ONTARIO POWER GENERATION

Albert Sweetnam
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June 14, 2010

File No: NK054-00531 P
CD No: NK054-CORR-00531-00106
Project ID: 16-27600

Mr. Alan R. Graham
Chair, Darlington New Nuclear
Joint Review Panel

c/o Canadian Nuclear Safety Commission
280 Slater Street
Ottawa, ON K1P 5S9

Dear Mr. Chair:

OPG Interim Response to Information Requests from the Joint Review Panel May 20, 2010

Reference:
1. JRP letter, JRP Chair to A. Sweetnam, "Darlington New Nuclear Power Plant Project: Information Requests from the Joint Review Panel", CD# NK054-CORR-00531-00098, May 20, 2010.

2. OPG letter, A. Sweetnam to JRP Chair, "Response to Information Requests from the Joint Review Panel May 20, 2010", CD# NK054-CORR-00531-000101, June 4, 2010.

The purpose of this letter is to respond to the Information Requests (IRs) from the Joint Review Panel as provided in Reference 1.

The attachments to this letter provide detailed responses to nine of 27 IRs that OPG has completed. The numbering of our responses is in accordance with the IR numbering provided in the request.

OPG will provide responses to the remaining IRs by June 30, 2010 as committed in Reference 2. Some IRs require further discussion with appropriate federal reviewers and other regulatory agencies, which may take additional time.

If you have any questions or require additional information, please contact Ms. Laurie Swami, Director of Licensing and Environment, Darlington New Nuclear Project, at 905-839-6746, extension 5306.

Sincerely,

Albert Sweetham
Executive Vice President
Darlington New Nuclear Project
Ontario Power Generation

cc. Ms. J. Beaudet, JRP Member
Mr. J. K. Pereira, JRP Member
Ms. K. McGee, JRP Co-Manager
Ms. D. Myles, JRP Co-Manager

ATTACHMENT A

Attachment to OPG letter, Albert Sweetnam to JRP Chair, "OPG Interim Response to Joint Review Panel Information Request May 20, 2010"

June 14, 2010

CD# NK054-CORR-00531-00106

OPG Response to Joint Review Panel Environmental Impact Statement (EIS) Information Request May 2010

Attachment A: OPG Response to Joint Review Panel Environmental Impact Statement (EIS) Information Request

Attachment to OPG letter, Albert Sweetnam to JRP Chair, "OPG Response to Joint Review Panel Information Request May 20, 2010", June 14, 2010, CD# NK054-CORR-00531-00106

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
158	11.3 Significance of Residual Adverse Effects; 11.2 Mitigation Measures	**JRP IR:** Provide justification for the determination of "negligible" residual environmental effects (TSD, page 3-65) for a number of the terrestrial VECs where site restoration / habitat creation is the primary mitigation strategy, including, but not limited to, provincially rare dragonflies, certain plant species (e.g. common water flaxseed, shagbark hickory), monarch butterfly, migrant birds, winter raptors, and certain amphibians and reptiles (e.g. green frog, northern leopard frog, midland painted turtle). Elements of this may be addressed through a review of the scientific literature pertaining to the re-establishment of species of interest following restoration activities. **Rationale:** Mitigation measures, in many instances, are to be applied "post development" of the project. However, effects (e.g., loss of habitat/species) will occur during project development. The proponent has stated that plans or programs for the development of new and/or artificial habitat will be provided as mitigation for various effects on terrestrial species. However, these programs and plans have yet to be developed and no details on them have been provided. These programs must be explained in sufficient detail so that it can be determined whether they will be sufficient to mitigate the effects. Information is required regarding which regulations, policies, scientific data etc. the plans will be based on, who will prepare them, when, etc.
		OPG Response: In several cases, the terrestrial studies concluded that residual environmental effects were "negligible" considering mitigation measures involving site restoration and/or habitat creation. The Information Request notes that the plans and programs that will lead to and support the site restoration and habitat creation activities have yet to be developed and further justification for this "negligible" determination is necessary in the absence of the detailed plans. It is noted that all mitigation measures identified and incorporated into the Environmental Assessment (EA) program are considered commitments by OPG and will become OPG's obligations during the continuing design of the Project. The incorporation of the mitigation measures into the design and operation of the Project will be a subject of the EA follow-up program which will, itself, become a regulatory obligation of OPG under the *Canadian Environmental Assessment Act*. As such, the realization of all commitments to site restoration and habitat creation will be assured through the EA and licensing programs. OPG anticipates that appropriate regulatory approval(s) may be required to implement the plans or programs for the

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		development of new habitat which will be provided as mitigation for various effects on terrestrial species. OPG has had ongoing discussions with the CNSC on the jurisdictional boundary to be applied to the NND Project. As a result, OPG and the CNSC are working to establish the principles for defining the jurisdictional boundary for the Project. Based on the CNSC's final determination of the jurisdictional boundary for the Licence to Prepare Site (LTPS), OPG will be required to meet the conditions of the LTPS when administering plans or programs as mitigation for various effects on terrestrial species, or obtain the appropriate jurisdictional approval required to implement the plans or programs, e.g., for wetland creation. The Appendix 1 to Attachment A "EIS IR 158: Terrestrial Residual Effects Deemed Negligible with Site Restoration / Habitat Creation as the Primary Mitigation Strategy" provides further information concerning each of the residual effects that were described as negligible in the Terrestrial Environment Environmental Effects TSD based on the expectation of site restoration and habitat creation. The Appendix 1 is derived from Table 3.4-3 in the TSD. Further rationale for the conclusions (i.e., negligible residual environmental effect) and commentary has been added (in a new column titled "Discussion/Rationale") to substantiate the expectations concerning success for the mitigation measures.
167	11.5.6 Human Health	**JRP IR:** Discuss whether each reactor type would be able to meet the current discharge limit of 4,000 Bq/L for OPG discharges. **Rationale:** In 2009, ODWAC stated that OPG would be able to meet the recommended standard of 20 Bq/L for tritium if it maintained the current discharge limit of 4,000 Bq/L for OPG discharges.
		OPG Response: A tritium concentration exceeding 4000 Bq/L at the station discharge is the level for notification when an abnormal tritium emission has occurred or is occurring that may result in higher than normal levels of tritium in the drinking water. This notification and action protocol was developed in agreement with local and provincial stakeholders for Pickering and Darlington Nuclear Generating Stations (EMO 2006). Under this agreement, OPG will notify the local communities, Emergency Management Ontario (EMO) and Ministry of Environment (MOE) if the tritium level is, or expected to be, above the notification level set for the facility. The current agreement does not include New Nuclear at Darlington (NND). Therefore, a similar agreement would need to be established in consultation and discussion with the community and stakeholders. The level for notification and action will be specific to the plant design, taking into consideration the potential for impact on the local drinking water supply plants.

