multi-unit accident." (at 39)
- It also found that "the performance of the emergency response organization under severe event or multi-unit accident conditions has not been challenged by designing and conducting exercises that are based on such conditions." (at 40)

# Frequency and scale of nuclear emergency planning drills

- The CNSC Staff CMD 13-H2.B stated that a “Unified Response Exercise” is planned for May 2014 and stated that “work has begun on coordinating the interfaces” between the various agencies. (At 8).
- CELA notes that this exercise will be conducted two and a half years after the receipt of the 2011 Fukushima Task Force Report and three years after the Fukushima accident. CELA does not consider this time frame to be responsive to the Task Force criticism of insufficient prioritizing in Canada of such emergency planning exercises.

# Frequency and scale of nuclear emergency planning drills

- CELA recommends that the CNSC should require annual exercises dealing with full scale severe event or multi-unit accident scenarios for each plant along with conclusive demonstration of their effectiveness as a licence condition for Pickering in this application.
- CNSC should require inclusion of members of the surrounding community and public interest organizations so as to increase input into and confidence in the results.
- Their results should be made public, along with lessons learned, and improvements recommended as a result of the exercises; and that the CNSC should require reporting of implementation of those improvements on an annual basis as part of the oversight that it should undertake with respect to offsite emergency planning.

# Nuclear Emergency Response times

- IAEA Safety Requirements GSR-R-2, “Preparedness and Response for a Nuclear or Radiological Emergency” states that “For facilities in threat category I or II {which includes nuclear power plants} the threat assessment shall demonstrate for the range of postulated emergencies that identification, notification, activation and other initial response actions **can be performed in time** to achieve the practical goals (see para.2.3) of emergency response.” (At Paragraph 4.26.) (Emphasis added).
- The practical goals in Para. 2.3 include among others, regaining control of the situation, preventing and mitigating consequences; and preventing health effects, both as to early injuries and as to long term effects such as cancers.

# Nuclear emergency response times cont'd

- IAEA GSR-R-2 requires, in a section on mitigative action, that “Arrangements shall include emergency operating procedures and guidance for the operator on mitigatory actions for severe conditions, for the full range of postulated emergencies, **including accidents beyond the design basis.**” (At paragraph 2.39.) (Emphasis added). However, as reviewed elsewhere in this report, OPG has focussed its emergency planning on-site for design basis accidents.

# Nuclear Emergency Response

## Times cont'd

- In particular, IAEA Guideline GS-G-2.1, “Arrangements for Preparedness for a Nuclear or Radiological Emergency” sets out Response Time Objectives (At Appendix VI, Table 12; pages 104-108). They are applicable for “selected critical response functions or tasks” for nuclear power plants and others. This IAEA Safety Standard states that they should be used as part of the performance objectives for a response capability and should be used as part of evaluation criteria for exercises.



# Nuclear Emergency Response Times

- The response times required by these IAEA Safety Requirements and Guideline documents GS-R-2 and GS-G-2.1 should be included in the Provincial and municipal emergency plans for Pickering. In particular, the CNSC should require that these response times are met and demonstrated as part of its licensing decision for the Pickering NGS.

# Nuclear Emergency Response Times

- Some of the matters of particular concern to the surrounding community in the event of a severe, beyond design basis accident, as to capacity to respond in a timely manner, and which should therefore be demonstrated by the operator; and required by the regulator to be verified include, among others (from IAEA GS-G-2.1 Table 12):
  - Classifying / declaring the emergency, within 15 minutes “from the time at which conditions indicating that emergency conditions exist are detected”
  - Notifying local authorities in the Precautionary Action Zone and the Urgent Protective Action Planning Zone, within 15 minutes from the time of declaring the emergency
  - Recommending urgent protective actions for the public on the basis of the emergency classification, within 30 minutes from the time of classifying / declaring the emergency.

# Community engagement

- IAEA Publication “Lessons Learned from the Response to Radiation Emergencies (1945 – 2010), (IAEA, August 2012) includes a comment in the chapter “providing information and issuing instructions and warnings to the public”, about the importance of providing information to the public on protective actions to be taken in event of an emergency in **advance** of any emergency for threats such as Nuclear Power Plants. They stated that “This will engender confidence – the knowledge that the officials have their interest at heart – and, by doing so, improve compliance with protective action recommendations in the event of a real emergency. In addition, there will be a better understanding of the systems used to warn them of an emergency.”

# Community engagement cont'd

- This recommendation is reinforced by the comment in ICRP Publication 109 which recommends engagement with stakeholders and discussions of the plans, including with members of the public. The rationale is that “Otherwise, it will be difficult to implement the plan effectively during the response. The overall protection strategy and its constituent individual protective measures should have been worked through with all those potentially exposed or affected, so that time and resources do not need to be expended during the emergency exposure situation itself in persuading people that this is the optimum response.” (at 42)

# Community engagement cont'd

- CELA recommends that the CNSC require extensive public engagement to be undertaken by OPG as a condition of any further operating licence of the Pickering NGS, to include specific input from the public as to, and explanation of the protective actions that may be required, why, resourcing, and how they would be communicated and in what eventualities.
- This engagement should include all aspects of emergency response and protective actions including alerting, KI ingestion, detailed review of evacuation, limits of sheltering, decontamination, medical treatment facilities, planning basis, drills, size of emergency response zones and all other matters reviewed herein.

