Concerns/Issues/Questions With the Air Quality Assessment Technical Study Report (AAQATSR), July 31, 2009 By Wendy Bracken

Section 3.1.1.1

The EA should acknowledge and assess against proposed new air standards under Regulation 419(EBR Registry Number: 010-7190). The proposal includes new standards for Chemicals of Potential Concern (CoPC) to the project as identified in Table 4-2 – dioxins and furans, chromium, cadmium, nickel and polycyclic aromatic hydrocarbons. The assessment should examine compliance with these proposed new standards.

Section 3.1.3

The York Durham emissions limits for CO, dioxins and furans and organic matter do not meet the proposed revised A7 guideline. The EA acknowledges the proposed changes to the air standards but does not purport that they will be able to meet them should they come into force.

Background Concentrations

Table 3-10 on page 37 gives the Summary of Background Concentrations used in the Air Quality Assessment.

- **The background concentrations reported for all volatile organic compounds (VOCs), chlorinated monocyclic aromatics (CMAs), and Polychlorinated Biphenyls (PCBs) were developed using data from other monitoring stations in Toronto and Newmarket** operated under the National Air Pollution Surveillance (NAPS) Network by Environment Canada **and did not come from the Courtice monitoring station.** This is documented on page 35.

- **There are no background concentrations (i.e. there was no ambient monitoring data reported) provided for combustion gases Hydrogen Chloride (HCl), Hydrogen Fluoride(HF), Ammonia, and Total Volatile Organic Matter (as CH4)** in Table 3-10 although they are identified as chemicals of potential concern(CoPC) in Table 2-2 on page 7. That there was no ambient monitoring reported for HCl, HF, and Ammonia is surprising as predicted emissions of those three chemical compounds trigger a Transboundary notification (page 58). In addition, HCl and HF are documented in this report(on page 277)as chemicals that will be monitored continuously if the Facility is approved, so why were these chemicals excluded from the ambient monitoring?

Furthermore, the SSHHERA identifies a health risk for HCl at one of the receptor locations so it is certainly a chemical of concern.

- **There are no background concentrations (i.e. there was no ambient monitoring data reported) reported for Mercury (Hg) – Vapour/Particulate** phase in Table 3-10 although it is identified as a chemical of potential concern.

- There are differences in the ambient air background concentrations in the Final EA AAQATSR (July 31, 2009) and the Draft Final EA AAQATSR (June 12, 2009) for some of the chemicals of potential concern. The Draft Final AAQATSR (June 12) is the document that was considered by Regional Council in their final vote on the EA on June 24, 2009. Some of the ambient air concentrations were changed significantly as shown below.

Dioxins/Furans	1 Hr-Average	24 Hr-Average	Annual Average
June 12	4.71E-08	1.93E-08	1.66E-08
July 31	5.77E-08	2.37E-08	1.66E-08

Sum of Metals (As, Ni, Co, Pb, Cr, Cu, V, Mn, Sb)	1 Hr-Average	24 Hr-Average	Annual Average
June 12	4.68E-02	1.92E-02	1.33E-02
July 31	5.15E-01	2.12E-01	1.05E-01

VOC – Pentachlorophenol	1 Hr-Average	24 Hr-Average	Annual Average
June 12	3.60E-04	8.76E-04	1.68E-04
July 31	2.13E-03	8.76E-04	4.10E-04

An explanation for the changes in these ambient air concentrations in the Final Report was not found.

Estimated Facility Emissions

Facility Emissions, stated in kg/h, are provided in Tables 4-1 and 4-2 on pages 50-54 for both facility size scenarios at maximum capacity(MCR) and at a reduced capacity(75% of full load(MCTD)).