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		The rationale of this IR mentions that "In 2009, ODWAC stated that OPG would be able to meet the recommended standard of 20 Bq/L for tritium if it maintained the current discharge limit of 4,000 Bq/L for OPG discharges." To clarify, ODWAC (Ontario Drinking Water Advisory Council) is recommending that the standard for tritium in drinking water be reduced from 7,000 Bq/L to 20 Bq/L applied on a 52 week rolling average. The ODWAC recognizes that the concern with tritium is related to chronic exposure, which is why the recommended limit would be applied on a 52 week rolling average, not on a short term transient increase measured at the water supply plants. As a result, the current notification level of 4,000 Bq/L from Pickering and Darlington Nuclear Generating Stations, used to trigger the EMO protocol (EMO 2006), does not need to be revised. The ODWAC report (ODWAC 2009) acknowledges that a tritium level of 4,000 Bq/L at the Darlington Nuclear station discharge may result in an approximate concentration of 1100 Bq/L at the nearest WSP (EMO 2006) under certain lake conditions. Reference: Emergency Management Ontario 2006, *Coordination of the Response to a Liquid Emission at OPG and Bruce Powe*r, July. Ontario Drinking Water Advisory Council 2009, *Report and Advice on the Ontario Drinking Water Quality Standard for Tritium*, May.
168	11.5.6 Human Health	**JRP IR:** Indicate uncertainty values (ratios of 95% to 5% percentiles) for dose estimates presented in table 8.4-3 of the EIS. **Rationale:** Many uncertainties exist with internal dose estimates from HTO and OBT. See www.cerrie.org
		OPG Response: OPG reports doses to the members of the public each year as part of the nuclear site Radiological Environmental Monitoring Program (REMP), in accordance to the requirements of Canadian Nuclear Safety Commission (CNSC) Regulatory Document S-99, *Reporting Requirements for Operating Nuclear Power Plants* (CNSC 2003). Uncertainties associated with calculated doses to the public are not required under this regulatory document and therefore not reported. Correspondingly, the uncertainty values associated with the doses to the public for NND have not been estimated. The doses to the members of the public are estimated using the methodology provided by the Canadian Standards

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		Association (CSA) N288.1-08 document (CSA 2008), which is based on the International Committee of Radiation Protection (ICRP) principles and recommendations. This is consistent with the suggestion of the CERRIE report (CERRIE 2004, Part 2, 72) that "...*concluded that it was important that doses and risks from internal emitters should be calculated on the basis of best current information, using central values, and with no bias towards 'conservatism' or 'pessimism' (as is sometimes implied)."* Notwithstanding, it is recognized that there are inherent uncertainties in models, model parameters and dose coefficients. Thus, as indicated above, recognized and widely accepted models (for air and water dilution), widely accepted models for exposure, uptake and dose (CSA 2008) and reasonably conservative assumptions including, for example, bounding air emissions, bounding water emissions and bounding exposure time were used. Such assumptions are intended to ensure that the dose estimates are more likely to be overestimated than underestimated. It should also be noted that the maximum estimated dose to the public from the operation of NND is 0.004 millisieverts per year (mSv/y) which is well below the regulatory limit of 1 mSv/y. Considering that the estimated dose impact is a small fraction of the regulatory limit (0.4%), the current assessment is sufficient for Environmental Assessment planning purposes. Reference: Canadian Nuclear Safety Commission 2003, *S-99 Reporting Requirements for Operating Nuclear Power Plants, Regulatory Guide*, March. Canadian Standards Association (CSA) 2008, *Guidelines for Calculating Derived Release Limits for Radioactive Material in Airborne and Liquid Effluent for Normal Operation of Nuclear Facilities*, N288.1-08, September. CERRIE 2004, *Report of the Committee Examining Radiation Risks of Internal Emitters*, www.cerrie.org, October.
170	10.1.7 Climate, Weather Conditions and Air Quality	**JRP IR:** As follow-up to IRs#105 and 106, provide the annual wind roses for 2008 and 2009 including the average wind speed and the percentage of calms. Compare the results with the data from 1996-2000. OPG has stated that "In order to improve data quality, procedural changes were made to increase scrutiny on the data provided by the DN meteorological tower. An annual availability target of greater than 90% has been set. Data unavailability will be reviewed and calculated on a quarterly basis to ensure an annual target is met." Provide details regarding the procedural changes and explain how the 90% annual availability target was arrived at.

<table>
<tr><th>EIS IR#</th><th>EIS Guideline Section</th><th>Detailed Information Request and Response</th></tr>
<tr><td></td><td></td><td>Rationale:

Local wind data for the period 1996 to 2000 has been used to support the dispersion modelling for the EIS. Normally it would be expected that the five most recent years of available meteorological data would be used for Project dispersion modelling. In the responses to IRs#105 and 106, information was provided on quality issues discovered in the meteorological tower. The correction of problems with the monitoring equipment should enable reference to recent information to confirm that the monitoring data from 1996-2000 are valid.</td></tr>
<tr><td></td><td></td><td>OPG Response:

The annual wind roses for 2008 and 2009 including the average wind speed and the percentage of calms have been reviewed and provided in this response. Overall, 2009 meteorological data compared well to the 1996 to 2000 period used for the Environmental Assessment (EA). The meteorological tower data from 2008 was expected to be problematic as the quality issue was discovered midyear in 2008, and corrective actions as discussed in the OPG responses to IRs #105 and #106 have been implemented.