# Siting

- One of the key requirements of the IAEA Safety Requirements Site Evaluation for Nuclear Installations, NS-R-3 (2003), is to analyze “the characteristics of the population of the region and the capability of implementing emergency plans over the projected lifetime of the plant.” (At 2).
- That document states that it is primarily concerned with low probability severe events. It states, “population growth and population distribution shall be monitored over the lifetime of the nuclear installation.” (At 3.)

# Siting cont'd

- NS-R-3 also states that, if after evaluation no measures can be taken to keep the “radiological risk to the population associated with accident conditions, including those that could lead to emergency measures being taken” acceptably low, then “the site shall be deemed unsuitable for the location of a nuclear installation of the type proposed.” (Excerpts at 9.)
- The concern with the ability to implement an emergency plan is also emphasized in the new Draft IAEA Safety Standard “Safety Aspects in Siting for Nuclear Installations”, DS433, October 10, 2011. (At 50)

## Siting cont'd

- Given the existing population density in area of Pickering (as reviewed earlier in the discussion on evacuation), the Pickering NGS is no longer a suitable site for operation of a nuclear power plant; particularly for operation of a multi-unit station. As noted earlier, Durham Region's population as a whole as of 2009 was 614,970; projected to grow to 949,100 by 2026, and within 40 km of the Pickering site were 3.2 million people back in 2001. These population numbers are too high to be located in close proximity to nuclear generating stations.



# Siting, cont'd

- CELA submits that the Pickering site would never be authorized today for a new nuclear facility. For the same reasons, neither should it be granted a licence to operate beyond the design life of the Plant. CELA submits that the Pickering NGS no longer meets the safety expectations of the public nor of siting standards by its location in such a highly populated region as a result of which expeditious evacuation is not possible.

# Zoning

- As CELA submitted in the Darlington refurbishment hearing, Official Plans for Durham Region should immediately be amended to restrict population growth in the vicinity of the Plants within 30 kilometers (the distance to which CELA recommends increasing the Primary Zone). These steps must most imminently be taken within the 10 km current Primary Zone.
- The Province should be requested to issue Minister's zoning orders to accomplish this restriction and/or to issue a statement of provincial interest with which the municipalities are required to comply.

# Safety

- The plan to operate beyond the design life of the plant is of serious safety significance.
- There are a large number of high concern safety issues facing the NGS at Pickering including aging components (see CELA's submission at pages 57-58).

# Sufficiency of the Information Base for a Decision

- There are a number of areas where the information on critical issues is not complete, and is not necessarily expected to be available by the time of the Day Two Hearing.
- CELA submits that the Panel should not make a decision on extending the operation of the Pickering Plant beyond its design life without having this additional information.
- Examples of these deficiencies in the Record are listed at pages 58 to 60 of CELA's submission and include highly significant issues that the Commission should not be delegating to its staff.

# CNSC Decision Requested

- Until these issues are addressed, the CNSC should not allow further operation / life extension of the Pickering A and B operating licence.
- Accordingly, the CNSC should not at this time exercise its authority to grant the Pickering operating licences beyond 2014.
- CELA urges the CNSC not to grant the requested Licence to Operate to OPG. Rather CELA urges that the CNSC require OPG to provide a plan for an orderly closure and decommissioning of all of the units at Pickering.

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The screenshot shows a web browser window displaying the homepage of the Canadian Environmental Law Association (CELA). The browser's address bar shows the URL <http://www.cela.ca/>. The page features the CELA logo, which consists of a stylized leaf with 'C', a sun with 'e', a house with 'L', and a water drop with 'a'. The main heading reads "Canadian Environmental Law Association" with the tagline "EQUITY. JUSTICE. HEALTH." below it. A search bar is located in the top right corner. Below the logo, there are navigation links: [HOME](#), [ABOUT CELA](#), [E-BULLETIN](#), [FRANÇAIS](#), [LIBRARY](#), and [CONTACT US](#). The main content area is divided into three columns. The left column lists: [News](#), [Publications](#), [Our Services](#), [Frequently Asked Questions](#), [CELA in the Courts](#), and [Access to Environmental Justice](#). The middle column contains two paragraphs of text. The first paragraph states: "CELA works to protect human health and our environment by seeking justice for those harmed by pollution and by working to change policies to prevent such problems in the first place. For 40 years, CELA has used legal tools to increase environmental protection and safeguard communities. As a **Legal Aid Clinic**, our top priority is to represent low income individuals and communities and to speak out for those with less influence and who receive less of a say in decision-making." The second paragraph states: "Through **landmark legal cases** CELA has helped shape government and industry approaches to pollution and other environmental threats and has forced polluters to clean up their act. CELA has also been part of shaping **innovative collaborations** to improve sustainability and human health including the Low Income Energy Network, the". The right column features a "Subscribe to our mailing list" form with a "Search" button and a "Subscribe" button. Below the form is the "Michelle's Prize Scholarship Fund in Honour of Michelle Swenarchuk" logo. At the bottom right of the page, there are links for [CELA's Lawyer Referral List](#) and [News and Events](#). A news item dated "Sep 18 2012" is titled "Bi-national Great Lakes Citizen Coalition Calls on US Agency Not to Remove Niagara-area Hazardous Waste Site From Superfund". The browser window shows several tabs, including "CELA Powerpoint Te...", "Windows Screen Sho...", and "Featured Items a...". The user's name "Kathleen Cooper" is visible in the top right corner of the browser. The browser's zoom level is set to 125%.

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