

Pickering B Refurbishment Project Questions and Answers
Latest update: August 2, 2007

Throughout the Pickering B Refurbishment and Continued Operation environmental assessment (EA) process, we have received questions and comments from the community and local stakeholders. The EA Study Report will identify and address these comments and questions, as part of the public consultation process.

Below is a compilation of the questions received from community members and interested parties and the answers provided to address those questions.

If you have a question or comment, please contact us by email at pickeringb@opg.com or by phone at 1-866-487-4600.

Question or Comment	Response
<p>What are the human health effects from the Project?</p>	<p>The Environmental Assessment (EA) Guidelines require Ontario Power Generation (OPG) to assess the effects of the project on human health. The World Health Organization (WHO) definition of “health” is used in the EA to provide a multi-dimensional approach to the assessment. WHO defines health as “a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity.”</p> <p>For a project such as this one, involving nuclear facilities, the primary considerations are the health and safety of people related to radiation and radioactivity. Preliminary assessments indicate radiation doses to people arising from refurbishment activities and ongoing operation of the Pickering B reactors are expected to be comparable to current levels, which are designed to be protective of human health.</p> <p>The EA study has assessed the likely project effects, including cumulative effects of radiation doses through various pathways (breathing, drinking and eating) on the general public and nuclear energy workers as well as non-nuclear energy workers. Potential radiation doses due to normal operations, refurbishment activities and malfunctions and accidents are described in the EA Study. Canadian radiological standards are comparable to European and International standards.</p> <p>The risks to the health of workers and the public posed by the refurbishment activities and the waste storage facilities were also raised as concerns. All refurbishment activities have been screened and evaluated for effects on workers and the general public. All potential effects have been predicted to be well within regulatory limits. OPG applies standards for radiation exposures that are more stringent than those required by Canadian regulations, and continually works to upgrade facilities and operations to meet or exceed new standards when they are revised.</p>

<p>Describe OPG's waste reduction programs.</p>	<p>Pickering Nuclear has a Low and Intermediate Level Radioactive Solid Waste (L&ILRW) Management Program that applies to all facilities at the site and on site property. The goal is to reduce the effect of radioactive waste on the environment to the lowest achievable levels by reducing volumes and improving waste processing efficiencies. A number of programs and activities are in place including initiatives to reduce solid waste. These include using washable cotton liners, rubber gloves and slip-on booties and reducing packaging at the warehouses before delivery to the station.</p>
<p>How was the list of Valued Ecosystem Components (VECs) developed for this Project?</p>	<p>Valued Ecosystem Components (VECs) are selected by stakeholders and the project team to be assessed during the Environmental Assessment (EA) because they are important local features of the environment and/or are potentially vulnerable. A preliminary list of VECs was developed by the project team based on work undertaken at the Pickering Nuclear site, including the Pickering A Return to Service EA, the Pickering Nuclear Screening Ecological Risk Assessment and the Pickering Waste Management Facility Phase II EA.</p> <p>The preliminary list of VECs was the subject of extensive stakeholder consultation. All suggested changes to the preliminary list of VECs were reviewed by technical specialists for consideration and a number of additions were made to the VEC list. Specifically, Bufflehead, Trumpeter Swan, Red Fox, and New England Aster have been added. Some of the suggestions were already included in the effects assessment methodology (public health, property values, and economic base). Others are a subset of a larger category (Rouge Park). Others, while not appropriate as VECs (e.g. biological population diversity), are addressed in the effects assessment in other ways.</p>
<p>What are the effects of the Project on the environment?</p>	<p>Each potential project related work or activity is screened to identify those that might have an effect on the environment. The outcome of the screening is a large table or matrix which lists where a project-environment interaction is likely to occur. These interactions are then further assessed to identify those that are likely to result in a measurable change on the environment, and if so to determine the nature and magnitude of that effect. A measurable change is defined as a change in the environment that is real, observable, or detectable compared with existing conditions. Only effects of measurable change are assessed.</p> <p>The majority of the potential effects from the project are within the site and local study area (i.e. within 10 km of the plant) and occur primarily during refurbishment activities (i.e. Phase 1). They are predicted to be similar to those from the Pickering A Return to Service work and can be effectively managed and/or mitigated by:</p> <ul style="list-style-type: none"> ○ Strict adherence to existing regulatory requirements; ○ Continued application of existing environmental management systems; and ○ Maintaining OPG's extensive environmental and radiological monitoring network. <p>The Environmental Assessment (EA) study considered all potential effects of the project on the</p>