The annual wind roses for 2008 and 2009 are provided in Appendix 2 to Attachment A, "EIS 170: Wind Roses for Darlington Nuclear (DN) Meteorological Tower" along with a comparison to data from 1996 to 2000. The average wind speed and the percentage of calms are provided in Table 1 below. The wind roses, and average wind speed and percentage calms in 2009 (Table 1) compare favourably to the 1996-2000 time frame. There is some variability in the wind direction, but that is to be expected for a one year time frame, and the overall wind pattern is similar to the one observed in 1996-2000. The data in 2008 is incomplete, and consequently the wind rose and percent calms do not compare well. Potential issues with 2008 data include missing data between February 18th and March 5th. Also, there are substantial periods of time during which there are recorded wind directions, but no wind speeds (i.e. wind speeds = 0 m/s). This is the reason for the high percent calms.

Table 1: Comparison of Average Wind Speed (m/s) and Percent (%) Calms

<table>
<tr><th>Parameter</th><th>Period 1996-2000</th><th>Year - 2008</th><th>Year - 2009</th></tr>
<tr><td>Average Wind Speed (m/s)</td><td>2.6</td><td>2.6</td><td>2.8</td></tr>
<tr><td>% Calms</td><td>7.8</td><td>15.6</td><td>8.5</td></tr>
</table>

In order to improve data quality, changes were made to the Radiological Environmental Monitoring Program (REMP) procedure (OPG 2009) to increase scrutiny on the meteorological data. An annual unavailability limit of ten percent (10%) for the meteorological data was adopted based on the recommendation provided in the Environmental Protection Agency (EPA) Meteorological Monitoring Guidance (EPA 2000). Unavailability will be calculated on a quarterly basis to ensure four</td></tr>
</table>

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		consecutive quarters, with not more than 10% unavailability, are recovered for a one year cycle. Data is invalid when it is outside the range of the instrument accuracy tolerances. Unavailability shall be assigned based on the following: (1) Percentage of invalid or missing data from each of the variables, wind direction, wind speed, stability, and to the joint recovery of wind direction, wind speed and stability. (2) Percentage of data that is unavailable from the datalogger. Reference: Ontario Power Generation (OPG) 2009, *Management of the Radiological Environmental Monitoring Program*, N-PROC-OP-0025. United States Environmental Protection Agency (US EPA) 2000, *Meteorological Monitoring Guidance for Regulatory Modeling Applications*, EPA-454/R-99-005, February.
173	11.5.6 Human Health	**JRP IR:** Provide information regarding the possible production and dispersal of bacteria from cooling towers. **Rationale:** Cooling towers are being considered for use in the project but the possible production and dispersal of bacteria such as Legionella from the cooling towers was not evaluated.
		OPG Response: **Formation of Bacteria in Cooling Towers** Cooling towers operate on the principle that process water is cooled by evaporation. The process water flows over large evaporative surface areas from which heat and humidity are exchanged with the surrounding air. As a result, evaporate and water droplets (known as drift) rise from the evaporative surfaces and exit the cooling towers as a plume, which is usually visible. Among many chemical and pathogen constituents in the process water to be cooled, there are bacteria known as *Legionella pneunophila*. This bacterium is present in all natural environments and has been known to cause Legionellosis or "Legionnaires' disease"; a severe form of pneumonia. The *Legionella* bacteria can be carried within the water droplets that rise up the cooling tower and exit in the plume. (Reference 1).

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		Respirable Drift It has been found that the greater risk of *Legionella* infection occurs by inhaling the very small water droplets containing the bacteria as the larger droplets sizes are not deeply inhaled. The very small water droplets, known as respirable drift, are typically five microns or less. Thus, deep inhalation of the respirable drift increases the amount of bacteria in the respiratory tract and risk of infection. In Figure E.37-1 (page E-27) of the Atmospheric Environment Assessment of Environmental Effects TSD, the water deposition from the mechanical draft cooling tower plume is predicted to occur mainly within the local study area, with the highest concentration within 400 m of the tower; whereas the water deposition for natural draft cooling towers shown in Figure E 3.7-4 (Page E-28) of the TSD is more widely dispersed and at a lower concentration. The higher water deposition rate of the mechanical draft tower is due to the height of the tower and the plume being closer to the ground than the natural draft tower, which releases plumes at greater heights. Thus, the risk of inhalation of drift is increased the closer the workers are to the towers. However, the risk of inhaling multiple *Legionella* bacteria from downwind plumes has been largely eliminated by implementing modern cooling tower designs, such as installing drift eliminators, and managing the cooling water quality. The use of drift eliminators reduces a high percentage of the respirable size drift in the plume to about one percent, thereby reducing the amount of bacteria dispersed in the plume from the cooling tower. **Dispersion of Bacteria** The primary mode of dispersal of *Legionnella* bacteria is through entrainment of the bacteria within water droplets (drift) of the cooling tower plume. The EIS (section 5.2.5, page 5-16) describes the height, length, direction and frequency of plumes from the mechanical and natural draft cooling towers. In general the longest plumes are southeast and west of the DN site with a greater frequency of longer plumes occurring during the winter months. Plume length is a function of wind speed and direction, and barometric pressure, and can be up to 10, 000 m in length and could be at a height between 80 and 100 m most of the time. The Atmospheric Assessment of Effects TSD documented the bounding conditions associated with all atmospheric cooling tower plume characteristics and maximum emission concentrations. Detailed design will be able to address site specific conditions to minimize potential effects associated with *Legionella* bacteria. **Cooling Water Quality Control** In order to prevent biofouling, scaling and corrosion that could occur on the evaporative surfaces, the chemistry and water quality of the cooling water must be maintained at an optimum condition. Since the *Legionnella* bacteria have been found to live on the organisms (biofilm) that colonize the evaporative surfaces, control of the biofilm is critical. Control of the growth of the biofilm can be obtained with chemical disinfectant additives, including halogens (chlorine gas, hypochlorites, chlorine dioxide), ultraviolet light radiation, copper/silver ionization or ozone. In summary, cooling towers are known to emit water droplets (drift) that contain the *Legionnella* bacteria in their plumes. Therefore, the primary mode of dispersion of the bacteria is via the drift in the plume. The drift can be reduced by drift eliminators incorporated into the design of modern cooling towers which would significantly reduce the respirable size of drift