- Page 49 states that emissions from both the 140,000 and 400,000 tpy Facility scenarios were **estimated**. It also states **"For CoPCs where no reliable source of speciation or emissions data was available from the proponent or literature sources(e.g. styrene, acetone), emission estimates could not be developed. Where this was the case, it is expected that emissions either do not occur or are negligible in magnitude."** The assumption made in the last statement is very concerning. Incinerators emit hundreds of pollutants that are not monitored and the health effects of many substances are as yet undetermined by the scientific community. This is one of the inherent risks of incineration.
- In Attachment 5 of the Municipality of Clarington Report PSD-071-09, July 2009, **Clarington peer reviewers** Murali Ganapathy and Talar Sahsuvaroglu of SENES Consultants Limited make the following statement regarding the Draft Report – Facility Energy and Life Cycle Assessment: **"The report contains no consideration of the monitoring requirements necessary to ensure and assess that emissions estimates are correct. If accurate offset calculations are to be made, monitoring must be considered, referred to and documented."** The initial date of this comment was May 29, 2009 and the replying disposition of the Project Team dated June 23, 2009, stated in part that: "Monitoring would be undertaken as broadly described in the Covanta Proposal and will be discussed in detail in the supporting documentation for the EPA approvals for the Facility."; **The Clarington peer reviewers DID NOT ACCEPT the disposition of the Project Team** and stated in their review comments dated June 30, 2009 "For GHG reduction assessment and CER calculations, site specific monitoring plan will be required. In our opinion, this should be included as the CofA may not require this."

Process Upset Assumptions

In Section 4.2.2 on page 55 it is documented how the emissions were estimated under Process Upset conditions.

It is stated that, as recommended by a 2005 U.S. EPA document, a procedure (which is based on work by the California Air Resources Board (CARB) (1990)) that multiplies the estimated emissions rate by 1.45 for metals and criteria air contaminants (CACs) and by 2.8 for all other CoPC to calculate annual average concentrations under process upset conditions is used, with two exceptions being SO2 and NOx where multiplication factors of 1.75 and 1.03 respectively were used. For determining short-term (1-hour and 24-hour average) ground level CoPC concentrations under process upset, the emission rates for the Facility were increased by a factor of 10, except for SO2 and NOx emissions which used factors of 16 and 1.63 respectively, as specified in the data received from the manufacturer. Concerns and questions with these methods are as follows:

- Are the assumptions to estimate process upset reasonable? They seem to be derived by the consultants and are not directly from a regulatory agency.
- Is the factor of 1.45 used to estimate annual average concentrations for metals and CACs under process upset appropriate? On page 56 it quotes the CARB reference that this factor assumes that, for metals, the facility is assumed to operate as measured during the trial burn (which we do not have – we only have estimates for the emissions) for 95% of the year and under upset for only 5% of the year? Is the factor of 1.45 high enough and does it underestimate metals and CAC emissions under upset conditions?
- Why do the consultants use a factor of 1.45 for estimating annual average concentrations for criteria air contaminants (CACs) when the CARB section quoted on page 56 says that a factor of 1.45 is used for metals, but it does not say anything about CACs?
- Is the factor of 2.8 used to estimate annual average concentrations for all other CoPCs appropriate? On page 56 it quotes the CARB reference that this factor assumes that, for organic compounds, the facility is assumed to operate as estimated 80 % of the year and operate under upset conditions 20% of the year. Is this a valid assumption?
- Why are the NOx factors used to estimate process upset emissions so low (1.03 and 1.63) compared to those used for other chemicals? NOx emissions are a very important consideration in this EA.
- Process Upset assumes failure in two of three APC systems. Is this the worst case? What about all three APC systems failing?

Canada – U.S. Air Quality Agreement Notification

In Section 4.2.4 on page 58 it is stated that:

> "According to Article V of the Ozone Annex to the Canada – U.S. Air Quality Agreement, since the facility is located within 100 km of the Canada –U.S. border, formal notification is required if the total emission of any of the listed contaminants in the agreement exceeds the one-tonne per year criteria. Based on the calculations provided in Appendix B for Operating Scenario 1B (MCR – 400,000 tpy Facility), the following contaminants are expected to exceed this reporting criterion:
>
> - Ammonia with a maximum emission rate of 19.1 tonnes per year (tpy);
> - Hydrochloric acid with a maximum emission rate of 31.8 tpy; and,
> - Hydrogen Fluoride with a maximum emission rate of 3.2 tpy."

