Fogler, Rubinoff LLP

Fogler, Rubinoff LLP Barristers & Solicitors
95 Wellington Street West
Suite 1200, Toronto-Dominion Centre
Toronto, ON M5J 2Z9
Tel: 416.864.9700 Fax: 416.941.8852
www.foglers.com

Reply To: Rodney V. Northey
Direct Dial: 416.941.8880
E-mail: rnorthey@foglers.com
Our File No. 094646

March 4, 2010

VIA EMAIL AND FACSIMILE

Christine Cinnamon
TransCanada Oakville Generating Station
55 Yonge Street, 8th Floor
Toronto ON M5E 1J4

Dear Ms. Cinnamon:

Re: Requested Comment and Feedback on
Proposed Oakville Gas-Fired Electricity-Generating Station
Draft Environmental Review Report: Public and Agency Review

In response to your request for comments and feedback within 30 days, and the recent extension of this period to March 4, 2010, we are writing on behalf of The Corporation of the Town of Oakville ("Town") to provide preliminary comments on your company's proposal to establish and operate a gas-fired electricity-generation stations (the "power plant"), and its draft Environmental Review Report ("ERR"), released on January 26, 2010.

The Town response begins with an overview of its main conclusions.

OVERVIEW

Based on current information, the Town believes that the TransCanada power plant at the present location, as depicted below, presents unacceptable risks to human health and safety:

(1) the power plant will add major emissions of toxic air contaminants into an already-burdened, completely urban and heavily populated airshed, at levels that the most current science predicts will cause fatalities, hospitalizations, and asthma attacks, with children and the elderly particularly vulnerable;

(2) the power plant will, in the course of each calendar year of its operation, regularly generate a vapour/ice plume that will reduce visibility kilometres off-site and, should it make ground contact, will coat the ground surface and create safety risks to all persons and vehicles crossing such ground and thereby put at risk usage of national railway routes, a 6-lane portion of the provincial Queen Elizabeth Highway, and regional and local roads; and

(3) the project will also present a human health and safety risk to nearby neighbourhoods due to the potential for fires, explosions, hazardous spills, gas leaks and other malfunctions that could have off-site impacts which have not been adequately assessed in the draft ERR.

The off-site attributes of the proposed power plant location are identified in Figure 1, below.

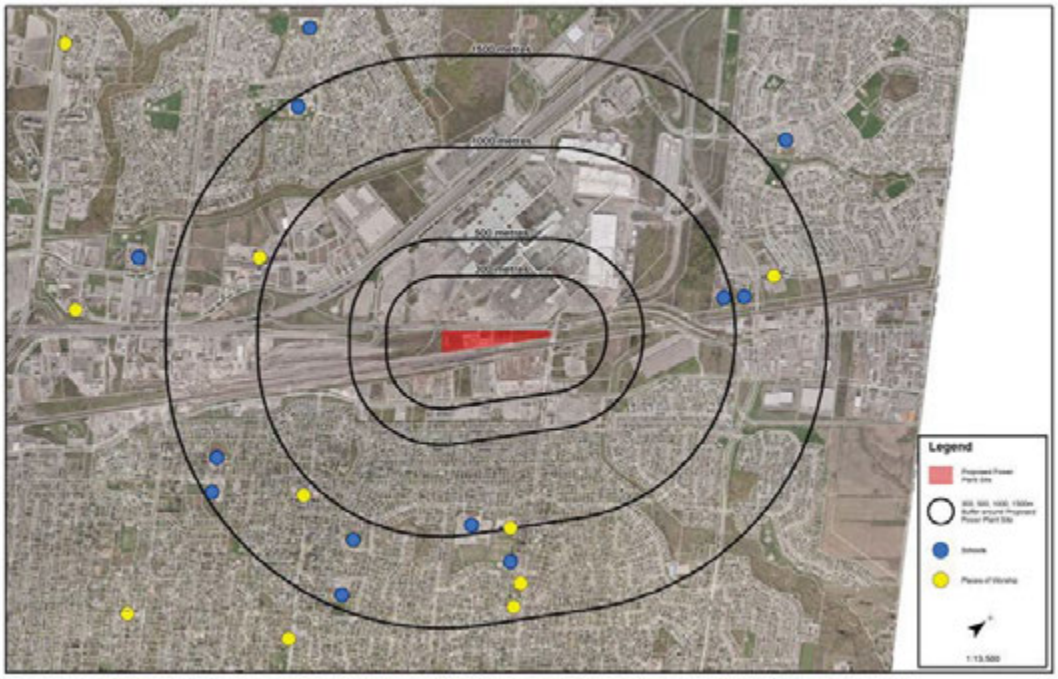

Figure 1

The Town also continues to have a fundamental objection with TransCanada's failure to carry out an individual environmental assessment of an undertaking of this magnitude, and its purported reliance on the streamlined "Electricity Projects" Regulation to guide project planning.

Organization of Response

The Town has organized its response into two parts:

Part One: Unacceptable Impacts to Human Health and Safety; and,

Part Two: Reasons why the draft ERR Demonstrates the Need for Individual EA.

In addition, the Town's response to the draft ERR includes technical comments from senior staff and three reports prepared by independent experts retained by the Town to review the draft ERR. A summary of the technical comments of Town staff, and copies of the expert reports are attached as appendixes to this letter as follows:

Appendix (A): Airzone One review of the draft ERR and supporting documents dealing with air quality;

Appendix (B): Dr. David Pengelly review of the draft ERR and supporting documents dealing with health risk from air emissions;

Appendix (C): Novus review of the draft ERR and supporting documents dealing with vapour plume and noise; and

Appendix (D): Technical Comments on the draft ERR from Town Staff.

PART ONE – UNACCEPTABLE RISKS TO HUMAN HEALTH AND SAFETY

Based on current information, the Town believes that the TransCanada power plant at the present location presents unacceptable risks to human health and safety. Such information raises three very serious problems:

(1) the air emissions from the facility and cooling tower;

(2) the anticipated vapour/ice plume generated by the proposed "wet" cooling towers; and,

(3) the potential for accidents, such as explosions.

1.1 Proposed Air Emissions Harming Human Health

Based on work done by the Canadian Medical Association, which the Town understands to be uncontradicted scientifically, existing levels of particulate matter less than 2.5 microns in size ("$PM_{2.5}$") in Oakville air are now causing more than 80 deaths per year in Oakville alone. According to the draft ERR, the project will be adding additional $PM_{2.5}$ emissions to Oakville's already overburdened airshed.

The draft ERR in part seeks to address the impacts of $PM_{2.5}$ emissions from the power plant by suggesting that emissions meet current regulatory standards. Respectfully, the Town believes this is misleading as there is no current regulatory standard for $PM_{2.5}$ other than that provided in the Town's Health Protection Air Quality By-law.

However, the draft ERR does not address the Town's Health Protection Air Quality By-law. While the draft ERR does contain some of the information required by the Town's By-law, the Town has serious concerns about the quality and extent of the information provided. Based on the limited information provided, the level of health risk posed by the project is unacceptably high.

1.1.1 The Current Regulatory Framework for $PM_{2.5}$

The draft ERR provides a misleading discussion of the current regulatory framework for $PM_{2.5}$ as it relates to emissions from the proposed power plant. First, the draft ERR appears to take the position that there is some regulatory standard for $PM_{2.5}$. For example:

> "For the purpose of ensuring compliance with the regulatory standards, we have assumed the estimate of Total Particulate Matter (TPM) as the estimate for PM_{10} emissions and $PM_{2.5}$.", (p.6-28)

However, the Town is aware of no regulatory standard for $PM_{2.5}$: that is why, on February 1, 2010, it passed the Health Protection Air Quality By-law 2010-035 (the "By-law"), which the draft ERR ignores.

Second, the draft ERR advises that the proposed power plant will not cause any significant effects because it complies with all applicable standards. For example:

> "Studies undertaken concluded that the operation of the OGS will not have any significant impact on local air quality and all applicable air quality standards and guidelines including those from the MOE, Environment Canada and OPA will be met.",(p. 6-19)
>
> "…[T]he OGS will meet or exceed all environmental regulatory requirements based on scientific evaluation of potential health and environmental impacts.",(p. 6-21)

However, if there are no standards for $PM_{2.5}$, then there is no basis to say that compliance with "all applicable" standards provides assurance that there will be no significant impacts.

Third, the draft ERR advises that because the power plant requires an air certificate of approval, it will not cause any adverse effects:

> "The MOE will also enforce the operation of the OGS within all requirements in the Environmental Protection Act. Since these requirements include prohibition of "adverse effects" such as those mentioned earlier, NOx levels produced by the OGS will not cause adverse effects or the OGS would not be allowed to operate.", (p.6-22)
>
> "In Ontario, the environment is protected by having enforceable air concentrations that result from operation of a facility.", (p. 6-23)
>
> "In Ontario, air quality standards are developed by the Standards Development Branch of the MOE that are deemed to protect humans and the environment." (p.6-23)

However, there are no *Environmental Protection Act* ("EPA") requirements or enforceable air concentration limits for $PM_{2.5}$. Also, while it is true that the EPA purports to prohibit emissions causing adverse effects, it is up to the provincial Ministry of the Environment (MOE) to enforce this prohibition. The EPA provides neither the public nor the Town with the power to enforce this prohibition. The Town's position is that current evidence indicates that $PM_{2.5}$ is above levels causing statistically significant increased deaths, and yet there is no known MOE action to prevent or limit such effects through enforcement.

1.1.2 Application of the Town's Health Protection Air Quality By-law

In late December 2009, prior to TransCanada's release of the draft ERR, the Town released a draft Health Protection Air Quality by-law for public comment. Public comment was facilitated by two Town-led information sessions, which we understand TransCanada attended. On February 1, 2010, the Town approved By-law 2010-035 for immediate application to all proposed facilities emitting major emissions of health-risk air pollutants.

The Town's definition of a "major emission" was quantitative and based on thresholds. The Town incorporated thresholds set out by the Government of Canada in its National Pollutant Release Inventory established under the *Canadian Environmental Protection Act*, as amended in 1999 ("CEPA, 1999), and by the Government of Ontario in its *Toxics Reduction Act*, *2009*. As

we believe that the Town definition in its By-law provides an important context for the present comments, we hereby set it out:

> "major emission" means an emission from a facility into the air of a health-risk air pollutant that exceeds at least one of the following thresholds:
>
> (a) for directly emitted fine particulate matter, more than 300 kilograms per year;
> (b) for volatile organic compounds, more than 10,000 kilograms per year;
> (c) for nitrogen oxides (as NO_2 equivalent), more than 20,000 kilograms per year;
> (d) for sulphur dioxide, more than 20,000 kilograms per year; or,
> (e) for ammonia, more than 10,000 kilograms per year;"

The draft ERR provides information on some, but not all, of the anticipated emissions of these health-risk air pollutants. For example, Table 4.4 referenced below, which is TransCanada's "conservative" scenario, indicates that the power plant's total $PM_{2.5}$ emissions will be 115,400 kilograms per year (based on the total found by adding all entries for PM_{10} listed below and recognizing that, in its draft ERR, TransCanada advises that it will treat all PM_{10} emissions as also $PM_{2.5}$ emissions.)

Table 4.4 Scenario 2 – Conservative Annual Emission Rates

Description	Contaminant	Tonnes / year				
		GT/G1	GT/G2	DG	Aux	CT
- Both units base loaded for 14 hours - 4 hours start-up and 1 hour shut-down - Aux boiler on 2 hrs/day	PM_{10}	56	56	-	0.4	3
	NO_x	279	279	-	2.2	0
	SO_2	3.8	3.8	-	0.04	0
	CO	3028	3028	-	4.5	0
	NH_3	133	133	-	0.0	0

Notes: GT/G1, GT/G2 = gas turbine 1 and gas turbine 2
DG = standby emergency diesel generator
Aux = auxiliary boiler
CT = cooling tower

Based on this information from TransCanada's draft ERR, though incomplete, the Town concludes that the proposed power plant would exceed the Town's *annual* emission threshold for a major emission of fine particulate matter in just over one day. Put another way, considering direct $PM_{2.5}$ emissions only, the proposed facility will emit $PM_{2.5}$ at a rate that is almost 200 times greater than the Town's threshold for a major emission.