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		to one percent. Cooling tower plumes vary in length and height depending on the ambient atmospheric conditions such as wind speed, wind directions, and barometric pressure. Control of the growth of the *Legionnella* bacteria can be obtained by optimizing the quality and chemistry of the cooling water to inhibit the growth of organisms (biofilms), which are necessary for bacterial growth. Reference 1: Chapter 8 "Cooling Tower, Drift and Legionellosis", 2009 EPRI Cooling Tower Technology Seminar and Symposium, August 2009.
174	11.2 Mitigation Measures	**JRP IR:** Provide details on mitigation methods that will be used for reducing potential public exposure to contaminants and radiation. For example, would construction activities be curtailed during smog alert days so as to not exacerbate poor air quality conditions in the area? **Rationale:** Insufficient details are given on mitigation methods that will be used for reducing potential public exposure to contaminants and radiation.
		OPG Response: The effects of public exposure to radiation and non-radiological contaminants are addressed in the Human Health Technical Support Document (TSD). This TSD provides a summary of the effects of all aspects of the project with the potential to impact on human health. The detailed effects assessments, including description of mitigation measures, are found in the individual environmental component TSDs (e.g., Atmospheric Environment Assessment of Environmental Effects TSD). These TSDs describe both in-design mitigation that is intrinsic to the project and additional mitigation that is applied to reduce identified adverse effects. Table 5.15-1 (pages 5-196 to 5-212 of section 5.15) of the Environmental Impact Statement (EIS) provides a summary of all project mitigation measures, organized by environmental component. The environmental components affecting human health in terms of exposure to radiation and non-radiological contaminants are the radiation and radioactivity environment, the atmospheric environment, and the surface water environment. Mitigation measures have been detailed to the extent practicable at this stage of project planning. The general intent of each measure is described, and where practicable more specific details of the measure are provided, recognizing that the project remains in its planning stages. For instance, implementation of a Dust Management Program is included as an in-design

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		mitigation measure; examples of the types of dust management strategies that may be employed are listed, but the specific measures to be employed will be finalized together with the vendor, when the vendor is selected. All aspects of the project, including mitigation measures, will be further defined as the project evolves through the licensing process. The mitigation measures represent commitments made by OPG to ensure that effects are reduced. Where applicable, these measures will be incorporated by the vendor during design and/or construction. Some proposed mitigation measures are defined at this stage as a commitment to implement Good Industry Management Practices. These practices will be incorporated into a comprehensive Environmental Management Plan. As noted on page 11-6 (section 11.6) of the EIS, one of the objectives of the follow-up program will be to verify the effectiveness of the identified mitigation measures. This will allow corrective actions to be taken as needed in a timely manner. The Information Request specifically referred to a situation in which poor air quality (not project-related) may temporarily exist in the local airshed, and asked whether construction activities would be curtailed in this situation. OPG values the health and safety of project workers, individuals who would experience the most intense effects of air quality on the work site. If warranted to protect the project workers, certain work activities would be delayed or deferred as a result of poor air quality. This protocol would be documented in the Health and Safety Plan for the site preparation and construction work. This plan will be prepared by the vendor and accepted by OPG.
175	10 Existing Environment Geology and hydrology	**JRP IR:** There are buildings located in the area of receptor #20 (see figure 5-2-1 of the EIS). What is the water supply for these buildings? If well water is used, how deep is/are the wells? What mitigation/contingency plans are envisaged to remediate any effects on the water supply to these properties due to dewatering activities, or to properties with shallow wells located north of Highway 401? **Rationale:** Dewatering during site preparation (in the order of five years or plus) will lower the water table. The largest drawdowns are predicted to occur in the north/east end of the excavation, especially for Scenario no. 2, south of the 401, and extending to St-Mary's Cement property. St-Mary's Cement property is also a source of present and future excavation into local bedrock and dewatering of the bedrock.

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		OPG Response: Receptor #20 on Figure 5.2-1 (page 5-11) of the Environmental Impact Statement (EIS) is located east of the Darlington Nuclear site, along the South Service Road. Figure 4.4-9 (page 4-46) of the Geological and Hydrogeological Environment Existing Environmental Conditions Technical Support Document (TSD) identified three water wells in the area of Receptor #20. These water wells were identified through the Ontario Ministry of Environment water well records system and showed the wells to be one bedrock well and two overburden wells. Since the buildings along the South Service Road are supplied with potable water from the Bowmanville Water Treatment Plant via a municipal water main that runs along the South Service Road, the wells are not needed as a water supply. St. Marys Cement is also serviced by municipal water. As described on page 5-4 (section 5.1) of the Geological and Hydrogeological Environment Assessment of Environment Effects TSD, groundwater modelling of the dewatering estimated that the shallow groundwater drawdown would not extend off site to the north of Highway 401 where shallow wells are located. As a result, wells to the north of the site are unlikely to be affected by the dewatering. Prior to undertaking site preparation activities, OPG anticipates that appropriate regulatory approval will be required for proposed water takings for the purposes of dewatering the site. OPG has had ongoing discussions with the CNSC on the jurisdictional boundary to be applied to site preparation of the NND Project. As a result, OPG and the CNSC are working to establish the principles for defining the jurisdictional boundary for the Project. Based on the CNSC's final determination of the jurisdictional boundary for the Licence to Prepare Site (LTPS), OPG will be required to meet the conditions of the LTPS or obtain the appropriate jurisdictional approval with respect to proposed water takings and dewatering activities. OPG anticipates that the regulatory approval to dewater the site would require the proponent to conduct studies that would delineate the extent of the potential dewatering effects, identify the volume of water to be collected, and undertake an inventory and survey of nearby water wells, including details of the well, such as well construction details (depth, age, static level, pump setting, etc.), water use and water quality (domestic, agriculture, potable/non-potable) and any pre-existing conditions (i.e., dry in drought years, iron staining, poor quality, etc.). OPG also anticipates that details of any monitoring programs, mitigation and contingency plans for wells that may be affected by dewatering would be defined as part of such an approval. In addition, the EIS states on page 11-12 (Table 11.6-2) that groundwater flow will be monitored to confirm EIS predictions. With respect to the effects of the Project on the St. Marys Cement quarry, the Geological and Hydrogeological Environment Existing Environmental Conditions TSD reported on pages 4-8 to 4-9 (section 4.4.4.1) that "… *there is very little groundwater seepage to the quarry. Most of the flow to the quarry results from precipitation falling inside the quarry.*" During the final stages of the quarry's operation, deep bedrock groundwater flow will be controlled by the depth of the quarry and not NND