	<p>atmospheric, aquatic, terrestrial and socio-economic environmental components, including effects on Lake Ontario, as required by the EA Guidelines. Recent field observations from all seasons of the year have been included as has the data collected from many years of study of the Pickering site and surrounding area.</p> <p>Valued fish species are infrequently impinged, with less than 50-150 individual fish removed from the fish population each year due to the operation of Pickering B. This small quantity of fish is not measurable compared to Lake Ontario fish populations. The largest quantity of fish impinged at Pickering B are Alewife (>85%). Alewife are non-native forage fish and the most abundant fish in Lake Ontario. The operation of Pickering B results in impingement of less than 0.5% of the Lake Ontario Alewife population, and is unlikely to affect lake fish populations, particularly considering the large variability in population.</p> <p>The thermal plume from Pickering B, with all four units operating, extends approximately four to five km either east or west of Pickering Nuclear (depending on the lake currents), and will decrease during refurbishment by as much as 50% due to reactor outages. It will return to no more than existing levels following completion of the refurbishment phase when all four units at Pickering B will be operational. However, at about this same time, Pickering A reactors (Units 2 and 3) are scheduled to shut down at their end of life, resulting in a reduced combined thermal plume. Ontario Power Generation (OPG) Nuclear is also studying ways to reduce algae clogging of its intakes, and is working with the Regions of York and Durham to assess the sources of algae and propose preventative or ameliorative measures as appropriate.</p> <p>The Pickering B Project is not expected to change what people do and enjoy about their communities and neighbourhoods. Positive effects are broad and regional in scope. The Pickering site will continue to contribute to local and regional economies and community stability. Continued involvement of people in the station's activities and ongoing communications with residents will continue to ensure that Pickering B is not an issue of concern for the vast majority of residents.</p>
<p>What effect does the Project have on climate change?</p> <p>How will climate change affect the Project?</p>	<p>The Intergovernmental Panel on Climate Change has predicted that changes to the climate in the Southern Ontario area may include:</p> <ul style="list-style-type: none"> ○ Air temperature increase by 2-5°C; ○ Lake Ontario water temperature increase by 3-5°C; ○ Water levels in the Great Lakes decrease; and ○ Increased frequency and severity of storm events. <p>The Environmental Assessment (EA) Study includes an assessment of the potential effects of climate changes on plant systems, such as the effects of:</p> <ul style="list-style-type: none"> ● Lower water levels on water intakes; ● Increased water temperatures on cooling systems; and