1.1.3 Information on Air Quality Provided In the Draft ERR

The Town's By-law provides a relevant context to assess the human health impacts of these emissions. Four aspects of the By-law appear particularly important:

(1) it focuses on $PM_{2.5}$;

(2) it demands consideration of existing air quality, measured as existing concentrations of fine particulate matter in the ambient air;

(3) it assesses not only the direct emissions of $PM_{2.5}$, but also the emissions of "pre-cursor pollutants" whose emissions will assist in generating additional $PM_{2.5}$ in the ambient air; and

(4) it contains no lower limit on an "acceptable" concentration of $PM_{2.5}$ in the ambient air; instead, it sets a health-based threshold, namely an increase to the ambient air of 0.2 micrograms per cubic metre.

The draft ERR provides information on some, but not all, of these topics:

(1) it provides some information on direct emissions of $PM_{2.5}$;

(2) it provides some consideration of existing air quality;

(3) it provides no consideration of precursor pollutants, or their contribution to $PM_{2.5}$ levels in the ambient air; and,

(4) it provides some, though incomplete, information on the anticipated changes to ambient air quality due to the power plant.

1.1.3.1 Information of Direct Emissions of Fine Particulate

The Town agrees that the draft ERR purports to provide worst-case emissions; however, based on input from Dr. Franco DiGiovanni, an independent air quality expert retained by the Town, the Town believes that the draft ERR numbers do not represent worst-case emissions.

In particular:

(a) The power plant "is an intermediate duty generating station" which means that it will be operating on a variable basis, often ramping-up and down, resulting in greater emissions than would be the case if it operated at a constant speed. The impacts of variability on emissions have not been adequately assessed, meaning that emissions may be higher than estimated by the draft ERR resulting in greater impacts on air quality.

(b) There is a lack of supporting information and documentation for (a) a number of calculations that determine emission levels, (b) statements regarding emissions rates of equipment, and (c) statements regarding the effectiveness of mitigation measures. As a result, these calculations and statements cannot be verified by independent peer review.

(c) The impacts of a number of additional factors that influence emission levels or cause emissions have not been assessed, including the impact of Lake Ontario on particle dispersion, and the impacts of additives or contaminants in the cooling tower plume.

1.1.3.2 Information on Existing Air Quality

The Town agrees that the draft ERR provides some data on existing ambient conditions in the Oakville airshed. However, the Town notes that Dr. DiGiovanni has concluded that:

> "Background ambient air data used in the study was not drawn from more relevant sources within the study area, and (a) does not include the impacts of local emissions other than the proposed OGS; (b) does not account for the range of variation of background concentrations. As a result, the incremental impacts of the OGS on air quality within the study area have not been adequately assessed." [Appendix A, p. 1]

The Town also notes that the draft ERR does not present all of the data necessary to assess adherence to existing standards. As set out above, the draft ERR does not consider the Town's By-law. Additionally, the draft ERR fails to consider the data necessary to address the Canada-Wide Standards for $PM_{2.5}$: the draft ERR identifies this standard, but fails to provide the appropriate data to assess adherence to it.

1.1.3.3 No Consideration of the Contribution of Precursor Pollutants

The Town observes that the draft ERR ignores the contribution to ambient air levels of $PM_{2.5}$ due to precursor pollutants. Based on expert input from Drs. DiGiovanni and Pengelly, the Town believes that consideration of precursor pollutants would significantly increase this worst-case 24-hour ambient levels. The Town has also received expert input that state-of-the-art models exist to address this topic; however, the draft ERR shows no consideration of such models.

1.1.3.4 Incomplete Information on Changes to Ambient Air Quality

Lastly, the Town has identified predictions for increases to ambient levels based on 24-hour averaging periods at three nearby residential receptors, a nearby school and a maximum point of impingement (RMax).

Based on information from the draft ERR, though incomplete, the Town observes that, in the predicted worst-case scenario, the proposed power plant risks adding 3.9 micrograms per cubic metre to existing 24-hour ambient levels of $PM_{2.5}$ at RMax, without considering precursor pollutants. The annual average incremental increase for that receptor is estimated at 0.6 micrograms per cubic metre.

Annual averages for other receptors are not provided; nor is the full extent of the affected airshed assessed through contour mapping which would provide the concentration distribution of $PM_{2.5}$ throughout the affected airshed. Rather, the draft ERR limits its assessment to an area within 3km of the power plant with contour mapping of short-term concentrations of $PM_{2.5}$ only.

In order to fully evaluate the risk to a population, contour maps of annual averages for the affected airshed are required. This is why the Town's By-law specifically requires this information, which has not been provided in the draft ERR. Had the information requirements of the Town's By-law been addressed, the necessary information to conduct a full health risk assessment would have been obtained.

The limited information provided indicates that the power plant poses a serious risk to pubic health. With respect to $PM_{2.5}$, there is sufficient information to conduct a partial health risk assessment at the RMax receptor, as an annual average is provided. This is the only location where the necessary information is provided. However, a full assessment cannot be conducted as the impacts of precursor pollutants have not been assessed, and these can add significantly to incremental ambient concentrations.

According to the draft ERR, the annual average increase at RMax is limited to 0.6 micrograms per cubic metre. It is important to consider the significance of this increase. The Town makes two points on its significance:

> First, this increase is above the Town By-law's threshold for acceptable emissions. The Town threshold considers any increase above 0.2 micrograms per cubic metre significant and deserving of further study.
>
> Second, based on the expert input from Dr. Pengelly, this annual increase in ambient air quality levels represents a risk of 870×10^{-6} premature deaths over a 30-year period. Dr. Pengelly has also taken into account the Ontario criterion of acceptability of 1 death per million of lifetime exposure. On this basis, the proposed increase exceeds the Ontario standard for an acceptable risk by 870 times.

The Town also observes that increases of $PM_{2.5}$ levels will have serious health impacts in addition to mortality. The Town's position is that, beyond increased mortality, current evidence indicates that, there will also be significant increases in hospitalizations, asthma attacks, and other serious respiratory and cardiovascular incidents.

In addition to the chronic risk posed by $PM_{2.5}$, the power plant emits large quantities of NO_2 which pose a risk to human health on a short term (acute) exposure basis. Given the 24-hour exposure value of 11.5 ug/m^3 for NO_2 at RMax, Dr. Pengelly calculates the annual risk of mortality to be 2.1×10^{-5}. The proposed increased risk exceeds the Ontario standard for an acceptable risk by 21 times.

The Town recognizes that the present information is "draft" and thus any conclusions must be considered preliminary, not final. However, the present preliminary conclusions of the Town suggest very serious health implications from this aspect of the proposed power plant. Further information is required in order to conduct a full health risk assessment.

1.2 Anticipated Off-site Vapour/Ice Plume due to Use of Wet Cooling Towers

Based on current information on the design choices of TransCanada, the Town believes that this power plant will, in the course of each calendar year of its operation, regularly generate a vapour/ice plume that may extend kilometres off-site. The Town identifies this issue as arising due to design choice because different existing technologies, namely an air cooling process, would avoid this problem.

The Town's position regarding the current TransCanada design choice is that, where a vapour plume makes ground contact, it can make dry surfaces slippery and/or icy, and thereby create safety risks to all persons and vehicles crossing such ground. In addition, a vapour plume can reduce visibility to a point where safe vehicle operation may be compromised. Here, plume issues cause major safety concerns because the proposed power plant is located adjacent to or near national railway routes, a 6-lane portion of the provincial Queen Elizabeth Highway, and regional and local roads.

Greater detail on the proximity of this power plant to these major federal, provincial, and municipal transportation facilities is set out in Figure 2, below.

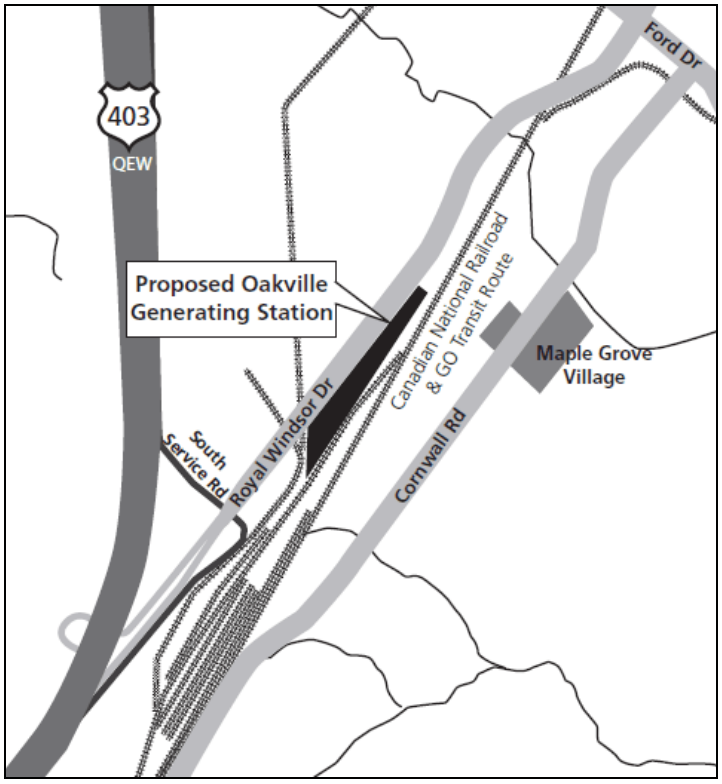

Figure 2

The Town notes that the draft ERR advises that the plume will not impact on the ground or roads; however, the Town has retained experts who do not accept that the current work meets applicable standards.

In considering how the impact of the vapour/ice plume should be addressed by a proponent like TransCanada, the Town begins with longstanding guidance on cooling towers from the Ministry of the Environment. According to this guidance:

> "A cooling tower should be located such that the distance to the point of impingement is greater than the length of the visible plume."

Under the terms of O.Reg.419/05, the Town understands the "point of impingement" to be any point, located off-site, that will be impacted by emissions from the facility in question. Applying this understanding to the MOE guidance, it would appear that the guidance seeks to confine a visible plume to the applicant's site.

By contrast, the draft ERR advises that:

> "There will be a visible water vapour plume from the cooling tower that will extend off property several kilometres mainly over industrial but also over some residential areas up to 9% of the year."

Elsewhere, the MOE guidance discusses the appropriate distance between a facility emitting a vapour plume and nearby roads to ensure public safety:

> "To predict the transport properties of the plume is a formidable mathematical task, with results not always consistent with observation.
>
> "We can circumvent these difficulties and at the same time introduce a safety factor by stating as a design standard that the length of the visible plume should be less than the distance from the tower to the nearest roadway."

The draft ERR states that at times the vapour plume will reach 2.5-3 km in length. However, a 6-lane portion of the provincial Queen Elizabeth Highway is located a mere 480m from the power plant, while national railway routes, regional and local roads are even closer.

Overall, the Town questions the acceptability of a proposal that cannot meet longstanding MOE guidance, and which virtually abuts major federal, provincial and municipal transportation infrastructure.

The Town also notes with concern that the risk assessment provided by TransCanada as part of the draft ERR contains no assessment of the risks associated with this aspect of the power plant.

1.3 Potential for Accidents such as Explosions

The recent February 2010 fatal accident at a gas plant in the United States in Middleton, Connecticut, provides a clear warning about the potential gas plants have to cause serious explosions. This accident tragically resulted in five deaths and 30 persons injured. From recent media reports, the Town believes that this accident arose from commissioning a natural gas pipeline to a new, 620MW combined cycle gas-/oil-fired power plant.