EIS IR#	EIS Guideline Section	Detailed Information Request and Response
		because the final quarry depth elevation of the St. Marys Cement quarry will be well below the elevation of the NND Project. In summary: • the buildings east of the DN site along the South Service road are supplied with potable water from the Bowmanville Water Treatment Plant. • groundwater modelling of the estimated dewatering indicated that the drawdown would not extend off site to the north of Highway 401 where shallow wells are located. • the Preliminary Plan for the Environmental Assessment Follow-up Program states that groundwater flow will be monitored to confirm EIS predictions. • subsequent regulatory approval to dewater the site will provide a mechanism for refining groundwater predictions and determining details of any necessary monitoring programs, mitigation measures and contingency plans.

Appendix 1 to Attachment A

Attachment to OPG letter, Albert Sweetnam to JRP Chair, "OPG Response to Joint Review Panel Information Request May 20, 2010"

June 14, 2010

CD# NK054-CORR-00531-00106

EIS IR 158: Terrestrial Residual Effects Deemed Negligible with Site Restoration / Habitat Creation as the Primary Mitigation Strategy

Appendix 1 to Attachment A

EIS IR 158: Terrestrial Residual Effects Deemed Negligible with Site Restoration / Habitat Creation as the Primary Mitigation Strategy

Environmental Sub-component	Likely Environmental Effect	In-Design* Mitigation Measures Considered in the Evaluation	Additional Identified Potential Mitigation Measures	Residual Environmental Effect	Discussion/Rationale
Vegetation Communities and Species	Removal of 17 ha Wetland Ecosystem and potential shift of up to 5 ha of wetland to upland communities	None	• Creation of new fish-free wetland ponds with riparian plantings • Create wetlands on lake filled area	Negligible or positive	The function of the ponds, namely Treefrog Pond, Dragonfly Pond and Polliwog Pond located on the northeast area of the DN site, (i.e., Wetland Ecosystem) that will be removed and which represent some of the higher wetland values on the site, will be replicated through replacement fish free ponds constructed in a similar manner to the ponds listed above which were all constructed by OPG. The fact that these ponds have evolved to their current level of wetland function effectively demonstrates the constructability of this function at the DN site. Potential locations for new ponds are indicated on Figure 3.4.2 of the Terrestrial Environmental Effects TSD. The loss of low function wetlands (i.e., thicket wetlands, Reed Canary Grass meadow marsh) on the site was not determined to be a meaningful residual effect because of their relatively low level of function as illustrated by the flora and fauna associated with them.. The history of evolution of these low-function wetlands (on disturbed areas with compacted soils and areas poor drainage) explains this low level of function. In the Terrestrial Environment Effects TSD it is noted in Figure 3-4.2 that there is potential for the creation of wetlands beyond that which are required to mitigate the loss of the three ponds. If this potential is realized it can be expected to result in a net environmental gain because wetlands near Lake Ontario shoreline are highly likely to be used by a wide variety of migrant birds.
	Loss of rare plant species: Common Water Flax-seed, Cup Plant, Shag-bark Hickory and Loesel's	• None	• Salvage and relocate or replant these plant species to suitable existing or	Negligible	The introduction and persistence of the flax-seed at even one location on the DN site will re-create the current situation regarding this plant. This is considered to be a readily achievable objective, because the Common Water Flax-seed is a floating plant, and collection and transplantation is not difficult. The current habitat (a constructed pond) is similar to

Environmental Sub-component	Likely Environmental Effect	In-Design* Mitigation Measures Considered in the Evaluation	Additional Identified Potential Mitigation Measures	Residual Environmental Effect	Discussion/Rationale
	Twayblade		created habitat		the existing Coot's Pond. The transplanting of Cup Plant (the current location at risk is itself a transplanted population) will also be straightforward and can be readily accommodated in existing habitat areas. The Loesel's Twayblade can also be readily transplanted to an appropriate existing habitat at two locations on the DN site, where the species currently occurs that will not be affected by the Project. The loss of a single Shagbark Hickory tree, which will be mitigated by including this species in future planting lists, is reasonably determined a negligible residual effect. All transplant methods will be determined by a botanist. The plan for the transplant program is being prepared and will be implemented prior to site preparation. The success of the current Site Biodiversity Plan (see EIS Section 2.9.4) and OPG's commitment to it adds further confidence to the expected success of the habitat species relocation and recreation measures.
Insects	Dragonfly – rare species: Amber-winged Spreadwing at Treefrog Pond which will be removed	• None	• Creation of new fish-free wetland ponds with riparian plantings	Negligible	The provincially vulnerable dragonfly has been observed twice at the constructed Treefrog Pond, with neither sighting being in recent years (most of the rarer dragonflies recorded at the DN site have been at Coot's Pond). The loss of the habitat in the vicinity of this pond is recognized as an effect, however, as noted above the development of similar constructed habitat elsewhere on the DN site will provide habitat opportunities in the future thus rendering the loss a negligible effect. Even in the event that no amberwings were ever to frequent the site again, and with the absence being entirely due to the