As stated earlier, ammonia, hydrochloric acid and hydrogen fluoride were not measured at the Courtice monitoring station and there were no ambient concentrations provided for them in the baseline assessment. With Facility emissions for these chemicals high enough, as shown above, to exceed the reporting criterion, why did the Project team choose not to obtain ambient background measurements for these chemicals? Note also that Appendix C contains a copy of the draft Trans-boundary Agreement Notification.

The report makes no reference to the Stockholm Convention, which is an international treaty on Persistent Organic Pollutants and whether or not this proposal violates it in any way as the purpose of the convention is the virtual elimination of POPs, including dioxins and furans. Canada is a signatory to this convention. Is this proposal in violation of any part of that convention?

Facility Emissions Contribute Significantly to Regional Industrial Total

Table 4-5 on page 63 provides a summary of the industrial point source emissions released within the study area in 2007 which compares the Regional totals to the anticipated Facility emissions for both the 140,000 and 400,000 tpy Facility scenarios.

Even when compared against the high Regional **Industrial** totals, the Facility contribution to the Regional Industrial total is significant for many of the chemicals of potential concern such as cadmium, lead, mercury, dioxins/furans and nitrogen dioxides. Figures for some of those chemicals in Table 4-5 are highlighted below:

Chemical of Potential Concern	Facility Contribution to Regional Total for 140,000 tpy Facility	Facility Contribution to Regional Total for 400,000 tpy Facility
Nitrogen Oxides	**3%**	**8%**
Total Particulate	2%	5%
Cadmium	**17%**	**37%**
Lead	**7%**	**17%**
Mercury	**15%**	**33%**
Benzo(ghi)perylene	24%	47%
Benzo(e)pyrene	6%	16%
Indeno(1,2,3-cd)pyrene	5%	14%
Dioxins and Furans (as Toxic Equivalents, TEQ)	**26%**	**50%**
Volatile Organic Compounds(VOC)	3%	7%

Future Developments Which Will Impact Air Quality

Table 4-8 on page 68 provides a summary of proposed development projects which identifies the following projects as having potential to change air quality: St. Marys Alternative Fuels, Darlington B Nuclear Generating Station, Highway 401 widening, and the Proposed 401-407 Eastlink.

The 407 link is only one kilometre northeast of the Project site. Table 4-9 on page 71 provides emissions estimates for the 407 project. Figures in that table show that:

- 407 emissions are projected to add 1 tonne per year of PM2.5 emissions in 2013 and 2 tonnes of PM2.5 in 2031;
- the 407 emissions are projected to add 97 tonnes of NO2 and 33 tonnes of VOCs per year by 2013 and 159 tonnes of NO2 and 54 tonnes of VOCs per year by 2031;

The table compares these emissions against the total of ALL regional community and industrial emissions and since they are relatively small compared to this very large total, the authors of the report conclude that "while the proposed 407 expansion has the potential to cause changes in air quality in the AQSA, the magnitude of the emissions are small compared to existing regional emissions". The authors go on to say the changes were "assessed, considered nominal and therefore assessed qualitatively (not modelled) in this study". There are many concerns and questions about this decision such as:

- the logic of using the comparison against the large regional total to justify the decision not to build the 407 emissions into the model is flawed; if one was to apply that very logic, then the greater the regional total (i.e. the greater the burden in the air shed), the greater the ease in dismissing the assessment of adding more pollutants to the area
- PM2.5 values are very high in the study area and the addition of the Facility may/will trigger exceedances of various regulatory benchmarks; the EA study is particularly sensitive to PM2.5 assessment and all sources must be considered carefully and quantitatively
- Ozone levels are also already high in the study area and are already in exceedance of some of the NAAQO criteria; the 407 project adds significant amounts of NO2 and VOCs , which are both precursors of ozone, to the study area as noted above, therefore these additions should also be assessed carefully and quantitatively in the EA; furthermore, NO2 emissions are documented in the SSHHRA to be of concern in the traffic case
- The 401 widening will also have impact, but there is no quantitative assessment of the impact provided.

Key Question: How Accurate is the Modelling?

How Sound Are the Assumptions?