	<ul style="list-style-type: none"> • Increased frequency and magnitude of severe weather events on storm water management systems. <p>All of the predicted effects from a change in climate are included in the current plant design parameters.</p> <p>Ontario Power Generation's (OPG) Greenhouse Gas Emission Reduction Strategy is to operate nuclear units at the highest possible capacity factors to displace greenhouse gases that would otherwise be generated by the burning of coal and natural gas. OPG recognizes there are aspects of the operation of a nuclear facility that can produce greenhouse gases (standby generators and vehicle emissions) and has taken measures to control them. Standby generators are only operated when needed to support safe operation of the Pickering units, OPG vehicles are not allowed to run idle, there is an agreement with the Town of Pickering to operate a public transit route to the Pickering site and offices from the GO station to minimize vehicular traffic, and energy efficient lighting was retrofitted into the large open areas of the powerhouse.</p> <p>With two exceptions, all of the potential changes in environmental conditions mentioned above are addressed in the EA Study. The greenhouse gas emissions associated with the complete nuclear fuel cycle and with any potential delays in refurbishment are not assessed, as those are beyond the scope of the EA study.</p>
<p>How does the EA assess the cumulative effects of development around the Pickering site?</p>	<p>Effects of the Pickering B Project have the potential to combine and interact with effects from other projects and activities that occur during the same timeframe and that overlap geographically. These are potential cumulative effects and must also be assessed.</p> <p>During our public consultation process, a number of projects were identified by stakeholders that may have a "cumulative effect" when combined with the potential Pickering B Refurbishment Project. The cumulative effects analysis considered:</p> <ul style="list-style-type: none"> ○ Increased construction activity and related demand for workers; ○ Community population growth, including residential infilling in Pickering; ○ The potential new Pickering airport; ○ Highway 407 extension; and ○ Development of new nuclear generation at Darlington. <p>Based on the assessment of all adverse residual effects from the Pickering B project and other existing or planned projects and activities taken together, there are no residual adverse cumulative effects of radiation doses on members of the public, workers on the Pickering Nuclear property or on non-humans anticipated. Sustained shortages of workers, potentially causing delays in construction activities is considered an adverse residual cumulative effect. Further reductions in the use and enjoyment of the Waterfront Trail</p>

	<p>during the Refurbishment Phase, and further reductions in use and enjoyment of community and recreational features near the Pickering site during the Continued Operation Phase of the project are also considered adverse residual cumulative effects.</p>
<p>How has the study considered malfunctions and accidents and their impact on human health and the environment?</p>	<p>The Environmental Assessment (EA) Guidelines (section 9.2.2) for this project require Ontario Power Generation (OPG) to provide information on credible project malfunctions and accidents. OPG worked with the Canadian Nuclear Safety Commission at the outset of the EA to define the malfunctions and accident scenarios to be included in the assessment. The effects of reasonably probable conventional, radiological and nuclear malfunctions and accidents with a probability of 1 in 1 million (1×10^{-6}) or greater per year, on both humans and non-humans, are assessed.</p> <p>A number of scenarios were selected and the potential impacts on both humans and non-humans have been identified. The EA Guidelines also require OPG to assess the effects of the project on human health. The potential effects of malfunctions and accidents were assessed for nuclear energy workers, other on-site workers and members of the public.</p> <p>Potential effects of a credible nuclear accident have been assessed and the EA does not predict any adverse effects on the surrounding communities.</p>
<p>Is Pickering B suitable for refurbishment and continued operation given the physical age and potential obsolescence of its buildings and the location of the plant relative to large population centres.</p> <p>What are the risks of refurbishment?</p>	<p>Prior to obtaining a licence to refurbish the Pickering B station, Ontario Power Generation (OPG) is required to conduct an Integrated Safety Review (ISR) of the plant. The ISR, and specifically the plant condition assessments and ageing management program reviews, will determine which components require replacement/refurbishment to ensure that Pickering B will continue to meet modern high-level safety goals and applicable regulatory requirements for safe and secure operation over its operating life. In addition, all OPG nuclear plants undergo periodic safety reviews, which must be submitted to the Canadian Nuclear Safety Commission (CNSC) for review and approval as a condition of its operating licence.</p> <p>Through a review of the feasibility of refurbishing the Pickering B reactor units to extend their service lives, OPG is examining the safety, environmental, financial and logistical feasibility of life extension. Building on extensive industry experience in nuclear plant life extension and continued operations, the assessment will consider current plant conditions, refurbishment scope of work and refurbishment costs, as well as future operating costs and production levels.</p> <p>OPG recognizes that it must clearly identify the financial risks and uncertainties which accompany a project of this magnitude. Refurbishing Pickering B would be a significant investment, and its costs must be weighed against its benefits before a decision can be reached. The OPG Board of Directors will consider the cost effectiveness of refurbishing Pickering B before a final decision is taken.</p>