Environmental Sub-component	Likely Environmental Effect	In-Design* Mitigation Measures Considered in the Evaluation	Additional Identified Potential Mitigation Measures	Residual Environmental Effect	Discussion/Rationale
					Project, the effect on this insect as a result of the Project could still be described as negligible based on the low population that is only intermittently present.
	Loss of 74 ha of Monarch butterfly habitat	• Include native forb seeds in hydroseed mix for Cultural Meadow to be restored	• None	Approximately 24 to 34 ha of Cultural Meadow removed	Monarch habitat at the DN site comprises Cultural Meadows created by OPG since the existing station was constructed. Although suggested in the Information Request as a negligible effect, the loss of Monarch butterfly habitat was, in fact, recognized as a residual adverse effect and considered for significance in EIS Section 9 (where it was determined to be not significant).
Bird Communities and Species	Migrant birds: removal of 74 ha of habitat	• Post-development restoration of: o Cultural Meadow; o Cultural Thicket; • Woodland, dominated by Sugar Maple	• None	Negligible	Although the removal of 74 ha of migratory bird habitat is predicted, the residual effect associated with this loss was determined negligible based on the fact that approximately 59 ha of such habitat will remain *in situ,* and there will be post-development creation of replacement habitat. Replanting of thicket will be undertaken for 15 to 20 ha with additional woodland plantings. Approximately 25 ha in total will be restored, using similar techniques that have resulted in the wildlife communities and habitats that are present today, enhanced by strategic plantings (e.g., Sugar Maple and Shagbark Hickory) and native seed mixes. Post-construction, approximately 59 ha of habitat for migrant birds will be present; post-restoration this will rise to at least 84 ha; with natural succession perhaps closer to 90 ha will be present on the DN site. This will compare with the original 134 ha, a large portion of which has been established by the OPG biodiversity program. The areas of potential restoration are provided in Figures 3.4-1 and 3.4-2 of the Terrestrial Environment Effects TSD. An additional factor in determining that the residual loss of approximately 45 to 50 ha of thicket-dominated habitat is negligible is the fact that this type of habitat for migrants is plentiful along the Lake Ontario north shore and places inland.

Appendix 1 to Attachment A

EIS IR 158: Terrestrial Residual Effects Deemed Negligible with Site Restoration / Habitat Creation as the Primary Mitigation Strategy

Environmental Sub-component	Likely Environmental Effect	In-Design* Mitigation Measures Considered in the Evaluation	Additional Identified Potential Mitigation Measures	Residual Environmental Effect	Discussion/Rationale
					However, while this habitat is used by migrant birds, it is not optimal habitat (which is mature woodland, especially those with tall pines along the lakefront). Planting plans will be prepared as site development plans advance. These habitats are readily established, as experience has demonstrated at the existing site, where over 100 ha have been created. The higher quality communities envisaged by this mitigation plan requires the addition of appropriate native species and a planting plan that will be developed by a botanist as disturbed areas are readied for restoration. The identified mitigation measures, including those intended for habitat restoration, are summarized in EIS Table 5.15-1. The preliminary follow-up program described in Table 11.6-2 includes for the monitoring of post-development conditions to confirm the success of habitat restoration.
	Winter raptor feeding area, loss of cultural meadow and thicket used by these species for winter foraging when Meadow Voles abundant	• None	• Post-development restoration of Cultural Meadow and Cultural Thicket	Negligible	Cultural meadow (grasses, often hydro-seeded) and especially cultural thicket (grassland with at least 25% or more shrub cover) have been developed or encouraged at the DN site since the existing station was constructed. These communities are further described in the Existing Conditions TSD page 3-12 Section 3.4.1. This habitat provides raptor feeding opportunities. However, this function primarily exists in areas dominated by grass, in winter and only in years of high vole populations (a prime food source for wintering raptors). Although the Project will result in the loss of 113 ha of meadow and thicket, much of the loss will be offset by the restoration of as much as 70 ha of higher quality (i.e., with native species) plantings. The residual loss of approximately 40 to 50 ha is negligible compared to the availability of roadside verges, old fields and other cultural habitats found all along the Lake Ontario north shore in a wide variety of situations.

Appendix 1 to Attachment A

EIS IR 158: Terrestrial Residual Effects Deemed Negligible with Site Restoration / Habitat Creation as the Primary Mitigation Strategy

Environmental Sub-component	Likely Environmental Effect	In-Design* Mitigation Measures Considered in the Evaluation	Additional Identified Potential Mitigation Measures	Residual Environmental Effect	Discussion/Rationale
Amphibians and Reptiles	Removal of the following amphibian breeding ponds: Dragonfly, Treefrog and Polliwog.	• None	• Creation of new fish-free wetland ponds with riparian plantings	Negligible, or habitat gain	The three noted ponds (Treefrog, Dragonfly, and Polliwog Ponds) were constructed by OPG as part of the DN site biodiversity program over the past 13 years. One pond has a small number of Eastern Midland Painted Turtles (one to four) and all three ponds support some common amphibian species. None of these ponds, however, were stocked with these animals and all are also present at Coot's Pond which will be retained. In addition, and as noted above, it is intended that the wetland function of these ponds be replaced through the creation of similar features elsewhere on the site; potential locations are indicated on Figure 3.4-2 of the Terrestrial Environment Effects TSD. For these reasons, the loss of the amphibian breeding capacity of these ponds is considered a negligible residual effect.
Mammal Communities and Species	Loss of Meadow Vole habitat (CUT and CUM)	• Post-development restoration of: o Cultural Meadow; o Cultural Thicket;	• None	Negligible	Cultural meadow and especially cultural thicket have been developed or encouraged at the DN site by OPG since the station was constructed. Prior to this the area was intensively farmed. This has provided habitat for Meadow Voles. The loss of 113 ha of vole habitat will be offset by the restoration of as much as 70 ha of higher quality habitat. The residual loss of 40 to 50 ha is very small compared to the availability of roadside verges, old fields and other cultural habitats found all along Lake Ontario in a wide variety of situations.