The accuracy of the model depends on many things:

- accuracy of the inputs
- local meteorological conditions (precipitation and wind patterns key to predicting emissions effects on air, soil and water)
- emissions data for the actual Facility
- baseline concentrations for air, all environmental media and for local agricultural produce, fish, game

Key Question: Were The Local Meteorological Conditions Accurately Estimated

This is an extremely important question as the estimated meteorological data from the CALMET model became the inputs into the CALPUFF model which does the air modelling of the emissions.

In Section 3.2.2.4 on Wind Speed and Direction it is stated that **"It should be noted that the wind climate normal data is based on Peterborough which is located inland relative to the Site. In the vicinity of the Lake Ontario shoreline, winds may be more influenced by the prescence of the Lake than those at Peterborough.** The influence of the Lake on wind conditions was accounted for in the dispersion modelling assessment of the Facility emissions (see Appendix C for details)".
I am very concerned that the wind data was from Peterborough and with the ability of the model to correctly model the effects of the Lake. The fact the CALMET model is not using actual data from the Site (or at least one on Lake Ontario) is very concerning and, I believe it introduces more potential for error. Can we trust the results? How well does the model account for shoreline fumigation?

There were very significant concerns and issues regarding the CALMET input file identified by the Clarington peer reviewer Barrie Lawrence of SENES Consultants Limited. (His comments can be found in the Municipality of Clarington Report PSD-071-09, Attachment 3. That same report, which was endorsed by Clarington Council, stated that these Clarington peer review comments (and those from other reviewers) would be sent to the Ministry of the Environment and so the Project Officer should already have these.)

The Clarington peer reviewer, Mr. Lawrence, identified the following important issues:

- first, in Comments 1 and 2 in Attachment 3 of the Clarington report, he identified some significant errors and oversights made in Appendix D of the Air Quality Assessment Technical Study Report: 1) in the CALMET input file, the location of the Trenton stations was mislocated by about 480 kilometres; and 2) the coordinates listed for Pearson Airport and Toronto Island Airport were shown to be identical, which clearly cannot be the case; the Project Team acknowledged they had incorrectly defined these and said that the final version of the report will be updated with the revised CALMET/CALPUFF runs; Question: Was this

updating done in the Final Report? Further Question: How does the Project Team account for such errors not being caught by their own staff? That such an obvious error as the two airports being input with the same coordinates is very disconcerting and stands as evidence that, with so many key inputs and assumptions open to errors of all sorts, risk assessment can be fraught with error.

- KEY ISSUE WITH CALMET IDENTIFIED - When comparing windroses between the CALMET output and the tower measurements, the Clarington peer reviewer noted the following (comment number 3):

  "Given the difference in heights between the CALMET output and the tower measurements, it is expected that there would be some small added variation is the windroses. In reviewing the windroses of Figure D2-10, the patterns appear to be quite different. For example the windrose for the data measured on the tower at 47 m indicates a strong easterly and southwest component. The CALMET generated data at 35 metres does not have the easterly component but has a strong northwest component and a weaker southwest component. As such it appears that there may be a problem with the CALMET generated windfields."

Mr. Lawrence initially made the above comment on May 31, 2009. The subsequent disposition of the Project Team stated in part that the model predictions were considered to be the best available options for this site and that further analysis of the CALMET model performance would be provided in the Final Report. The Project Team also responded that all WRF and CALMET inputs were submitted to the Ontario MOE for review, with changes being made to meet MOE requirements and further stated that the MOE had reviewed, requested modifications to, and approved sample WRF/CALMET output wind fields.

Question: Was further analysis provided in the Final Report and where can those documents be found? Why did the Project Team not pursue further analysis earlier, understanding that the CALMET predictions and model performance are critical to the Air Dispersion modelling and subsequent Site Specific Human Health and Ecological Risk Assessment?

Question: Even if the CALMET inputs meet all MOE requirements, if the resulting model predictions do not match well with tower measurements as indicated by the Clarington peer reviewer (i.e. the model does not perform well), is it not the responsibility of the Project Team to clearly report this to the public and to the Council decision makers and to clearly indicate that this is a significant source of uncertainty in the model? How and where did the report CLEARLY identify the variation in the windroses? How, where and when was this CLEARLY communicated to all Regional Councillors before they voted to accept this report? The Clarington peer reviewer found the windroses in Appendix D, but the public and Councillors should not have to delve into the appendices for important and very relevant information and results.