This accident provides a clear rationale for the Town to insist that TransCanada pay specific attention to a third category of impacts to human health and safety, namely possible impacts on community safety and risk due to the potential for life-threatening disasters. Such risks would include disasters such as fires, explosions, hazardous spills, gas leaks, and other malfunctions having off-site community impacts. It should also include consideration of risk due to malevolent action, not simply risks from malfunctions and/or accidents.

The Town has identified one brief section in the draft ERR that specifically addresses "Emergency Response": p.3-31. The Town seeks a more systematic examination of this topic, and one which rigorously assesses the risks of such accidents occurring at this location and the potential impacts associated with such accidents at this site.

The Town also expects a much more detailed plan on public notification and engagement on hazards and responses, including an awareness campaign for nearby neighbourhoods alerting residents, schools, and other sensitive land uses.

PART TWO – FAILURE TO CARRY OUT INDIVIDUAL ENVIRONMENTAL ASSESSMENT

As set out in the Town's letter to the Minister of the Environment, the Town believes that this power plant should be subject to an individual environmental assessment.

According to a 1995 draft EAA designation guideline which has not been replaced, there are four key topics to consider:

- likelihood of adverse environmental effect(s)*;*
- adequacy of existing laws and standards*;*
- adequacy of agency and public consultation*;* and
- overall benefits of designation*.*

2.1 Likelihood of adverse environmental effects

For the Town, the likelihood of significant effects, and unacceptable risks, from this facility is a key reason why the Town believes it is inappropriate to rely on the abridged EA process provided under the Electricity Projects Guide.

Put simply, the present proposed facility appears to be located in a built-up urban environment and presents serious risks to human health and safety, as set out in detail above (Part One of this letter). These circumstances lead the Town to insist that TransCanada describe and evaluate "alternatives" that would avoid or lessen these impacts, including alternative locations, site designs, and technologies. As the Electricity Projects Regulation allows for a process that pays no regard to any alternatives, the Town's position is that this process is not suitable to assess the TransCanada proposal.

The Town also puts forward other considerations which support its position that this proposed power plant requires a broad individual environmental assessment, not a circumscribed, abridged assessment:

> First, the Town has considered the scale of the facility. The EAA "Electricity Projects Regulation" provides a useful perspective on understanding the major scale of what is proposed at this site. Under the EAA *Electricity Projects* regulation, a project producing more than 5MW of electricity from natural gas is considered a “major commercial or business enterprise”. The proposed power plant involves the production of 945 MW of electricity for the Ontario grid. This production is almost 200 times greater than the threshold for what the Province has declared to be a "major commercial or business enterprise".
>
> Second, the Town has considered the scale of key environmental operations. The Town observed that this facility will emit the annual amount of $PM_{2.5}$ that qualifies as a "major emission" under the Town's By-law in just more than one day of operations: see page 5 above. An even greater scale applies to the magnitude of water impacts. According to the draft ERR, the proposed works will require a maximum sustainable flow of 17,838 L/min. This involves a daily taking of 25,686,720 L/day. Provincial approval under the Ontario Water Resources Act is required for any water taking greater than 50,000 L/day. Thus, the proposed water taking exceeds the provincial threshold by 500 times.

> Third, considering the likelihood of adverse impacts, the Town believes it essential to examine the proximity of this facility to incompatible sensitive land uses. The Town observes that the Ministry of Environment recommended "influence area" for adverse effects from a facility that is expected to have "frequent outputs of point source and fugitive emissions of significant impact" is 1,000 m. Figure 1, above, illustrates the sensitive land uses (another defined MOE term) within 1 and 3 km of this proposed site. Such uses include a school at approximately 350m from the site and residences approximately 400m from the site. We note also that the site size is small and has virtually no on-site separation distances or opportunities for buffering available.

In sum, on this first point, the Town concludes that the scale of this facility and its operations, and the risks to human health and safety presented by its proposed emissions, proposed cooling technology, and proximity to residential and other sensitive uses make an individual environmental assessment essential, as only such assessment demands thorough examination of alternatives.

2.2 Adequacy of existing laws and standards

In Appendix B to the ERR, TransCanada provides a copy of its initial publicly-circulated "Fact Sheet" on this proposed project. In this Fact Sheet, TransCanada provides:

> "TransCanada is committed to meeting the highest regulatory standards and managing the environmental footprint of its facilities."

The Town's position is that the draft ERR does not address this standard.

One key example of this ERR failure is the omission of the Town's new By-law from any consideration in the draft ERR. This omission arises despite an express section in the draft ERR that purports to deal with "Permits and Approvals", and includes municipal approvals in this list.

The Town thus seeks an assessment process that addresses the high standards of the new Town by-law. Since the self-assessment process of TransCanada surrounding the draft ERR is not meeting these high standards, the Town seeks an individual environmental assessment process that will.

A second example of the failure of the draft ERR to address existing laws is its failure to address an international convention signed and ratified by Canada on conducting transboundary environmental impact assessments (the "Espoo Convention"). The trigger for the Espoo Convention is a proposal to carry out an activity listed in Appendix I to the Convention and the likelihood that the proposed activity will cause a significant adverse transboundary impact, using the criteria for significance set out in Appendix III to the Convention (set out in the Table below). According to Appendix I, the designated activities include "Thermal power stations…with a heat output of 300 MW or more…". The proposed power plant is 3 times the scale of this threshold, so this criterion is met. According to Appendix III to the Convention, key criteria of significance are "Size", "Location", and "Effects". The Town's position is that this project meets all three criteria and is therefore significant. The Town also observes that the draft ERR provides a further indicator of transboundary significance: the anticipated emissions of specified air contaminants in such volume (i.e., greater than 90 tonnes per year) that notification is required to Environment Canada under the terms of the Canada-United States Air Quality Agreement.

Where applicable, the Espoo Convention advises that an environmental impact statement must meet minimum information requirements see out in Appendix II. According to Appendix II, the environmental impact assessment must include:

> "A description, where appropriate, of reasonable alternatives (for example, locational or technological) to the proposed activity and also the no-action alternative".

As set out above, the draft ERR and the Electricity Projects Regulation and Guide make no provision for consideration of alternatives, whereas an individual environmental assessment does. The Town thus believes the terms of the Espoo Convention provide a further reason why an individual environmental assessment is required for this proposed power plant.

APPENDIX III
GENERAL CRITERIA TO ASSIST IN THE DETERMINATION OF THE
ENVIRONMENTAL SIGNIFICANCE OF ACTIVITIES NOT LISTED IN APPENDIX I

1. In considering proposed activities to which Article 2, paragraph 5, applies, the concerned Parties may consider whether the activity is likely to have a significant adverse transboundary impact in particular by virtue of one or more of the following criteria:

(a) Size: proposed activities which are large for the type of the activity;

(b) Location: proposed activities which are located in or close to an area of special environmental sensitivity or importance (such as wetlands designated under the Ramsar Convention, national parks, nature reserves, sites of special scientific interest, or sites of archaeological, cultural or historical importance); also, proposed activities in locations where the characteristics of proposed development would be likely to have significant effects on the population;

(c) Effects: proposed activities with particularly complex and potentially adverse effects, including those giving rise to serious effects on humans or on valued species or organisms, those which threaten the existing or potential use of an affected area and those causing additional loading which cannot be sustained by the carrying capacity of the environment.

2. The concerned Parties shall consider for this purpose proposed activities which are located close to an international frontier as well as more remote proposed activities which could give rise to significant transboundary effects far removed from the site of development.

2.3 Adequacy of Agency and Public Consultation

The present process involves an abridged timeframe, no formal process of government review, and no opportunity for a hearing to challenge the proponent's environmental assessment or its proposed mitigation. All of these limits on the present environmental assessment process would be removed under an individual environmental assessment.

The Town also believes that, given the major scale of this power plant, its proximity to sensitive land uses (such as residences and schools), and its potential impacts, particularly impacts to public health and safety, this power plant should undergo thorough government review, broad public consultation, and a quasi-judicial hearing into the merits of this environmental assessment and supporting studies, before it should be considered for EA approval.

For the Town, one of the strongest reasons for the need for independent and detailed examination of this proposal is the juxtaposition of the Town's concerns respecting impacts on and risks to human health and safety set out above in Part One of this letter and the repeated statements in the draft ERR that all impacts and risks are "negligible". For example:

(1) "Effect on air quality (negligible effect)". (p.7-1)

(2) "TransCanada would not be pursuing this project if there was any indication that it could not be done responsibly and without adverse effect on people and the environment.", (p.6-20);

(3) "No human or ecological health effects are expected…", (p.6-21).

For these reasons, the Town believes that this third rationale to support the application of an individual environmental assessment is met.

2.4 Overall Benefits of Designation

The most important benefit of designation is the requirement to describe and evaluate alternatives, particularly alternative locations, site designs, and technologies that would avoid or minimize impacts on and risks to human health and safety.

A second benefit of designation would be clarity on the undertaking subject to assessment and the process to be followed. The draft ERR provides an inconsistent presentation of the undertaking that is subject to assessment and of the outcome of the assessment process. On the one hand, the draft ERR suggests that the undertaking is a proposed 945-megawatt gas-fired electricity generation project located at the Ford site; on the other hand, the draft ERR repeatedly responds to public concerns that its impacts, particularly emissions, should be compared advantageously against the emissions of a coal-fired electricity generating station: see, for example, pp.6-20, 6-31 re emissions of nitrogen oxides and carbon dioxide. On this basis, the "undertaking" appears to be that of providing 950 MW of electricity, and thus encompassing alternative means of providing that amount of electricity.

However, the Town submits that there are three problems with this approach. First, the "undertaking" of providing 950 MW of electricity to the South-West GTA is not an identified undertaking subject to the Electricity Projects Regulation: this Regulation deals only with specific electricity generating technologies and scales. Second, this Regulation makes no provision to consider alternatives, but instead focuses exclusively on whether a specific project may have any effects that are "significant". Third, the draft ERR provides no systematic evaluation of alternatives.

It thus appears to the Town that TransCanada is "cherrypicking" applicable environmental assessment requirements. When it serves the proponent's purposes, the draft ERR considers alternative technologies, and relative "advantages and disadvantages" compared to other alternatives. Yet, overall, it provides no systematic examination of alternatives.

The Town thus submits that TransCanada put its claims to appropriate proof. If, as TransCanada appears to claim, its proposed undertaking is superior to alternatives, TransCanada should carry out an assessment that systematically evaluates alternatives. Such

an approach is not consistent with the Electricity Projects Regulation, but it is entirely consistent with an individual EA.

The Town would be very pleased to have a systematic evaluation of alternatives carried out that is consistent with the *Environmental Assessment Act*. To date, there is only the secretive evaluation of alternatives carried out by the Ontario Power Authority, which remains outside any public scrutiny, and there is the ad hoc evaluation that TransCanada provides in its draft ERR.

The Town submits that there are two implications to the draft ERR approach to the undertaking and its assessment:

(1) If the undertaking is simply the proposed power plant, and the assessment is only that required by the ERR, then TransCanada should revise its assessment conclusions and responses to the public to focus on the issue of whether proposed effects are "significant", and not suggest that there is some legitimate comparison with other technologies or other sites; or

(2) If TransCanada wishes to make broader claims about the undertaking and its superiority to other technologies and/or other sites, then TransCanada should submit to an individual environmental assessment and carry out a systematic description and evaluation of all reasonable alternatives.

Conclusions

Thank you for your consideration of these comments. Once the Town has more detail than is provided in the draft ERR, and more time to review such detail, the Town will provide additional comments.

In the meantime, feel free to contact us on behalf of the Town if you have any questions about any of the concerns or other matters raised in this letter.

Yours truly,

FOGLER, RUBINOFF LLP

Rodney V. Northey

RVN/jp
Encl.