Appendix 2 to Attachment A

Attachment to OPG letter, Albert Sweetnam to JRP Chair, "OPG Response to Joint Review Panel Information Request May 20, 2010"

June 14, 2010

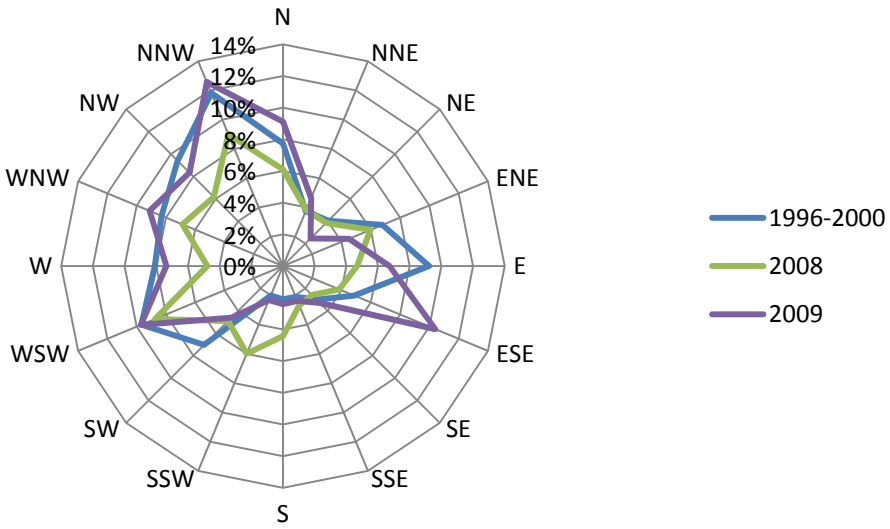
CD# NK054-CORR-00531-00106

EIS 170: Wind Roses for Darlington Nuclear (DN) Meteorological Tower

Appendix 2 to Attachment A

EIS 170: Wind Roses for Darlington Nuclear (DN) Meteorological Tower

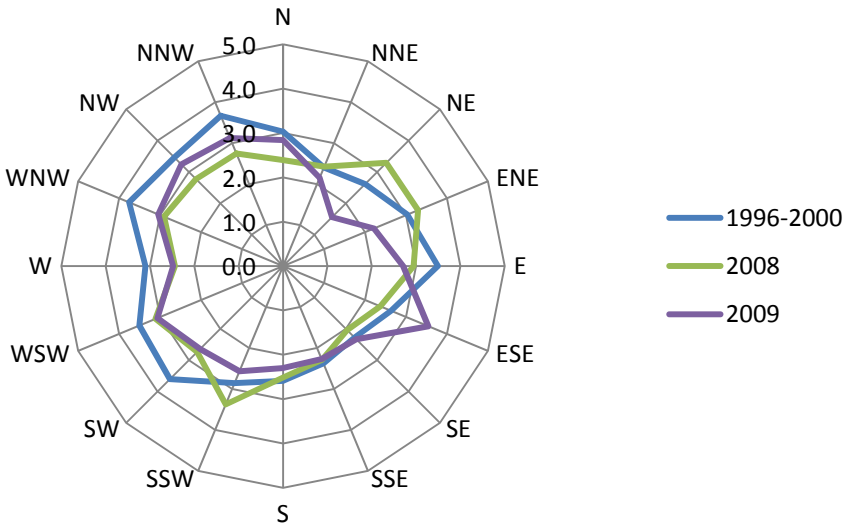
FIGURE 1: Frequency of Wind Direction (Winds From 1996-2000 compared to 2008 and 2009)



Appendix 2 to Attachment A

EIS 170: Wind Roses for Darlington Nuclear (DN) Meteorological Tower

FIGURE 2: Average Wind Speed (m/s) (1996-2000 compared to 2008 and 2009)



ATTACHMENT B

Attachment to OPG letter, Albert Sweetnam to JRP Chair, ”OPG Interim Response to Joint Review Panel Information Request May 20, 2010”

June 14, 2010

CD# NK054-CORR-00531-00006

OPG Response to Joint Review Panel Licence to Prepare a Site (LTPS) Information Request May 2010

Attachment B: OPG Response to Joint Review Panel Licence to Prepare a Site (LTPS) Information Request

Attachment to OPG letter, Albert Sweetnam to JRP Chair,"OPG Response to Joint Review Panel Information Request May 20, 2010", June 14, 2010, CD# NK054-CORR-00531-00106

LTPS IR#	CNSC Regulation	Detailed Information Request and Response
23	Class I Nuclear Facilities Regulations, Section 4(e)	**LTPS IR:** Include a section for "Aquatic Environment" in Table 4.3.1 as part of the analysis for likely adverse effects arising from site preparation activities. In particular, provide details on the mitigation measures for the proposed lake in-fill. **Rationale:** The "Aquatic Environment" environmental component has been excluded from Table 4.3.1. This information needs to be included to fully describe the environmental effects arising from site preparation activities and the proposed measures to mitigate those effects. The information is needed to satisfy the information required under Section 4(e) of the Class I Nuclear Facilities Regulations.
		OPG Response: In accordance with the Class 1 Nuclear Facilities Regulations, section 4(e), OPG's Licence to Prepare Site (LTPS) Application identifies the effects on the environment, and measures to be taken to mitigate those effects, that may result from the activities to be licensed. This information is provided in Table 4.3-1, Summary of Likely Adverse Environmental Effects and Mitigation Measures (pages 4-11 to 4-15) of the LTPS Application. Lake in-fill activity is included in the Application for Authorization for Works or Undertakings Affecting Fish Habitat under the Fisheries Act and the Application for Approval for proposed works under the Navigable Waters Protection Act submitted to Fisheries and Oceans Canada (DFO) and Transport Canada respectively in parallel with the LTPS Application. OPG continues to work with DFO, along with other regulatory agencies, to establish the specific terms and conditions of the DFO Authorization. The DFO requirements for an Authorization under subsection 35(2) of the Fisheries Act (for the harmful alteration, disruption or destruction of fish habitat) and section 32 of the Fisheries Act (for the destruction of fish by means other than fishing) will be complied with after the EIS is accepted, and once the detailed engineering has been completed. Table 4.3-1 of the LTPS Application did not include lake in-fill effects and mitigation details since lake in-filling was not included as an activity under the OPG application for a Licence to Prepare Site. Page 1-4 (section 1.2.2) of the LTPS Application describes the licence to prepare site activities. Nevertheless, the requested effects and mitigation measures for lake in-fill activities described in Table 5.15-1, Summary of Likely Environmental Effects, Mitigation Measures and Residual Adverse Effects (Pages 5-198 to 5-202) of the EIS (), are provided here.