<p>Describe OPG’s emergency response program and responsibilities.</p>	<p>The Province of Ontario has the overall responsibility for managing the off-site response to nuclear emergencies. Ontario Power Generation (OPG), Emergency Management Ontario (part of the Ontario Ministry of Community Safety and Correctional Services) and regional and local governments work together to protect the public. Each organization has responsibility for a distinct area of emergency response. The people, plans and procedures that are put in place for a nuclear emergency response can also be called upon during more common emergencies like ice storms, train derailments or industrial accidents. Briefly, the nuclear emergency response is divided into three areas of responsibility.</p> <ul style="list-style-type: none"> • OPG’s first responsibility is to make sure our reactors are operated, maintained and designed in such a way that accidents won’t happen. If an accident occurs, our responsibility is to make sure it is controlled and radiation releases are minimized. We are also responsible for the safety of our employees. OPG also assists the Province and local municipalities with funding and planning support for their emergency programs. • Emergency Management Ontario, an agency of the provincial government, is responsible for the overall Provincial Nuclear Emergency Plan and public safety during nuclear emergencies. If a nuclear emergency were to take place the provincial government is responsible for the off-site response. It has responsibility for making decisions on the proper level of public action. <p>Regional and local municipalities also have emergency plans in place. But more importantly, it is their emergency responders; the police, fire and ambulance crews, with support from a host of other groups, who make sure the emergency plans are implemented properly.</p>
<p>Are the emergency response plans adequate given the increase in population density surrounding the plant, the proximity of the proposed Pickering airport, or any threats from terrorist activities?</p>	<p>As described earlier, a robust emergency response system is in place. Population growth projections are required to be factored into emergency response plans and the plans are also updated to ensure they reflect the current conditions, such as the development of a new residential community or an airport.</p> <p>While populations in the areas immediately surrounding Pickering Nuclear are projected to double in the period 2006 through 2060 (the expected lifespan of Pickering B if refurbishment proceeds), populations in the immediate vicinity of the Pickering site are expected to be more limited to a few condominium developments and infill housing near the GO station and the Hwy. 401 interchange at Brock Road. Ontario Power Generation (OPG) works closely with Emergency Management Ontario, the Region of Durham and the City of Toronto, providing information to assist in the continuous review and improvement of emergency plans for which these agencies are responsible.</p> <p>Emergency Management Ontario testified at the January 24th, 2007 CNSC hearing, that,</p> <p>“...The Provincial Nuclear Emergency Response Plan outlines the distance beyond the facility, in this case</p>

	<p>the Pickering Nuclear Generating Station, in which protective actions may have to be taken by the public, both for purposes of protection from a plume as well as for ingestion control purposes.... From our perspective, in terms of spatial considerations, we feel we have a robust emergency response system in place that can accommodate the entire area in question.”</p>
<p>Describe the methodology used to determine the significance of effects and consideration of human health</p>	<p>The <i>Canadian Environmental Assessment Act (CEAA)</i> requires an assessment of the “significance” of the environmental effects that are likely to occur as a result of the project.</p> <p>Any effects that are predicted to remain after the implementation of proposed mitigation measures are called “residual effects”. Adverse residual effects are investigated to determine their “significance” using criteria that measure the effects’ magnitude, geographic extent, duration, frequency or probability, reversibility, ecological importance and societal value. The significance of a residual effect is determined by the degree to which it changes the environment relative to baseline conditions and regulatory standards or guidelines. Where standards or guidelines are not available, professional judgment plays a part in the assessment of significance.</p> <p>These significance criteria and how they were measured were discussed with stakeholders at a workshop in November 2006. Stakeholders indicated that human health considerations should be explicitly recognized in the significance criteria. In response, OPG has added two additional criteria in the significance determination: the likelihood of affecting physical human health and psycho-social human health.</p>
<p>What level of EA is being carried out?</p> <p>Why are alternatives not being assessed in this EA?</p>	<p>This assessment is following the requirements of a screening-level assessment under the <i>Canadian Environmental Assessment Act (CEAA)</i>. Refurbishment of an existing nuclear plant is not designated by the <i>CEAA</i> regulations as a project subject to a comprehensive level EA or a Panel review. Therefore it is carried out at the screening level. Following a public hearing on the Guidelines for the Project, the Canadian Nuclear Safety Commission (CNSC) confirmed that a screening level assessment is appropriate.</p> <p>In making this decision, the CNSC considers four criteria:</p> <ul style="list-style-type: none"> • Can questions or issues being raised by members of the public and stakeholders be thoroughly addressed in a screening? • Are concerns being raised relevant to the project being assessed and can they be considered within the powers conferred to the Commission by the Nuclear Safety and Control Act? • Would a Panel Review provide more meaningful opportunities for the public to obtain information and to communicate its concerns and influence the decision maker? • Are there negative concerns expressed from a large proportion of the population living in