APPENDIX A

Review of the draft Air Quality Assessment
For the Oakville Generating Station
Environmental Review Report (ERR)
Airzone One Ltd.
Franco DiGiovanni and Claude Davis

 **and** 

Scope of Review

This review focuses on the draft Air Quality Assessment provided in Supporting Document 1 (SD 1), and relevant sections of the ERR, as well as the Cumulative Effects Assessment (SD6) specific to the air quality assessment.

Overview

We found a number of deficiencies in the air quality assessment, specifically:

(i) There is insufficient supporting information and/or documentation to allow for independent verification by peer reviewers of a number of key calculations that determine impacts on air quality;

(ii) There is potential for actual emissions, while in operation, to be greater than those stated in the report, which would lead to greater impacts than those assessed. In particular, the report has not adequately assessed the variability of operations, which may result in higher emission levels than has been estimated;

(iii) Complete assessments for a number of contaminants that may be emitted from the proposed plant, or may be present in the ambient background, have not been conducted. For instance, the concentration of $PM_{2.5}$ in the atmosphere is the result of both direct emissions of $PM_{2.5}$ and secondary pollutant formation due to the emissions of precursor contaminants. Secondary pollutant formation of $PM_{2.5}$ was not considered and which may result in a significant underestimate of predicted concentrations;

(iv) Background ambient air data used in the study was not drawn from more relevant sources within the study area, and (a) does not include the impacts of local emissions other than the proposed OGS; (b) does not account for the range of variation of background concentrations. As a result, the incremental impacts of the OGS on air quality within the study area have not been adequately assessed;

(v) Areas of uncertainty have not been highlighted and areas of conservatism have been overstated. As a result a balanced analysis of impacts has not been provided;

(vi) While the assessment does discuss some of the regulatory approvals that will be required there is no discussion of the Health Protection Air Quality By-law 2010-035, recently passed by the Town of Oakville;

(vii) No formal risk assessment was provided for major accidents (including transportation of materials), spills or upsets; and

(viii) Many of the difficulties with the Air Quality Assessment also present difficulties for the air quality aspects of the Cumulative Effects Assessment.

As a result, in our opinion, the draft Air Quality Assessment and Cumulative Effects Assessment do not clearly demonstrate a lack of significant air quality impacts. A detailed discussion of the draft air quality assessment is provided below.

(i) Insufficient Supporting Information and Documentation

There is insufficient supporting information and/or documentation to allow for independent verification by peer reviewers of a number of key calculations that determine impacts on air quality.

Section Number	Page Number	Comment	Explanation	Issue
1.4	1-3	The gas turbine generator (GT/G) and steam turbine generator (ST/G) firing rates are said to vary but no information is provided on the range of variation.	Varying firing rates can affect emission rates of contaminants.	(i)
2.1		The influence of nearby (2 km) Lake Ontario should be addressed as it could affect the propriety of the dispersion model (AERMOD) that was used.	Not accounting for lake effect breezes may lead to underestimation of maximum concentrations and hence off site impacts.	(i)
2.2	2-11	The modelling approach entailed examination of dispersion from only the OGS together with the average background based on the Clarkson Airshed Study. The calculation of the average background concentrations, derived from selected monitoring stations in the Clarkson/Oakville area, does not account for local	The model approach does not account for the influences of other sources in the airshed (especially those near to the OGS) and will lead to underestimates and overestimates of impacts at receptors in Oakville. A more thorough approach, in which all sources are considered, should have been used. While the	(i)

		influences on air quality. Measured ambient air concentrations at, for example, the residential station (46117) in Oakville were not assessed.	approach used might satisfy Certificate of Approval and point of impingement assessment purposes and requirements, it does not adequately address overall air quality in the modeled domain.	
8.2.2.	8.4	Table 8.1 – support for the value of the water salt concentration that was used has not been provided.	Supporting documentation is required for independent verification by peer review. Incorrect assumptions about water salt concentrations could lead to underestimating PM emissions from the cooling towers.	(i)
9.0		There is insufficient information on the location of maximum $PM_{2.5}$ and PM_{10} concentrations. (Either the location of maximum concentrations for Table 9.1 or preferably additional isopleths for $PM_{2.5}$, PM_{10} and NH_3 are required).	The lack of detail on the predicted spatial variation of PM_{10} and $PM_{2.5}$ does not allow for meaningful assessment of the spatial impacts of these pollutants.	(i)
Appendix B	B-4	The basis for the cooling tower particle emissions calculations has not been provided. A much more detailed explanation of this is required.	These calculations are required for independent verification by peer review. Potentially, fine PM emissions from the cooling tower may be underestimated resulting in an underestimate of off-site $PM_{2.5}$ concentrations.	(i)
Appendix C	C-1	There are no calculations to support the claims that certain sources of emission are negligible and do not need to be included in the assessment.	A peer review cannot be performed on these assessments of negligible sources unless calculations are provided.	(i)

(ii) Actual Emissions may be Higher than the Emissions used in the Assessment

There is potential for actual emissions, while in operation, to be greater than those stated in the report, which would lead to greater impacts than those assessed.

For example, one of the difficulties lies in the way that turbines will be operated. If a generator is operating at constant speed, its power output and air pollutant emissions do not change from hour to hour or minute to minute. However, combustion turbine generators are capable of relatively rapid response to varying load.

In this case, TransCanada has indicated that *"The OGS is an intermediate duty generating station,"* which means it will operate on a variable basis, often rapidly ramping-up and down. Under these conditions, air pollutants will be emitted in greater quantities than in the constant speed condition. This situation has not been fully estimated by TransCanada.

Since the off-site air pollution concentrations depend directly on the estimates of emission rates of the OGS, it follows that there is an increased uncertainty in the size and extent of air impacts forecast to result from the OGS. If the load is more variable than what is estimated in the Scenarios, there will be an increase in pollution levels, and increased adverse community health effects.

Additional section by section comments are below.

Section Number	Page Number	Comment	Explanation	Issue
1.4	1-3	What is the basis for the claim that the installation of a selective catalytic converter (SCR) will reduce NOx emissions to 3.5ppm?	The basis for the claim of the effectiveness of the SCR to reduce emissions, including all supporting documentation, must be provided for independent verification by peer review. Operational exceedance of this rate would mean that NOx emissions and concentrations would be higher than modelled.	(ii)
1.5	1-6	In using the SCR will TransCanada commit to installing a continuous emissions monitor (CEM) for NH_3 emissions to confirm/monitor ammonia slippage? What guarantees does the manufacturer provide that NH_3 slippage will not exceed the levels used in the model?	Lack of guarantees may mean that operational emission rates may exceed that indicated in the report. NH_3 emissions also cause enhanced secondary fine PM formation.	(ii)

3.1	3-2	It is unclear whether the heat input value for Gas Turbine in Table 3.1 is a nominal value or the maximum design heat input.	If maximum design capacities exceed the values given, then emissions during actual operations may be higher than indicated by the model.	(ii)
3.8.1		Scenario 1 does not reflect the maximum annual emissions rates for all contaminants (NOx and CO higher in scenario 2). Rather it represents "maximum steady operation of the turbine."	This scenario will not result in maximum impact as is indicated in the report	(ii)
3.9	3-18	For CEMs a statement is made that contaminants measured will "include" NOx, CO and O_2.	Other contaminants apart from those explicitly listed should be measured by CEM (e.g., NH_3).	(ii)
9.3		Are there estimates of emissions for VOCs, PAH and metals during start-up and shut down (in the same way that there are for PM_{10}, NOx, SO_2, CO and NH_3 for the Gas Turbine)?	No information has been provided on variation in emissions of these substances during start-up/shut-down. This information is required for independent assessment by peer review in order to ensure that emissions have not been underestimated during these periods.	(ii)
Appendix B	B-2	Clarification as to whether the manufacturer's emissions data are the guaranteed maximum emissions that the equipment are capable of during operations is required for peer review, especially for GT start-up/shut-down. How do emissions vary over the entire start-up/shutdown time? Copies of all relevant documents and correspondence should be provided.	Full data-range of emissions is required on an assured basis in order to provide certainty to the EIA results.	(ii)

(iii) Missing Assessments

Complete assessments for a number of contaminants that may be emitted from the proposed plant, or may be present in the ambient background have not been conducted. For instance, concentration of $PM_{2.5}$ in the atmosphere is the result of both direct emissions of $PM_{2.5}$ and the result of secondary pollutant formation due to the emissions of precursor contaminants. Secondary pollutant formation of $PM_{2.5}$ was not considered which may result in an underestimate of predicted concentrations;

Section Number	Page Number	Comment	Explanation	Issue
1.5	1-7	No information is provided on the water quality and any water treatment used in the Heat Recovery Steam Generator (HRSG)/steam turbine/condenser system. What guarantees are there of no microbial (particularly, *Legionella*) emissions?	The dissolved water treatment chemicals, when evaporated and emitted to the air from the cooling towers, effectively result in particulate and other emissions. Assessment of the validity of the cooling tower particulate emission rates is not possible without this information. Also the nature of the other contaminants emitted from the cooling tower is unknown.	(iii)
2.2	-	Historical criteria pollutant data are available from other OME/NAPS stations in Oakville, Mississauga and Burlington as well as toxics data from at least one NAPS station – why were they not used and cited in the assessment? Only data from a single year as cited from the Clarkson Study were used.	The description of air quality is inadequate since no trend data were developed and the background estimate provided does not adequately reflect variations in air quality as measured by monitoring stations. The conclusions drawn based on use of the estimated background are therefore questionable.	(iii)
2.2	2-11	For $PM_{2.5}$ average background value was chosen as the 90th percentile from selected stations in the Clarkson Airshed data, eliminating the top 10% of values measured at the selected stations in that study.	The TransCanada background value is lower than that required when assessing against the Canada Wide Standard for airborne $PM_{2.5}$.	(iii)

		However, the Canada Wide Standard criterion, cited elsewhere in the report, is based on the 98th percentile value thus eliminating only 2% of values.		
3.7	3-7	In earlier documentation provided (Nov. 24, 2009 Presentation) site plans indicated that some on-site roads would be gravel. Please confirm whether this is still intended.	Gravel roads have not been assessed but are known emitters of airborne contaminants in significant quantities.	(iii)
3.7		The storage of ammonia should be described – to establish whether or not fugitive ammonia emissions could occur.	Not accounting for additional NH_3 emissions will underestimate site-wide emissions	(iii)
3.8	3-7 and on	To the extent that any operating scenario includes a source of emissions which is not modelled at the maximum emissions of a contaminant that the source is capable of, an explanation (with all supporting evidence) should be provided as to why maximum emission rates were not used to develop any worst-case scenario. This should be done for all sources and averaging periods with a particular focus on start-up rates (which tend to be the highest emissions rates), start-up duration and the basis for start-up frequencies and duration. For example, why are start-up/shut-downs limited to 1 per day? Would TransCanada commit to no more than 1 start-up/shut-down per 24-hr period? How would more than 1 start-up/shut-down per day affect daily and annual emissions?	It is possible that operations of the plant could be more variable than described (especially with regard to the maximum frequency of start-ups per day and the maximum duration of a start-up). It is necessary for TransCanada to clearly explain and provide the supporting evidence for (a) which devices in each scenario, for each averaging period, and for each contaminant, are modelled at the maximum emission rates they are capable; (b) for how long they are modelled at the maximum rate; and (c) the basis for the frequency and duration used in each scenario, for each contaminant and averaging period. This is particularly important for start-up and shut-down rates and duration. Misidentifying the start-up and shut-down frequency, and more importantly the maximum duration of those transitional emissions, will likely underestimate off-site air quality impacts.	(iii)