Questions: Was the MOE aware of the different windrose patterns and potential problem with the CALMET generated windfields when it apparently approved sample WRF/CALMET output wind fields? What level of detail was provided to the MOE in the sample values?

- In Comment 4, Mr. Lawrence reported concerns with the setting of 3 parameters in the CALMET input file. Those parameters were the ICOARE, IMIXH and parameter JWAT (1 & 2). ICOARE is a parameter which defines the algorithm the model will use to determine the boundary layer in the marine environment. He indicated that there are essentially two algorithm options available and that instead of using the more recent Coupled Ocean Atmosphere Response Experiment (COARE, circa 2000) algorithm in 1 of 5 modes (and one of the COARE options is the default), the Project Team used a much older Offshore & Coastal Dispersion (OCD, circa 1985) algorithm. With respect to the IMIXH parameter, the reviewer states that this parameter defines the method to use when calculating the convective mixing height. Mr. Lawrence states that of two options available (Maul and Carson, circa 1980 and Batchvarova and Gryning, circa 1994), again the Project Team went with the older approach – choosing the Maul – Carson method coupled with the OCD algorithm for overwater mixing heights. The peer reviewer states "The effect using the older approach is unclear". Regarding the JWAT1 and JWAT2 parameters, the peer review states: (please note that the text bolding is mine):

  "JWAT1 and JWAT2 are parameters to define which land use categories will have the over land temperature interpolation used and which will have the over water temperature interpolation used. ***In the input file, these parameters were disabled meaning all interpolation would be as if the land use was over land, which effectively removes the effect of onshore/offshore flows.*** *Therefore, in reality data collected at the actual surface stations experience the effect of onshore/ offshore flows, the generated virtual stations would have had the effects incorporated from the NAM model, however, when, this data was incorporated into CALMET for interpolation between these points, the onshore / offshore effects was turned off. How the model will interpret this dichotomy is uncertain.* ***This could also explain why the windroses of Figure D2-10 do not align well."***

In their response to the above comments made in the Clarington peer review, the Project Team stated that the options selected to initialize CALMET were bases on U.S. EPA regulatory values, model default values and many years of experience with the CALMET model. The Project Team also states that the methodology used for implementing overwater and surface temperatures in CALMET was discussed in detail with the MOE, who also reviewed and approved these options in the input file.

Question : Did the MOE approve the settings of all parameters in the input file, and, more specifically did they approve the setting of the ICOARE, IMIXH and JWAT (1 &2) parameters? Exactly what options, referred to by the Project Team in their disposition,

were approved by the MOE? Was the MOE aware of and does the MOE share the concern of the peer reviewer that the setting chosen by the Project Team for the JWAT (1 & 2) parameters disables these parameters in the input file and so effectively removes the effect of onshore/offshore flows? How well, if at all, do the settings chosen by the Project Team account for offshore/onshore flows? Is the choice of U.S. EPA-recommended options appropriate and optimal for this aspect of this Environmental Assessment? Are they considered the most current, up-to-date, and most accurate options for CALMET modelling at this particular site?

The Clarington peer review comments give a CALMET Summary as follows:

> *The review of the CALMET portion of the modelling completed for the assessment indicates that the windfields generated by the model may not accurately reflect the actual windfields at the site. The effect of this windfield inaccuracy on the CALPUFF results is uncertain. Ultimately since there is only one major emission source, the net effect will be that some receptors which indicated higher concentrations may actually have lower concentrations and vice versa. The magnitude of those differences on a short-term basis may not be significant, however the effects on longer averaging periods may be substantial. For example based on Figure D2-10 in the assessment, the easterly component of the wind flow may be underestimated by at least a factor of 2, which on a long term basis, increases the concentrations to the west of the site by this factor.*

It should be noted that the Clarington peer reviewer, Barry Lawrence, in his report of June 30, 2009 DID NOT ACCEPT the Project Team's disposition made on June 23, 2009 in response to his Clarington peer review comments 3, 4 and 5 released on May 31, 2009. Instead he makes the following statement in his report of June 30, 2009:

> *"Items 3 thru 5 were apparently agreed upon by the MOE, and while this concurrence is mentioned in the supporting documentation, it doesn't necessarily mean it is correct or the best approach. Not being privy to the discussions between the MOE and the consultant we will have to take the disposition at face value and agree to disagree on the approach."*

In addition in Comment 9 of the Peer Review report, Barry Lawrence of SENES states:

> ***"An apparent meteorological mismatch may cause an inaccurate representation of long-term exposure."***

Question: The accuracy and performance of the meterological modelling is critical as the CALMET model predictions become input into the CALPUFF model to predict emissions concentrations, and the CALPUFF results in turn become inputs into the health assessment. As stated by the Clarington peer reviewer, the effects on a long term basis to public health may be substantial. Given that the modelling results have potential for a high margin of error based on the Clarington comments and that much of the modelling is

based on data from other locations, there is a strong possiblity that the margin of error could affect the conclusions for the Inhalation and Multi-pathway assessments in the HHERA. Will the MOE perform a thorough analysis of this aspect of the report and thoroughly investigate the concerns identified in the Clarington peer review and by the public? The entire validity and accuracy of the Site Specific Human Health and Ecological Risk Assessment is in question.

Is the Ambient Air Monitoring At the Courtice Station included as an appendix? Did any peer reviewers review it?

Key Question: Is The CALPUFF Air Model Appropriate for this Assessment and for the Courtice Site

The rationale provided for the selection of the CALPUFF model to predict ground level concentrations for Facility stationary emissions, onsite traffic, and secondary particulate formation and of the CAL3QHCR model to predict offsite traffic are provided in Table 6-1 page 76. The explanations given for each model choice are very short and many important questions remain such as:

- What other models were available? What were there strengths and weaknesses?
- What are the strengths/weaknesses of the selected models?
- Are the models appropriate for the Courtice site and, in particular, what models best suit predicting concentrations when sites are in close proximity to large fresh water bodies?
- What are the most current models most in use? Can they account for cumulative effects from multiple point sources such as the highway and the facility? How do these models compare?
- Since the selection of the best model is of utmost importance to the Site Specific Human and Ecological Risk Assessment, why were so few details provided about model choice in this report?

Tables 7-1 to 7-4 on pages 81-135 provide summaries of the ***statistical*** **maximum predicted ground level contaminant concentrations** for each of the facility sizes (140,000 tpy and 400,000 tpy) and for each of the operational capacities (full and turned down). The results are for the Facility alone as well as the Facility in conjunction with measured background concentrations. It states on page 79, that:

> The predicted statistical maximum concentrations account for meteorological anomalies as per the Air Dispersion Modelling Guideline for Ontario (MOE,2009a). For 1-hour averaging periods, this involves removing the eight highest predicted values for each calendar year. The maximum 1-hour average was then selected from the remaining values over the 5-year period. For 8-hour and 24-hour averaging periods, the highest maximum predicted value was removed for each calendar year. The next highest value was then selected over the five-year period.

- Is it appropriate to adjust for meteorological anomalies and remove some data points? Are meteorological anomolies built into the model to better reflect reality and therefore should all data points be included in the analysis?

Comparing Predicted Maximum Ground Level Concentrations For Facility Sizes

Going back to Table 4-5 on page 61 and Table 4-1 on page 50, both tables give estimated facility emissions for each proposed facility size. The ratio of the estimated emissions of the 400,000 tpy facility compared to the estimated emissions for the 140,000 tpy facility seems to correspond somewhat to the ratio of the actual sizes which is:

$$\frac{400{,}000 \text{ tpy}}{140{,}000 \text{ tpy}} = 2.857$$

In other words, the estimated emissions of the 400,000 tpy facility are close to 3 times those of the 140,000 tpy facility.

One might expect then that the predicted ground level concentrations from the 400,000 tpy facility would be somewhat close to 2.86 times what the predicted ground level concentrations are for the 140,000 tpy facility.

However, when one calculates the ratio of the predicted statistical maximum ground level concentrations of the 400 000 tpy facility to the 140,000 tpy facility for various CoPC, the ratio is considerably lower than 2.86.