	<p>communities that would likely be affected by the project?</p> <p>Applying these criteria, the CNSC has determined that a screening level EA is appropriate.</p> <p>The issue of assessing need and the supply mix of electricity is a broader policy matter beyond the mandate of OPG or the CNSC, which has no regulatory authority of supply mix. These choices are energy policy decisions for which accountability ultimately rests with the Government of Ontario, and as such, they are outside the scope of a project-specific EA.</p>
<p>What is the geographic scope of this EA? Does it include the City of Toronto and all lake Ontario shoreline communities?</p>	<p>The Environmental Assessment (EA) Guidelines state that the geographic study area for this EA must encompass the areas of the environment that can reasonably be expected to be affected by the project, or which may be relevant to the assessment of cumulative effects, and establishes general boundaries for the site, local and regional study areas. The actual study area used by each technical discipline was adjusted to include locations where any identified effects arising from the Project might occur. In this respect, the nature of the project-environment interactions determined the study area used by each subject area expert. For example:</p> <ul style="list-style-type: none"> • Atmospheric Environment considers baseline air quality data from as far west as Etobicoke and climate data from Pearson International Airport in Toronto; • Geology study area extends west to Etobicoke; • Terrestrial, Aquatic and Surface Water study areas extend north to the southern boundary of the Oak Ridges Moraine, west to Toronto Harbour and approximately 4 km offshore; and • Population projections out to a distance of 50 km in all directions have been developed. <p>This approach ensures that effects on Lake Ontario and on shoreline communities are assessed wherever potential effects have been identified.</p>
<p>What timeframe is being considered in this EA?</p> <p>Does it include the entire active lifespan of used fuel?</p>	<p>With respect to timeframes, the assessment is based on the duration of the project to the end of service life of the reactors estimated to be 2060. This timeframe is considered adequate for the proposal under consideration: i.e., the refurbishment and continued operation of the reactors. The effects of managing refurbishment wastes and the used nuclear fuel during continued operation at the site during that time frame are included in the Environmental Assessment (EA) study.</p> <p>Longer-term management of the waste will occur at separately licensed facilities that have been, or will be, the subject of separate environmental assessments under the <i>Canadian Environmental Assessment Act (CEAA)</i>.</p>