		Are start-up times limited to a maximum of 1 hour? Does the start-up time depend on the length of the shut down period?		
3.12	3-21	The comparison of the OGS NOx emissions with province wide NOx emissions is not appropriate. A more appropriate region for comparison would be a smaller region such as the GTA or Oakville, etc., since NOx emissions can influence ozone concentrations downwind of an urban core. It is also necessary to evaluate the VOC (in conjunction with NOx) emissions for the same region in order to estimate the impact of OGS on ozone formation.	Ozone impacts were not adequately assessed.	(iii)
3.14	3-22	TransCanada should provide a fuller description of (dust generating) construction activities in order to assess dust emissions during construction phases.	Short-term exposures to components of construction dust may be harmful to the surrounding population.	(iii)
4.1	4-1	The evidence upon which the significance / insignificance of emissions was determined should be provided in an ERR.	A full peer review is not possible unless the evidence is provided.	(iii)
7.0	7-1	The use of AERMOD does not allow determination of formation of secondary pollutants ($PM_{2.5}$) as a result of the OGS emissions. A model with appropriate secondary aerosol formation is required.	Off-site fine PM concentrations will be underestimated by not accounting for secondary aerosol formation.	(iii)

7.0		What is the basis for using only three receptors for point-specific air impact assessments? How will background vary among receptors?	The receptors may not include the highest predicted concentrations. Greater impacts may occur at other specific sensitive receptors.	(iii)
9.2	9-2	The maximal off-site concentrations for contaminants with no MOE POI should be compared to limits provided by other jurisdictions, if available. If not available then site-specific toxicological assessment is required and should be presented in the report.	No basis is provided for some contaminants to evaluate whether impacts are significant or not.	(iii)
General	General	Secondary pollutant formation, especially $PM_{2.5}$, was not considered and the lack of such consideration would underestimate predicted particulate pollutant concentrations.	By not considering secondary $PM_{2.5}$ formation off-site impacts due to $PM_{2.5}$ would be underestimated.	(iii)
General	General	The method of simply adding a single value for background contaminant concentrations to the concentrations that are predicted to arise from OGS emissions is inappropriate as there are known (measured) variations in pollutant concentrations in the surrounding area (i.e., model domain). .	Defining the background concentration as constant misrepresents known measurements and the influences of existing known sources. This leads to oversimplification and/or misrepresentation of the combined impacts of OGS and the surrounding sources.	(iii), (iv)

(iv) The Impacts of Other Local Sources of Contaminants Were not Assessed:

The background ambient air data used in the study was not specifically drawn from sources within the study area, and (a) does not include the impacts of local emissions other than the proposed OGS; (b) does not account for the range of variation of background concentrations. As a result, the incremental impacts of the OGS on air quality within the study area have not been adequately assessed.

Cumulative air contaminant concentrations, at any location around the power plant, will be a combination of power plant emissions and emissions from all other air emission sources (both near and far) for any particular contaminant.

Determining the incremental concentration due to the proposed power plant requires modelling to determine the spatial pattern of impacts and how those spatial patterns vary over time. For example, air concentrations usually (but not always) decrease with increasing distance from the plant, but this can vary by wind direction when prevailing winds exist, as they do in Oakville. This results in a unique air concentration pattern at all locations around the proposed plant due to plant emissions. Notwithstanding other criticisms noted elsewhere, TransCanada has assessed incremental impacts using a dispersion modelling approach.

Likewise, every location around the proposed plant will possess a unique pre-existing (background) concentration pattern that will depend on time of year, meteorology and the spatial patterns of air emission sources around it. This pre-existing background can usually be sub-divided into a relatively constant, "regional" background level, and a much more variable "local" component. The regional component can usually be attributed a constant value valid over a large area for long averaging periods but seasonal and episodic variations in the regional background also occur. However, the local component is not constant and it is usual, in modelled assessments, to include local "non-project" sources to explicitly estimate this variation in the local component of background. Indeed, this requirement to explicitly model local, non-project, sources has been used in a number of jurisdictions across North America including Alberta and Saskatchewan and many US States as well as by the US Federal government.

Instead, TransCanada in their draft ERR, has assumed the same background levels for all locations around the proposed OGS. This approach lacks the more thorough assessment afforded by including local non-project sources in the modelled assessment.

(v) Understating Areas of Uncertainty and Overstating the Degree of Conservatism

It is not unusual to have areas of uncertainty in any air quality assessment. This assessment is no different in that respect, but these areas of uncertainty have not been highlighted and areas of conservatism have been overstated. As a result a balanced analysis of the results has not been provided.

Section Number	Page Number	Comment	Explanation	Issue
2.1.2	2-4	It was stated that because washout (which removes pollutants from the air) was not included in model predictions that predicted concentrations would be conservatively high. This is true only for longer (e.g., annual) averaging periods since for shorter averaging periods there are always a number of days without precipitation during any year and hence without washout. In order to evaluate impacts for shorter averaging periods, evaluation without washout is required in order to capture what may occur on dry days.	Statement should be clarified as it gives the impression of a higher degree of conservatism than is actually the case for shorter (hourly and daily) averaging periods.	(v)
2.2	2-11	One year's data was used for annual average background derivation (providing one, single value). The lack of a time series introduces uncertainty as to whether the values from that year are representative annual values.	Not highlighting uncertainties provides the public with the impression that final results are without doubt.	(v)
3.2.1	3-3	The statement that $PM_{2.5}$ is set equal to PM_{10} and that it is "very" conservative assumes that the coarse fraction ($PM_{2..5 - 10}$) is substantial.	Again care should be taken not to overstate the case in order to provide a balanced assessment for the public.	(v)

		This is unlikely with a combustion source; it is more likely that $PM_{10} \approx PM_{2.5}$ which means equating the two is <u>not</u> *very* conservative. The word "very" should be removed		
10.0	10-1	Statements that the increment in off-site contaminants are low relative to the background are questionable. According to the report the background contaminant levels used for the assessment were set conservatively high. A high background value skews the *relative* increase due to the OGS low. A worst-case assessment of the *relative* increase would require a comparison of the maximal increment to a more representative background concentration.	See comments above.	(v)
10.0	10-1	Statements that the probability of coincidence of maximal emissions with worst-case meteorology is "remote" should be backed-up with some quantification of that probability and the basis for that quantification.	The use of the word "remote" is unwarranted if no basis is provided to back it.	(v)

Appendix B	B-7	Air quality impact assessments should utilize worst-case emissions to find worst-case impacts. AP-42 emission factors are generally average values and not worst-case or highest values. As such the use of AP42 emission factors should not be represented to reflect worst case emissions.	This can lead to the incorrect impression that all aspects of emission calculations are worst-case, whereas they are not.	(iv)
General		There is no discussion on the uncertainties in model predictions. Such uncertainties should at very least be discussed qualitatively if not utilized quantitatively in the conclusions provided.	For example, AERMOD is only accurate to a factor of two meaning that impacts may be under-estimated by a factor of two due to modelling error.	

(v) No Reference to Town of Oakville Bylaw Requirements

While the assessment does discuss some of the regulatory approvals that will be required there is no discussion of the Health Protection Air Quality By-law 2010-035 recently passed by the Town of Oakville. Based on the air quality assessment as it presently stands the proposed operation would have difficulty in demonstrating compliance. The bylaw must be complied with before construction of the OGS is allowed. Compliance with the by-law should be assessed.

Section Number	Page Number	Comment	Explanation	Issue
General	General	Although the public agency consultation section of the main report documents extensive interaction with the Town of Oakville, no reference is made to the Town of Oakville By Law 2010-035. This bylaw will apply to the proposed OGS.	Results provided indicate that $PM_{2.5}$ impacts would likely exceed the Town's limits, and that the air quality assessment would not show compliance under the Town's By-Law.	(v)

Cumulative Effects Assessment (SD6)

This section includes sections extracted or referenced in the air quality assessment document (SD 1). Many of the difficulties with the SD 1 are again present in SD6. In addition, we also found a number of specific problems with this section.

Section	Comment	Explanation
2.4 Selection of Environmental Components for Cumulative Effects Assessment	Is there a reference for the statement that the air quality and associated ecological effects were identified as the key concern by Oakville residents?	If other concerns were expressed, they may not have been captured in this assessment.
2.4.2 Spatial Extent of the OGS Cumulative Effects Assessment	Without presentation of isopleths for NH_3, PM_{10} and $PM_{2.5}$ it is not possible to peer review the selection of the 3 km zone for modelling of impacts and the selection of which pollutants to focus upon	
3.1	Overall the assessments of past, present and future effects as presented provides little cumulative effects information.	
3.1.1 Past Effects	The discussion of past effects is insufficient. Historical emissions and equally importantly air quality data are available from the NPRI and from OME/NAPS stations in Oakville, Mississauga, Burlington and surrounding areas – an explanation as to why these data were not used should be provided.	Dependence on Clarkson Airshed Study (CAS) data may miss more relevant data readily available for the area around the proposed OGS.
3.1.2.	Statements are made that air quality in SW Ontario is affected "in large part" by emissions from the US. Similar statements are made in SD 1.Please verify the reference cited. Reference to the provincial statistics alone fails to recognise the variations at the local level shown in the relative contributions of local sources. This is exhibited, for example, in the variation of air quality levels at the	The statement assumes little impact on local air quality from local sources whereas this may not be the case.

	different monitoring stations in the Oakville, Burlington, and Mississauga areas.	
3.1.3 Reasonably Foreseeable Future Effects	Some of the (bulleted) initiatives can be quantified in order to give an idea of the relative impact from OGS emissions.	
3.2 Existing Conditions in the Project Area	Why were wind data in the Clarkson and other OME stations not considered? Was it established that Lester B. Pearson International Airport winds are representative of the OGS with respect to the surrounding area and especially the nearby receptors? If so, how was this established? Similar comments apply regarding the background data presented in this section to the comments on Sections 2.2 of the Supporting Document 1 and Section 2.2 of the main ERR.	
3.4 Connection Between Incremental Effects and Existing Conditions	What were the actual predicted concentrations due to the OGS at a) the nearest receptors? b) the monitoring stations? The modelling approach does not allow for comparisons between model predictions and measurements at the monitoring stations. The impacts of other sources of emissions in the airshed should have been assessed in estimating ambient air quality levels as part of the assessment of incremental effects. Why were other sources not considered in the modelling (as was done in the Clarkson Airshed Study)?	

APPENDIX B

Review of
"*Human Health and Ecological Effects Assessment for the Oakville Generating Station",*
Draft Version, SENES Consultants Limited, January 2010.
L.D. Pengelly; March 4, 2010.

Scope of this review.
The following is a limited review of salient points in the document having to do with the human health effects, and restricted to the air pollutants PM_{10}, $PM_{2.5}$, NO_x . We reserve the right to comment in more detail on the final version of this document when it is released.

PROJECT DESCRIPTION

The Oakville Generating Station (OGS) consists of two combined cycle gas-fired combustion turbine generator sets, operating independently, in parallel. The exhaust output from the gas turbines is fed to a heat recovery steam generator, with optional duct firing providing additional heat, and the steam output is fed to a steam turbine generator set. Most of the "waste heat" at the outlet of the steam turbine is rejected to a forced draught water-cooled cooling tower to reduce the outlet pressure of the steam turbine, for the purposes of increasing its power output. In line with each of two HRSGs is a selective catalytic reduction (SCR) system to react with and abate the output of NO_x from the combustion turbine.

Safety and Health Issues

Safety issues for the community include the fire, explosion and electrocution hazard of the 230kv switchyard; toxic chemical hazard of the aqueous ammonia storage tanks and associated pumps; and the fire and explosion hazard of the natural gas supply line and associated compressors both on and off-site. There are safety hazards associated with the combustion and steam turbines and associated equipment, although in general it is unlikely that there would be significant off-site hazard from this source. In addition, there is a safety risk to the community associated with the open water-cooled cooling towers from fog and icing effects on rail and roadways nearby. These issues do not appear to be canvassed in this document.

Community Health issues arise from the fuel combustion and pollution abatement processes. Combustion of natural gas is not a pollution-free process, and the exhaust from the combustion turbines contains a large suite of gaseous and particulate air pollutants, as well as water and carbon dioxide. These include suspended particles (PM_{10}, $PM_{2.5}$) gaseous pollutants (NO_x, SO2, CO), metals, volatile organic contaminants (VOCs) and polycyclic aromatic hydrocarbons (PAHs). In addition, ammonia (NH_3) is released as a consequence of the operation of the SCR system, as are fine particles ($PM_{2.5}$).