<table>
<tr><th>LTPS IR#</th><th>CNSC Regulation</th><th>Detailed Information Request and Response</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Likely Adverse Environmental Effect arising from lake in-fill Activities</th><th>Mitigation Measures*</th></tr>
<tr><td colspan="2">Surface Water Environment</td></tr>
<tr><td>Construction of the infill area coffer dam is likely to result in turbidity in the lake water. Any turbidity created will be temporary in nature, and the extent of the turbidity plume will be limited because of the high energy environment of the nearshore.</td><td>Dust and sediment control measures will be employed to minimize suspended sediment concentrations.

Implementation of Good Industry Management Practices during any activities associated with lake dredging and lake infilling to manage suspended sediment to meet appropriate regulatory requirements for discharge to Lake Ontario.</td></tr>
<tr><td>Placement of the lake infill will result in disturbance and loss of lake substrates.</td><td>No mitigation measures identified as practicable during the site preparation phase.</td></tr>
<tr><td colspan="2">Aquatic Environment</td></tr>
<tr><td>Placement of the lake infill will result in the loss of up to 40 hectares of near shore aquatic habitat.</td><td>Development of an appropriate Fish Habitat Compensation Plan to satisfy the requirements of a federal Fisheries Act Section 35(2) authorization.</td></tr>
<tr><td>Placement of the lake infill will result in localized loss of some VEC species (i.e., benthic invertebrates, fish).</td><td>Capture and release fish from in-water work areas as work advances.</td></tr>
</table>
*Note that mitigation measures identified here are being clarified as part of DFO requirements for an Authorization.

Reference

OPG letter, Mr. A. Sweetnam to Mr. R. DesJardine, "Application for Authorization for Works or Undertakings Affecting Fish Habitat – Habitat File No.PE-07-1092", September 30, 2009, CD# NK054-CORR-00539.4-00001.

OPG letter, Mr. A. Sweetnam to Mr. B. Putt, "Application for Approval for Proposed Works under the Navigable Waters Protection Act, September 30, 2009, CD# NK054-CORR-00524-00001.
</td></tr>
<tr><td>24</td><td>Class I Nuclear Facilities Regulations - Section 4(b)
RD-346, Section 5.3</td><td>LTPS IR:

As follow-up to LTPS IR#16, provide evidence to support the claim that that the new nuclear at Darlington facility operations will not coincide with the phase 4 operations of the St. Mary's quarry.</td></tr>
</table>

LTPS IR#	CNSC Regulation	Detailed Information Request and Response
		Rationale: If the new nuclear at Darlington facility operations overlaps the phase 4 operations at St. Mary's quarry, the information provided in the submissions referenced in the response to LTPS IR#16 cannot predict the potential phase 4 blasting effects on the new nuclear plant.
		OPG Response: Based on the New Nuclear at Darlington (NND) Environmental Assessment (EA) timeline used for planning purposes and available St. Marys Cement information, NND facility operations for the first two reactor units are not expected to coincide with Phase 4 operations of the St. Marys quarry. During the end of the operation of the later (third, fourth) units, approaching the year 2100, there may be some brief overlap with several years of Phase 4 operations at St. Marys. However, this hypothetical scenario occurs in the distant future, and there is considerable variability as to exactly when or if Phase 4 operations at St. Marys will proceed. Nonetheless, the timing and potential effects (blast wave and seismic) of Phase 4 blasting at St. Marys will be taken into account in detailed design of the NND at the Application for Licence to Construct stage(s). OPG maintains a co-operative relationship with St. Marys Cement, including an existing agreement to limit ground vibration levels to 3 mm/second at the property boundary between Darlington and St. Marys. This agreement is in effect for as long as St. Marys is licensed to conduct blasting operations at its site. To meet the 3 mm/second limit, charge weights have to be reduced as distance decreases. Potential vendors were advised of the 3 mm/second peak ground velocity agreement with St. Marys for the Darlington site at the start of the bidding process, and the seismic effects of St. Marys blasting will be accounted for in the detailed design, during the Application for Licence to Construct stage. As noted in the OPG original response to Information Request LTPS #16, blast wave effects are screened out for St. Marys current production and for production phases well into the future. Phase 4 will be taken into account as discussed above. The information to support the timeline rationale as pertaining to Phase 4 operations at St. Marys quarry was drawn from the application for the St. Marys Quarry Permit Licence of March 2004, which concluded Agency Review by September 5, 2006. Based on this information, and assuming that more than half of Phase 1 is already complete, OPG predicts that Phase 4 will occur from 2088 to 2094, which would be the last 7 years of St. Marys Cement production. The first two NND units are assumed to operate for sixty (60) years from 2018 to 2078, thus finishing operation ten (10) years before St. Marys Cement would commence their Phase 4. For EA planning purposes, the later (third, fourth) NND units are assumed to operate until 2100, and hence with about 7 years of potential overlap with Phase 4.