	<p>Ontario Power Generation is continuing with plans for the long-term management of its low and intermediate level wastes, and the Nuclear Waste Management Organization (NWMO) has the responsibility for implementing Canada’s approach for the long-term management of used nuclear fuel. Applications submitted to the Canadian Nuclear Safety Commission in relation to these other projects are subject to the <i>Nuclear Safety Control Act</i> and <i>CEAA</i>.</p>
<p>Is the level of detail in the Project Description that was submitted to the CNSC sufficient?</p>	<p>An initial Project Description is required to enable Canadian Nuclear Safety Commission (CNSC) staff to evaluate the scope of the project and the required federal Environmental Assessment (EA), and to determine which other federal authorities may also have a responsibility or interest and need to be notified. The EA Study contains a more detailed project description including the sources, types and quantities of waste to be generated by the project and the transportation of low-and intermediate-level waste to management facilities.</p> <p>A preliminary decommissioning plan is included in the EA Study. Before Pickering Nuclear can be decommissioned, the CNSC, pursuant to Canadian Environmental Assessment Act regulations, will require OPG to conduct an EA of the decommissioning plan.</p> <p>The EA Study provides an indication of timing and sequencing of refurbishment activities. The schedule and timing of refurbishment outages are important considerations for business planning purposes but do not affect the determination of environmental effects.</p>
<p>What are the costs of this project? Is refurbishment cost effective?</p>	<p>Ontario Power Generation (OPG) is undertaking a review of the feasibility of refurbishing the Pickering B reactor units to extend their service lives. The Environmental Assessment (EA) of Pickering B refurbishment and Continued Operation is one part of this review. The process for developing the business case assessment is extensive and examines the safety, environmental, financial and logistical feasibility of life extension. Building on extensive industry experience in nuclear plant life extension and continued operations, the assessment will consider current plant conditions, refurbishment scope of work and refurbishment costs, as well as future operating costs and production levels. None of these parameters can be predicted with absolute confidence, and OPG recognizes that it must clearly identify the financial risks and uncertainties which accompany a project of this magnitude. Refurbishing Pickering B would be a significant investment, and its costs must be weighed against its benefits before a decision can be reached.</p> <p>While there were cost overruns in the return to service of Unit 4 at Pickering A, lessons were learned and the Unit 1 return to service came in essentially on time and on budget. The OPG Board of Directors will</p>

	<p>consider the cost-effectiveness of refurbishing Pickering B before a final decision is taken.</p>
<p>Is Pickering located on a fault line? Could the station withstand an earthquake?</p>	<p>Deformation features observed in the Rouge River Valley, within 10 km of the Pickering Nuclear site, were originally interpreted by Mohajer et al. (1992, 1995) to represent geologically young (last 80,000 years) faulting. By contrast, Adams et al. (1993) suggested that a glacial origin of the features was more likely. An overview of seismic hazard in the Pickering area concluded that the likelihood of the Rouge River structures representing a seismogenic fault (i.e. a fault that is seismically active) is less than 5%, based on the ambiguity of the origin of the features, the limited crustal extent, and the lack of association with historical seismicity. The observed fault features were thoroughly documented and analyzed by an expert team and most features were considered to be clearly of glacial origin, though significant normal fault features affecting recent deposits in several locations along the Rouge River, that appeared to be tectonic in origin, were noted and examined in greater detail. Borehole studies of the most prominent of these faults indicate that displacements affect only the surficial sediments, with no offsets being present at depth. This means that the deformation was not caused by earthquakes, because earthquakes are deep-seated, causing displacements that increase progressively with increasing depth. It was concluded that the deformation features in the Rouge River Valley are unlikely to be seismogenic in origin (Godin et al. 2001); they are not earthquake faults. They do not significantly affect the estimated seismic hazard at Pickering, as concluded by Geomatrix (1997).</p> <p>As a guide to levels of seismic activity in the region, the western Lake Ontario region experiences an earthquake of M=4.5 to 5 about once every hundred years. (Note: M is magnitude, measured by seismologists on the moment magnitude scale, which is similar to the Richter magnitude scale). The rate of occurrence of M=6 earthquakes is about 10 times lower than that of M=5 earthquakes; thus we would expect an M=6 event somewhere within the western Lake Ontario region about once every thousand years. The estimated recurrence rate of events of M=7 in western Lake Ontario is about 1 event per 10,000 years (Wallach et al. 1998, Mohajer 1997). Within the immediate vicinity of Pickering (e.g., within 100 km) there have been no events of M > 4.2 in the period of historic record.</p> <p>The reactor building, reactor core and safety systems are qualified for the design basis earthquake (DBE). The design ensures that in the event of an earthquake:</p> <ul style="list-style-type: none"> ○ The reactor can be shut down; ● The reactor remains shut down;

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| | <ul style="list-style-type: none">• The decay heat can be removed;• The radioactivity released from containment is minimized;• The status of the nuclear steam supply system can be monitored;• Systems, other than the reactor proper, containing significant amounts of radioactivity must not be damaged to such an extent as to lead to radioactive releases above allowable limits; and• An earthquake does not cause a loss-of-coolant accident. |
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