OPERATING SCENARIOS

The pollutant emission from the OGS is a function of the operations status of the combustion turbines and associated equipment. Unless the system has come to a stable operating temperature and is running under constant load, pollutant emission will vary both in character and amount. The following is a quote from the Draft Report:

During start-up and shut-down of the GT/Gs, the consumption of natural gas is lower than at full operation and concentrations of gaseous pollutants such as SO_2 and PM that are related to the amount of gas consumed are smaller during these phases. However, the combustion process is not optimized, therefore CO and NO_x emissions are greater during start-up and shut-down. The NO_x emission rates are also higher because the SCR is not operating (a minimum temperature is required for its operation). There are NH_3 emissions only when the SCR is operating (full operation conditions).

To deal with this problem, Senes have developed five "scenarios" of different operating conditions, and have predicted the pollution emissions associated with each scenario. Using the emissions, they have gone on (using dispersion models) to predict the temporal and spatial distribution of ground-level concentrations associated with each scenario. It is from these ground-level concentrations that Senes have estimated health effects according to the species of pollutant being examined.

The emission of two key pollutants of interest associated with each scenario are shown in Table 1, which has been developed from data in Section 1.3 of the report.

Table 1. Comparison of emission rates for PM_{10} and NO_2, using the same units for all scenarios.

		Emission (kg/day)	
Scenario	Description	PM10	NO2
1 Max Annual	-Both units base loaded with duct burners all year round - Emergency Stand-by Diesel Generator testing 1 hour per week - Auxiliary boiler off	444	1180
2	-Both units base loaded for 14 hours - 4 hours start-up and 1 hour shutdown - Aux boiler on 2 hours per day-	316	1534
3 Max 24hr	- Both units base loaded for 19 hours - 4 hours start-up and 1 hour shutdown - Aux boiler on 3 hours per day (2 hours start-up and 1 hour shutdown)	411	1780
4 Max 1hr	- Both gas turbines starting up - Both duct burners off - Auxiliary boiler on	322	4008
5	Emergency stand-by diesel generator testing only		360

Note that this comparison is not directly available from the Report, as three different emission units (tonnes/yr, kg/day, kg/hr) are used in the scenario tables in the text.

One of the difficulties with this approach lies in the way that generators are "dispatched". If a generator is operating in a "pure" base load mode, that means that the power demand on the generator is fixed, and does not change from hour to hour or minute to minute. This is particularly true for nuclear power generators, which are not designed to handle rapid load changes. Combustion turbine generators, on the other hand (like their cousins, ducted fan turbine aircraft engines) are capable of relatively rapid response to varying load. In this case, we have been told : *"The OGS is an intermediate duty generating station*", which means it operates somewhere between a "base load" and a "peaking" station. In this intermediate mode, it can be expected that for a proportion of the time (and we are not told what proportion) it will operate under conditions of highly varying load. Under these conditions, air pollutants will be emitted in greater quantities than in the base or constant loaded condition: how much greater will depend on the degree of load variability. This situation has not been modeled or estimated by Senes, which calls into question the usefulness of the information provided from the scenarios given in the report.

Since the ground level pollution concentrations depend directly on the estimates of emission rates of the OGS, and the health outcomes depend on the ground level concentrations, it follows that there is an increased uncertainty in the size and extent of potential adverse health effects forecast to result from exposure to air pollution from the OGS. If the load is more variable than what is estimated in the Scenarios, there will be an increase in pollution levels, and increased adverse community health effects.

HUMAN HEALTH ASSESSMENT

As indicated above, this review will be restricted to human health risks, as distinct from ecological risks, and will focus on the particulate and gaseous pollutants, not including toxic metals, VOCs or PAHs.

We accept, on the basis of this limited review that the human health risks from OGS emissions of toxic metals and organics are very small, because of the low concentrations of these pollutants expected to be found at ground level. In the same way, from examining the hazard indices and cancer risk values associated with human contact with soil and other deposition surfaces (garden food, surface and ground water) where deposition of pollutants might take place, we accept that the health risks from this pathway are likely to be very small. We have a concern, however that the emission rates of ferrous fine (and perhaps ultrafine) particles was not examined, as it might be expected that these could arise from the combustion turbines, and recent evidence suggests that there may be significant health outcomes associated with ultrafine ferrous particles.

<u>Chemicals of Concern:</u>

-Conventional airborne contaminants from turbine operation - gaseous air pollutants, particulate matter, ammonia;

-Natural gas combustion byproducts – trace polycyclic aromatic hydrocarbons (PAHs) and trace volatile organic compounds (VOCs); and

-Trace metals in natural gas.

The list of Chemicals of Concern is comprehensive, and appropriate. As stated above, some indication of combustion turbine (CT) sourced metals, in particular ferrous compounds might provide insight into the nature of CT particles, which again might be a health issue.

Emission Rates

The following statement is made on page 2-4:

> *"The predicted short- (1 hour, 8 hour and 24 hour) and long-term (annual averages) air concentrations of these chemicals are estimated by modelling at the maximum generation rates."*

It is not clear from the above whether this means the maximum electrical generation rates, or the maximum emission rates. This statement is unclear, but must be clarified by referring to Supporting Document #1. From Table 1 (this document) it can be seen that for PM_{10} and NO_2, emission rates vary by scenario and pollutant species, and in this Table we have assumed which scenarios have been used to determine maximum yearly, daily and hourly values.

Receptor locations

Four fixed receptor locations have been selected: three residential, R1, R2 and R3; and one school, S. A fifth receptor Rmax has been determined by the modelling process, and its location depends on scenario, and apparently by pollutant species, according to the text. R1, R2 and S are to the east (downwind), and R3 is to the west (upwind) of the OGS. All receptor locations are within approximately 1000 metres of the OGS.

Predicted maximum ground-level concentrations from operation of OGS (without background)

Maximum predicted air concentrations for the various pollutants (at the Rmax receptor) are given in Table 3-6 from Document 4, as reproduced on the last pages. Details of the predictions for PM_{10} by scenario are given in Table 3-7, which follows.

Health Outcomes

Senes has used two different methods in assessing health outcomes related to exposure to fine particulate. The first method is one commonly used in toxicological risk assessment, that is to say a comparison of the predicted concentration (with or without background) to a Toxicity Reference Value (TRV, expressed here as a Reference Concentration , RfC). The comparison (Predicted / Reference) is referred to as the Hazard Quotient (HQ), and the acceptable value is usually taken as 1.0. Greater than 1.0 is evidence of an unacceptable risk.

For outcomes that do not have a threshold (that is, no safe level), the concentration or dose is multiplied by a slope factor, which then determines the level of risk (probability) of an event (cancer incidence, or death). In Ontario, the acceptable level of risk is 1 in a million ($1* 10^{-6}$) for a lifetime exposure. Health Canada has defined an acceptable level of risk as 1 per hundred thousand ($1* 10^{-5}$). Since for mortality associated with exposure to fine particles it has been agreed that there is no safe level, the same general

technique (risk coefficient) can be applied to determine whether a given concentration gives rise to an unacceptable risk. This technique has only recently begun to be used, and Senes is to be commended for using this method when examining the chronic (long-term) burden of illness associated with fine particles.

For the gaseous pollutants, Senes has used only the HQ method.

Senes' Conclusions

> *In summary, predicted concentrations of gaseous air pollutants, fine particulate matter, VOCs, PAHs and metals from the OGS will incrementally add to existing air quality levels. However, the increment will be small, of limited duration and extent and will, for the most part, be well within the natural variation of existing levels. Therefore, it is not expected that any additional measurable health effects above those already associated with background will be observed in the residents of the Town of Oakville. Similarly there will be no adverse effects on ecological receptors.*

Senes admits that which is obvious, that the operations of the OGS will add to the existing burden of air pollution in the Clarkson airshed and beyond. In attempting to minimize the contribution of the OGS however, they continually make the claim that the increments from the OGS will be well within the natural variation of existing levels. The argument is especially fallacious for chronic exposure, as "natural variations" become smaller, the longer the averaging period, and what may appear to be an unmeasurable contribution becomes much more significant. There is no doubt that the statistical power of any measurement increases with the number of samples, or as in this case with the length of the sampling period. Their strategy seems to be to take pains in their selection of sampling sites to increase the background level (such as by excluding measurements from the Clarkson "residential" site, and to include sites with a high "natural variation" such as those close to highways. This has the double effect of tending to make the OGS contribution smaller in relation to background, and less discernable from background by their own criteria.

Application of the "No Safe Level" Approach

To examine the community health burden of fine particles, we can use the air quality data modeled by Senes, accepting the fact that $PM_{2.5}$ values have been underestimated because secondary formation from precursor pollutants has not been included. Contour mapping of annual averages of the incremental concentration of fine particulate across the affected airshed, including secondary formation of fine particulate from precursor pollutants, is required to conduct a full health risk assessment. This has not been provided. Since we have not been provided contour mapping which would provide us with the concentration distribution of fine particulate, we are limited to the use of the annual maximum modeling results concentration of 0.6 ug/m^3 (Table 9-2, ERR Supporting Document 1 (Air Quality)).

Using coefficients from the ICAP 3 (2008) National model, it can be shown that at a concentration of 0.6 ug/m^3 of $PM_{2.5}$ chronically, the risk of premature mortality is $2.9 * 10^{-5}$ per year (see details below).

If expressed as a risk per million, for the 30 year period that Senes has used to calculate other risks, it would amount to 870 * 10^{-6}, over the Ontario criterion by 870 times. This means that the OGS is exposing the residents, schoolchildren and school staff to a highly unacceptable risk of death at these locations.

The same method can be used to examine the risk of mortality associated with acute NO_2 exposure. Using coefficients from ICAP 3, it can be shown that, given the 24 hour exposure value in Table 3.6 (11.5 ug/m^3) , the annual risk of mortality is 2.1 * 10^{-5} , or 21 * 10^{-6}, again well in excess of the Ontario criterion.

To put these observations in a different context, the risk of mortality in Canada due to exposure to the H1N1 virus is approximately 1 * 10^{-5} . The Federal, Provincial and municipal governments have mobilized huge, and as yet uncounted resources in protecting the community from this risk. Why would a community welcome an even greater risk to its health by accepting the consequences of air pollution from a large fossil-fuelled electrical generating station? The Senes report has not demonstrated that air pollutants added to a taxed airshed do not pose an increased burden of ill health to the surrounding community.

Details of risk calculation:
In 2004, Oakville had a population of 167,888, and there were 725 NT deaths. Thus the annual NT mortality rate was 725 / 167888 x 100,000 = 432 / 100,000.[1]

From ICAP 3.0 [2] , the increased per cent risk of annual premature NT mortality for chronic exposure to 10 ug/m^3 PM2.5 is 11%, and thus the increase in NT mortality would be 432 x 11/100 = 47.5 deaths per hundred thousand. The risk associated with a concentration of 0.6ug/m^3 would be (0.6/10) *47.5 = 2.85 deaths per hundred thousand.

[1]Intellihealth Ontario; March 6, 2009

[2]Canadian Medical Association. *No Breathing Room: National Illness Costs of Air Pollution.* Technical Report, August 2008.
www.cma.ca/multimedia/cma/content_Images/Inside_cma/Office_Public_Health/ICAP/CMAICAPTec_e-29aug.pdf. Accessed 2009-03-09.