For example:

for 24 hour - NO2, the ratio would be 11.47/6.06 = 1.89
for 1 hour – NO2, the ratio would be 95.17/43.87=2.169
for 24 hour – PM2.5, the ratio would be 1.00/0.53=1.89
for 1 hour – PM2.5, the ratio would be 8.25/3.67=2.24

- Why are these ground level concentration ratios so different from the facility size ratio? Are the modelled maximum ground level concentrations underestimated in the 400,000 tpy case? Is the model accurately predicting ground level concentrations for all cases?

Facility Emissions Have Significant Impact to Background Ambient Air

In Table 7-1, it is noted that the facility emissions have a significant impact to the background air concentrations, particularly for the 1-hour period. This can be seen by comparing the predicted statistical maximum concentrations to the existing background concentrations. In some cases the predicted statistical maximum concentrations significantly exceeds the background concentrations, as in the case of some of the criteria

air contaminants (SO2, NO2) and a number of the heavy metals (which are also high for the 24 –hour concentrations) with the predicted maximum
1 – hour concentration for nickel being seven times the background concentration for the 400,000 tpy scenario and lead being four times the background. Some results are shown below for the MCR (maximum operating capacity) scenario for both sizes:

Contaminant	Background Concentration (mcg/m3)	Predicted Statistical 1-Hr Max Concentration (mcg/m3)	Predicted Statistical 1-Hr Max Concentration (mcg/m3)
Sulphur Dioxide	19.5	12.69	27.53
Nitrogen Dioxide	64.6	43.87	95.17
PM2.5	22.8	3.67	8.25
Dioxins	5.77E-08	2.18E-08	4.72E-08
Cadmium	1.47E-03	2.54E-03	5.51E-03
Lead	0.01	0.02	0.04
Nickel	0.01	0.03	0.07

Note that the scope of the report makes it impossible to compare predicted maximum concentrations for ammonia, HCl, HF, mercury, thallium, organic matter and other compounds since, as discussed previously, no ambient measurements were done/provided for the background concentrations. This missing information is concerning. The comparison of the facility emissions of such important compounds as mercury, HCl, and HF to existing ambient air concentrations cannot be done.

Information in Tables 7-1 to 7-4 also show possible concerns regarding PM2.5 and NO2. The predicted statistical maximum concentrations including background for NO2 are 40% of the 1-hour criteria, 35% of the 24-hour criteria and 37% of the annual average criteria for the 400,000 tpy, MCR scenario. The predicted statistical maximum concentrations including background for PM2.5 are 71% of the 24-hour criteria (1-hour and annual criteria are not provided for PM2.5) for the 400,000 tpy size, MCR scenario.

Contour Plots

Explanations for the development of the contour plots is given on pages 136-137. The contour plots for some of the CoPC are provided in Figures 7-1 to 7-38 and are found in pages 138 to 183.

There are many questions arising from these contour plots. Some of those questions are:

- It is stated on page 137 that "Figures 7-9 and 7-10 present the contour plots of maximum annual average concentrations (maximum year over the 5-year data set) for facility-wide unit emission rates for the 140,000 tpy Facility (Scenario 1A) and 400,000 tpy facility (scenario 1B), which are the expected long-term operating levels. **The maximum predicted ground level concentration occurs about 1.5 km northeast of the 140,000 tpy Facility, and 2 km west of the 400,000 tpy Facility.** The difference in locations of maximum ground level concentrations are due to the different sources present at the two Facility scenarios: emissions from the 140,000 tpy Facility occur from a single stack, while those for the 400,000 tpy Facility occur from two physically separate stacks."; Do these results make sense and do they accurately represent what would be the reality? More explanation is needed as these results seem to be contrary to common sense.