TABLE 3.6
MAXIMUM PREDICTED AIR CONCENTRATIONS FOR GASEOUS AIR POLLUTANTS EMITTED FROM THE OGS (NOT INCLUDING BACKGROUND)

Gaseous Air Pollutant	Maximum Predicted Concentration ($\mu g/m^3$)			
	1 hour [a]	8 hour [b]	24 hour [c]	Annual [d]
CO	912.7	404.8	137.3	2.95
NH_3	14.8	N/A	6.7	0.4
NO_2	118.5 (252.2)	N/A	11.5	0.76
SO_2	1.43	N/A	0.187	0.013
$PM_{2.5}$	22.9	N/A	3.87	0.59
PM_{10}	22.9	N/A	3.87	0.59

Note: For Rmax receptor

a - Based on Scenario 4 (start-up/shut-down operations) for CO, NO_2, SO_2 and $PM_{2.5}/PM_{10}$; based on Scenario 1 for NH_3; number in brackets for NO_2 is based on Scenario 5 (testing of the emergency stand-by diesel generator).

b - Based on Scenario 3 (maximum 24 hour emissions from 4 hours start-up and 19 hours continuous operation).

c - Based on Scenario 1 (24 hours of operation, maximum annual emissions) for SO_2 and NH_3; based on Scenario 2 for $PM_{2.5}/PM_{10}$ and CO; based on Scenario 3 for NO_2.

d - Based on Scenario 2 (expected annual emissions from 4 hours start-up and 14 hours operation everyday) for CO, NO_2, SO_2 and $PM_{2.5}/PM_{10}$; based on Scenario 1 for NH_3.

N/A - not applicable since no health-based limits exist.

TABLE 3.7
MAXIMUM PREDICTED AIR CONCENTRATIONS FOR FINE PARTICULATE MATTER EMITTED FROM THE OGS (NOT INCLUDING BACKGROUND)

Fine Particulate Matter		Scenario *	Maximum Predicted Concentration ($\mu g/m^3$)
$PM_{2.5}/PM_{10}$	1 hour	4 (Maximum 1 hour)	22.9
	24 hour	2 (Expected annual)	3.87
		1 (Maximum annual)	3.86
		3 (Maximum 24 hour)	3.86
	Annual	2 (Expected annual)	0.59
		1 (Maximum annual)	0.55

Note: at RMax receptor; fine particulate matter emitted from the stack was assumed to be $PM_{2.5}$

* Operating scenarios are described in detail in Section 1.3.

SIGNATURE PAGE

Signed by L.D. Pengelly, Ph.D., P. Eng

_____ March 4, 2010

APPENDIX C

Research Park Centre
150 Research Lane, Suite 105
Guelph, ON, Canada, N1G 4T2
t. 226.706.8080
f. 226.706.8081
info@novusenv.com

March 3, 2010

Town of Oakville
1225 Trafalgar Road
Oakville, Ontario, L6J 5A6

Attn: Mr. Doug Carr, LL.B., Town Solicitor DCarr@Oakville.ca

Re: TransCanada Oakville Generating Station
Peer Review of Air Quality, Noise and Vibration Assessments
Novus Ref. 10-0002

Dear Mr. Carr:

This letter presents the peer review of the draft studies conducted in support of the draft TransCanada Oakville Generating Station (OGS) environmental review report that may be relevant to assessing impacts from the anticipated water vapour plume and noise. The following studies have been reviewed:

- Draft Environmental Review Report, Oakville Generating Station, January 2010
- Draft Supporting Document 1, Air Quality Assessment for the Oakville Generating Station, prepared by SENES Consulting Ltd., dated January 2010
- Draft Supporting Document 2, Acoustic Assessment for the Oakville Generating Station, prepared by SENES Consulting Ltd., dated January 2010
- Draft Supporting Document 4, Human Health and Ecological Risk Assessment for the Oakville Generating Station, prepared by SENES Consulting Ltd., dated January 2010
- Draft Supporting Document 6, Cumulative Effects Assessment for the Oakville Generating Station, prepared by SENES Consulting Ltd., dated January 2010

The goal of our peer review work is to identify if the work conducted for OGS station demonstrates the required understanding of the potential vapour plume and noise impacts from the proposed OGS facility, and is consistent with good engineering practices and current scientific understanding.

No additional modeling has been conducted by Novus as part of this peer review.

As set out below, a major limit of the present review is the absence of sufficient data in the draft reports to replicate many findings. The areas where additional information should be provided have been highlighted below.

1.0 Water Vapour Plumes

"Wet" cooling towers of the type proposed at OGS can result in the emission of visible plumes, which can result in potential adverse effects, such as aesthetic effects, sun-shadow effects, fogging and icing.

1.1 Impacts of Visible Plumes

A visible plume is a mixture of air, saturated with water vapour and very small water droplets. The water droplets are formed when water vapour condenses as a fine mist. Although the plume is only condensed water vapour, it is seen as a form of pollution, i.e. 'sight pollution'. Plumes may pose a visibility hazard and may lead to the icing of roads if touching down to ground level. People may find living and working in the shade of a plume aesthetically unacceptable.

Potential fogging conditions can occur when atmospheric conditions allow the cooling tower plume to generate a visible plume cloud that contacts the ground. This can occur under periods of high ambient humidity and favourable temperatures and stabilities with the fog being generated by the cooling tower plume. Generated fog migrating across a highway or other thoroughfare may become a potential hazard and mitigation measures such as signs and traffic assistance may be needed.

Similar to a fogging episode, a cooling tower plume may develop into an "ice fog" and create icing hazards in surrounding area, when ambient temperature is below the freezing point (0°C). Cooling tower, plume icing, can potentially create significant hazardous conditions in public or residential areas and on roadways. In order for icing to affect roadway operations, the cooling tower plume must touchdown on the road surface and be condensed. This usually requires high winds (causing building downwash and low plume rise), correct wind direction, and low temperatures (< 0°C).

1.2 MOE Guidance on Minimum Separation Distances for Cooling Towers

Early in 1975, Ontario Ministry of Environment released the "Cooling Tower Guideline" (965-5776). The document provides guidance on predicting cooling tower visible plumes using simplistic screening level calculations, and in determining the potential for impacts. The MOE continues to use these guidelines in evaluating impacts of visible plumes on a site specific basis. This document is not referenced in SENES' reports.

The guideline states that "a cooling tower should be located such that the distance to the point of impingement is greater than the length of the visible plume". The guideline also notes the difficulties in predicting the transport qualities of plumes and states that as a "safety factor" "visible plumes should be less than the distance from the tower to the nearest roadway." However, it is also noted in the guideline that "... some judgment is necessary in its application. It is recommended that this guideline not be used as a basis for denial of an application without consultation with the Air Resources Branch."

The draft ERR estimates that the length of the visible plume will at times be in the range of 2.5-3km. The proposed OGS is immediately adjacent to Royal Windsor Drive and the CN Railway corridor, and is 480 m away from Highway 403. Given the close proximity of the project to major freeways, roadways, and rail transportation corridors, the MOE guideline should be addressed in the final SENES report, or alternatively, a more detailed evaluation of the safety risk of fogging and icing should be provided.

1.3 Modelling Deficiencies in the SENES Report

The SENES report provides an assessment of potential fogging and icing impacts, using the "Seasonal/Annual Cooling Tower Impact (SACTI)" model originally produced by the U.S. EPA.

While this is a much more advanced model than the calculation methods contained in the 1975 MOE guideline, it does not represent the current state-of-the-art for assessing plume impacts. The SACTI model is no longer supported by the U.S. EPA and Canadian governments. Regardless, it is still used for cooling tower impact assessments, despite its limitations.

SACTI uses a simplified plume downwash algorithm and does not account for the downwash effects of upwind/downwind buildings. This is important in the area of the proposed OGN site, due to the presence of large industrial buildings (the Ford Plant) and the proposed location of tall noise barriers. Terrain effects are also not accounted for in the modelling. The terrain increases in height towards the north, and may result in increased frequency of plume touchdown in this direction.

Furthermore, the modelling was based on weather (meteorological) data obtained from the Ministry of the Environment (MOE) for Lester B. Pearson Airport (Pearson Airport), which is far from the proposed OGS site, instead of local data or data more representative of conditions near Lake Ontario.

Weather data is a key input for modelling plume impacts. Consequently, the data used may not be representative of existing relative humidity and wind conditions (wind speed / direction).

In addition, in evaluating the potential for icing, the threshold (duration) of fogging required for icing to occur has not been provided. For example, in other recent assessments, it has been assumed that multiple hours of fogging at sub-zero temperatures is required for icing to occur. While we do not necessarily agree with this approach, the threshold used by SENES (if any) should be provided.

In order to adequately evaluate the risk posed by the OGS cooling tower we recommend that potential icing and fogging impacts be assessed using a more advanced model such as AERMOD, which can account for building downwash effects, or using a non-steady state model such as CALPUFF. Such modelling should account for terrain effects, building downwash effects, and use appropriate local meteorological data.

2.0 Human Health and Ecological Risk, and Cumulative Effects Assessment

Consistent with our comments above on vapour impacts from the proposed cooling tower, we have carried out a review of the human health risk assessment released with the draft ERR. Based on our initial review, we have identified no assessment of the risks associated with the anticipated water vapour plume in relation to different seasonal impacts (e.g., conditions where ice may result) or the relationship to several major transportation facilities within the range of the anticipated plume. Given the seriousness of these issues, we would expect that a quantitative risk assessment of the risk of accidents is required.

3.0 Noise

3.1 Models Used

The noise model used in the assessment is Cadna/A, a computerized version of the internationally recognized ISO 9613 noise propagation algorithms. This model is acceptable and is generally used in the industry.

However, the model utilizes key parameter settings which can affect predicted results. For example, the ground absorption value "G", which can range from 0 (reflective) to 1 (absorptive), can radically effect how far noise propagates. Other settings, such as relative humidity and temperature, can have similar effects. Depending the height and location of sources, changes in these parameters can result in "shifts" in sound levels by several hundred meters.

The highly-reflective ground absorption of G=0.05 stated as used in the assessment is appropriate. However, information on the other parameter settings used in the model should be provided in the final report. As appropriate values for these settings can be difficult to determine, a sensitivity analysis should also be completed.

Similarly, some of the default "factory" settings in the model can affect the results. One such factor is the search radius, which limits how far the model predicts noise levels from certain sources. The default setting in Cadna/A is 1500 km which, in general, is acceptable. However, for power plants, the sources emit sufficient noise levels that potential noise impacts can extend well beyond this limit. There are "0 dB" values for some major sources shown in the point of reception summary tables; it seems possible that this may be due to this setting. The effect of other settings such as the lateral diffraction search distance can have similar effects.

Another important model setting, particularly for large sources, and where noise mitigation is involved, is reflection from building walls and vertical structures. The Order of Reflection stated used in the model of 3 is generally appropriate. However, the reflective surfaces used in the modelling should also be identified, and the reflectivity coefficients used in the modelling should also be provided.

For example, there are situations in the modelling where "retro-reflections" can occur, reducing the effectiveness of noise mitigation, such as between the cooling tower side walls and the proposed noise barrier walls. This could also occur for the HRSG sidewalls and the transformer sides. If the noise barriers are required to be sound absorptive on the equipment side to reduce this effect, this should be specified in the report.

3.2 Noise Emission Levels and Details on Noise Mitigation

Noise emission levels are a key parameter in the modelling. Noise emission levels for equipment are provided in Tables 7.3 and 7.4 in the SENES report. However, based on our experience, the values seem quieter than for similar equipment we have seen in the past. In some cases this is due to the effect of noise mitigation measures, such as lagging for the Heat Recovery Steam Generators (HRSGs), included in the "base" noise emission data.

For situations where the mitigation measures are already included, no data has been provided on the amount of noise reduction provided by these measures. This makes it difficult to determine if the mitigation measures are reasonable or feasible. No supporting data such as manufacturer data sheets or guarantees have been provided in the report appendices. Such data should be provided.

3.3 Source Directivities

Noise sources are often directional in nature, with more sound energy being focused in certain direction than in others. This would apply to sources such as the HRSG exhaust stacks and the turbine air intakes. Information on source directivities used in the modelling has not been provided.

3.4 Interior Noise Sources and Noise From Building Walls

SENES has used a feature of the Cadna/A model where interior noise sources, such as the Gas Turbines, compressors, etc., which are located "indoors" within buildings, can be modelled as radiating "through" the building wall, accounting for the noise reductions of the wall structure. This allows for the model to "simulate the sound radiation from buildings". This technique, although a useful screening tool for smaller facilities, can underestimate impacts for large structures such as the OGS power plant. It does not account for the effective changes in source heights and locations (and corresponding reduced screening effects) resulting from the taller buildings, and does not necessarily account for the build-up of reverberant sound energy in the

space. Sufficient information has not been provided in the report to ensure that the screening method used has been done correctly.

A more accurate, appropriate method would be to manually calculate sound levels at radiated at exterior facade points, and to model them as exterior "area sources" or arrays of point sources.

3.5 Potentially "Missing" Sources

The power plant buildings will require ventilation fans and air openings to provide adequate air changes to control heat build-up. Noise from the fans themselves, as well as noise from the interior spaces escaping out through the openings can be significant sources of off-site sound levels. These are not currently addressed in the modelling work done by SENES.

3.6 Facility Operating Conditions

Power plant noise emissions may vary significantly with time. For example, combined cycle power plants such as the proposed OGS may produce more noise during start-up due to the need to direct low quality steam away from the steam turbine. The gas turbines can also be louder during start-up. Similarly, emergency equipment can produce additional noise during scheduled testing.

The SENES report only addresses normal operations and emergency generator testing. Start-up noise should be further analysed in the final report. This is consistent with recent Ministry of the Environment initiatives, such as changes to Regulation 419, which will specifically require start-up impacts to be assessed. Similarly, the final SENS report should provide evidence that other planned high-energy intermittent noise sources, such as steam or air venting, or "steam blow downs" have been adequately assessed and mitigated.

3.7 Low Frequency Noise

Low frequency noise (LFN) is not addressed in the assessment; although gas turbine power plants are significant sources of low frequency noise that can result in nuisance impacts at nearby sensitive receptors. In particular, it is known that gas turbines and boilers can produce low frequency noise which can result in feelings of annoyance due to vibration induced rattle, nausea, headache and uneasiness.

Sound (and noise) is composed of energy at a number of frequencies. Noise in the range of 10 Hz to 100 Hz is typically considered to be low frequency noise. This comprises the low bass, "rumble" frequencies of sound.

Due to the physical characteristics of LFN (i.e., its wavelength), and the molecular characteristics of the atmosphere, low frequency noise does not readily attenuate. Thus, it can travel (propagate) farther and at higher amplitudes (sound levels) from major sources than other types of noise.

Low frequency noise has the ability to easily penetrate most structures, such as residences, while higher frequencies of sound are attenuated. As an example, many people have had the experience of hearing the bass beat of music within their homes from a near-by neighbour, while the remainder higher frequency portion of the musical sound is inaudible.

It can also create resonances in light-weight building structures such as windows, resulting in audible and potentially perceptible vibration (rattle).

The wavelength of LFN and its ability to penetrate structures makes noise mitigation difficult. Noise barriers, enclosures and silencers (mufflers) are not as effective in mitigating LFN.

The majority of noise guidelines are expressed in "A-Weighted decibels", also known as dBA values. A-Weighted decibel values incorporate a weighting scheme that reduces the influence of low frequencies to the total sound level. For sources producing high levels of LFN, such as power plants, A-Weighted criteria by themselves are no longer appropriate, as they do not adequately predict potential annoyance.

There has been much research on appropriate noise measurement metrics for low frequency noise. Most research shows that "C-Weighted" decibels, or un-weighted (linear or dBZ) values are most appropriate, since the low frequency noise portion is not removed from the total level. Many LFN impact assessment techniques involve comparisons between overall dBC or dBZ values and the corresponding dBA levels.

While the MOE requirements under Publication NPC-205 do not address LFN, the fact that the draft ERR does not address this significant source of nuisance impacts is not consistent with best practices.

For instance, in 2000, Sithe Global Ltd. (Sithe) began an approval process for the Sithe Southdown Station. The proposed location was Mississauga, Ontario. As part of negotiations with local ratepayer groups, led by the "Clear the Air Coalition" (CTAC), Sithe agreed to introduce additional noise controls to address LFN. The agreed-to limits were a total sound level of 45 dBA and linear value of 65 dBZ at the closest residential receptors.

An evaluation of potential LFN impacts should be presented in the final ERR. It is recommended that a linear value of 65 dBZ at the nearest sensitive receptors should be utilized as a practical limit to mitigate the impacts of LFN.

4.0 Conclusions

Based on our scope of work, we have identified several issues with the vapour plume and noise modelling work provided in the draft reports for the OGS. Additional modelling work using appropriate input data is required. Additional information should be provided in the Final ERR reports to allow for a complete peer review. We also recommend that all noise and water vapour plume modelling files be supplied by SENES.

Should you have any questions or concerns, please do not hesitate to contact us.

Sincerely,

Novus Environmental Inc.



Nigel Taylor, M.Sc., CCEP Scott Penton, P.Eng. Xin Qiu, Ph.D., ACM

Appendix "D"

Technical Comments on the Draft ERR

The Town response to the draft ERR has involved review by senior staff and review by independent experts.

Recognizing the preliminary nature of the draft ERR and the brief period of time made available to carry out this review, the Town has sought to carry out a focused review.

In the limited time available to comment on the draft ERR, Town staff have provided comments on two topics:

(1) Town approval issues beyond those identified by the draft ERR; and

(2) other Town issues with the draft ERR.

On the first topic, the Town provides the following table on approval issues:

Draft ERR Section	Approval Issue
All sections dealing with air emissions	• Failure to reference the Town Health Protection Air Quality By-law
Section 3.1	• The size of the site is inadequate for a facility of the scale proposed, according to Ontario Power Authority (OPA) requirements. • The OPA document, "Supplementary Environmental Impacts Report for the Integrated Power System Plan", indicates that a 900MW generation facility requires 12.51 hectares of land, which includes zones or exclusion areas (p 3-16 to 3-21). The draft ERR states its footprint is only 5.5 hectares.
Section 3.1.2 Natural Gas	• The municipality is concerned about the impact of permitting any large diameter, high pressure gas feeder main(s) to the OGS site located on municipal property or road allowances. • Alternative routing to the site may be necessary such that it does not encumber or require the use of lands under Town of Oakville jurisdiction.

Draft ERR Section	Approval Issue
Section 3.1.4 and 3.1.5 Site Layout and Process Water and Wastewater System	• The municipality is concerned that permitting any new or future use of the Maple Grove Drive road corridor for private water or storm drain pipe operations to the OSG site, beyond the terms of the current agreement for the existing lines only.
Section 3.2.3 Grading Section 3.6.5.1 Conservation Halton	• Site grading acknowledges an impact to an existing wetland area. Impacts to this area require review and approval from Conservation Halton – should confirm that approval will be forthcoming.
Section 3.2.5 Stormwater Management Plan	• Reference is made in at least three parts of this section to the "Sheldon" sub-watershed. The Sheldon Creek sub-watershed is located in southwest Oakville and not affected by this site. Why is this referenced?
Section 3.3.3 Underground Transmission Cables Section 3.6.5.3 Transmission Line Permits Section 4.9.1 Effects during Construction	• The Town is concerned that any proposal to bury / install transmission cables upon or within lands under the jurisdiction of the Town of Oakville. This will seriously impact on the future use of municipal roads / property. • There has never been any discussion with the Town regarding the use of municipal property or roadways (Maple Grove Drive, Royal Windsor Drive) for the purpose of installing transmission cables. • Similarly, there has never been any discussion with the Town to solicit our comments or support for the use and occupation of traffic lanes and shoulders along Royal Windsor Drive for construction purposes.

Draft ERR Section	Approval Issue
Section 3.6.4 Municipal Permits	• The proposed zoning amendment referenced is not a minor one. Current proposal does not conform to the Town's Interim Control By-law and can not be supported as an appropriate land use until completion of planning studies and a new zoning regulation is put in place. • Reference should be added to the municipal approval required under the Health Protection Air Quality Bylaw.
Section 3.6.5 Other Authorizations	• The proponent has failed to acknowledge that Conservation Halton (CH), Department of Fisheries & Oceans (DFO), Ministry of Natural Resources (MNR), and possibly other agencies will be involved in the assessment and permitting of any proposal to discharge effluent to Lake Ontario from the large diameter drain outfall.
Section 4.7.4 Aquatic Features Associated with Discharge to Lake Ontario	• The net effects and mitigation referenced in this section have not been reviewed / confirmed with the appropriate regulatory authorities. If the regulatory authorities are not in agreement with this assessment – what will happen? • The reference to Water Resources (page 4-51) discounts the Great Lakes Agreement for water use thresholds, yet the proponent's predicted use is within 6% of the threshold. Have these water use figures been confirmed to the satisfaction of the approval authorities? What are the implications if the proponent's estimates are on the low side and actually do fall within the threshold of the GL Agreement?

On the second topic, the Town provides the following additional comments:

Facility Description:

- Inconsistencies re: operating hours – 5110 hours per year on p.3-3 vs. calculated 3640 on p. 4.2.

Screening Process

- ERR report provides "yes" or "no" answers to screening criteria questions in the "Guide" (p.4-2) but not a systematic response to each of the criteria in the actual evaluations. Should at least be a "concordance" table showing where screening issues are addressed and summarizing findings.

- Inconsistencies re: Screening Checklist (zoning consistency, contaminated land, rare, threatened and endangered species) and conclusion that no ERR is formally required.

- ERR should be clearer in demonstrating how mandatory requirements/discretionary elements were addressed.

- Incomplete summaries of net effects, advantages and disadvantages in main text and Table 7-1.

Land

- No systematic policy review (as per screening list criteria).

- No recognition of Oakville ICBL or OMB Decision. States no rezoning/variances required which is incorrect.

Natural Environment

- Fish entrainment studies deferred until operations – possible Fisheries Act CEAA trigger, should be considered before construction. Possible issue of piecemealing deferring an issue so that it doesn't have to be addressed in this process). Requested information re need for Fisheries Act permit not provided to Halton Conservation or DFO; therefore no confirmation re: trigger.

- OGS requires 25.6 million litres per day, returns 3.1 million to the lake (p.6-43). Thus loss of water.

- Possible impacts re additional algae not addressed

- Removal of marsh not addressed

Water Issues:

The Town is concerned about the lack of detail in the draft ERR on the infrastructure proposed to be used to take and discharge massive volumes of water. There is concern related to the age and capacity of the water intake and storm sewer services, including structural integrity of the pipes and outfalls. The Town requests video inspection reports on the integrity and capacity assessment data for the infrastructure related to water intake and discharge.

The Town would also like to see more detail from TransCanada on how its proposed taking addresses applicable law and policies, including regard for the recent Great Lakes Agreement signed by Ontario.

Similarly, the assessment of impact on fisheries is cursory. This is not satisfactory. The Town seeks more detail on what fish habitat exists in the vicinity of the infrastructure proposed for future use, whether any changes may be required of such infrastructure, and how fish habitat may be altered by the proposed actions.

The Town is also unclear about the water balance shown schematically in the draft ERR. This schematic suggests potential for a draw on the Regional water system should the proposed TransCanada raw water source for cooling be out of operation. The Town thus seeks more clarification about what is intended by this schematic in terms of potential draw from the Regional potable water system

Human Health & Safety

- Setbacks and ammonia storage and rail hazard – not addressed – location of ammonia storage not shown on site plan.

Individual EA Considerations

- 945 MW output vs. Minister's Declaration/IPSP for up to 850 MW, IPSP requirement for "approximately" 850 MW (ERR says 750 MW on a cold day, 950 on a hot day, average 945 MW) – what is "rated capacity" as in Minister's Directive? If IPSP/Directive is exceeded, what is authority?