- Figures 7-15 and 7-16 provide contour plots for the maximum predicted annual-average NO2 ground level concentrations(GLCS) for the 140,000 tpy and 400,000 tpy scenarios; it is noted on page 137 that the location for the maximum predicted GLC is **east** of the facility **for the 140,000 tpy scenario** yet it is a significant distance **west** of the facility **for the 400,000 tpy case**; how is this possible?
- Comparing the Predicted Statistical Maximum GLCs given in Contour Plots 6-1 to 6-3 (the 140,000 tpy cases) against those in Plots 6-4 to 6-6 (the 400,000 tpy cases), **the Predicted Statistical Maximum GLCs for 400,000 tpy cases are all lower than those predicted for the 140,000 tpy cases.** How can this be?

Page 148 has a report on the contour plots for NO2. It states that the maximum hourly ground level NO2 falls to roughly 15% above background level within roughly 8-9 km of the 400 000 tpy. At the location of the predicted statistical maximum ground level concentration (which includes background), the NO2 is 247% above background levels.

It is stated on page 181 that "The maximum predicted 24-hour Lead (Pb) ground level concentration for a 400,000 tpy Facility is about 93% above the background level and decreases to about 40% above the background level within about 5-6 km of the Facility".

Predicted Statistical Maximum Concentrations Versus Predicted Maximum Concentrations

Tables 7-5 to 7-8 on pages 184 to 232 give summaries of the maximum predicted GLCs over all the special receptors for both facility sizes. It is stated on page 184 that "In these tables, the maximum predicted contaminant concentrations (not accounting for meteorological anomalies) are presented. Therefore, the values presented in these tables

are conservative relative to the MOE requirements in Guideline A-11, which are based on the statistical maxima (meteorological anomalies removed)." Recall that Tables 7-1 to 7-4 provided the predicted *statistical* maximum concentrations where some of the highest data values are removed before analysis.

This difference in data sets affected the values reported between the two sets of tables with the predicted maximum concentrations of course being higher (considerably higher in some cases) than the predicted statistical maximum concentrations. Below is a comparison for some of the CoPC between values taken from Table 7-3 and Table 7-7 which start on pages 111 and 209 . Both Tables 7-3 and 7-7 provide values for Scenario 1B(MCR, 400,000tpy). All concentrations are in micrograms per cubic metre.

Contaminant	Predicted Statistical Max Concentration	Predicted Maximum Concentration
Nitrogen Oxides(NO2), 1-hour averaging period	95.17	118.57
Particulate Matter PM2.5 1-hour averaging period	8.25	10.52
Particulate Matter PM2.5 24-hour averaging period	1.00	1.71
Lead	0.04	0.05

- **Question: Were the predicted maximum concentrations or the predicted *statistical* maximum concentrations used in the Site Specific Human Health and Ecological Risk Assessment? What is required by the MOE?**

Process Upset

Tables 7-11 and 7-12, which start on page 135, provide summaries of the predicted statistical maximum concentrations for Process Upset. Note the PM2.5, 24-hour for the 400,000 tpy Facility is very high and is 91% of the benchmark criteria.

Section 9.1 – Emissions Mitigation

The mitigation measures discuss the pollution control equipment they already used as part of the assessment and assumed will be in operation as part of the normal operating scenarios. The EA suggests further mitigation measures are not necessary thus no further mitigation measures are suggested. Given the level of inaccuracy and assumptions in the modelling, plans should be put into place to mitigate emissions should it be necessary to meet regulatory requirements and protect human health and the environment.

Section 9.2.2.1 – Continuous Emissions Monitoring

The proposed monitoring program for the facility does not continuously monitor for heavy metals, fine and ultrafine particulate matter and the organic carcinogens. Only annual stack tests are planned for these pollutants of great concern. This is inadequate especially when one considers the toxicity of these pollutants and the potential for incinerator emissions to vary as the wastestream does and with no pre-sort planned for the facility.

Summary and Conclusions

I feel the summary is inadequate as summary/conclusions does not point out ozone exceedances, high PM2.5, no ambient monitoring for some key chemicals, and other key factors which could have affected how well the model represents reality including, for instance, how the ambient monitoring data may not be true reflection of area conditions over time. (since some of the monitoring data was not actual site data, how parameters were set in models, and other factors such as the ambient monitoring at the Courtice station occurred during a period where there was an unusual number of shutdown periods for St.Marys Cement and GM due to economy and cooler summers with fewer smog days, etc.),