Appendix
To

REMASCO
Environmental Screening Report

Contains

Technical Reports

and

Peer Review Comments and Responses

October 2011

Contents of Technical Report Appendix

Major Reports

Available under Separate Cover

Air Quality Assessment
Human Health Risk Assessment

Staff Report to Council
Planner's Reports
Peer Review of Major Reports and Responses
Acoustic Assessment Report

Special Council Mtg. Agenda

AGENDA
CORPORATION OF THE TOWN OF KINGSVILLE
SPECIAL MEETING OF COUNCIL
MONDAY, AUGUST 15, 2011
Kingsville Council Chambers, 2021 Division Road North
7:00 p.m.

A. CALL TO ORDER

B. COMMENCEMENT PRAYER

C. DISCLOSURE OF PECUNIARY INTEREST
– Council's Declaration to be made prior to each item

D. STAFF REPORTS

1. **D. Truax, Planner** - Report dated August 8, 2011 RE: Land Use Opinion & Peer Review enclosing the following (Jim Gallant, REMASCO and Gregory Crooks and Ruwan Jayasinghe, Stantec Consulting Ltd. will be in attendance):

i) Correspondence from Jones Consulting Group Ltd. dated April 13, 2011 RE: Summary of Environmental Approval Process

ii) Correspondence from Jones Consulting Group Ltd. dated August 10, 2011 RE: Planning Opinion on Zoning By-law Conformity

iii) Correspondence from Stantec Consulting Ltd. dated August 3, 2011 RE: Peer Review of the Revised REMASCO Air Quality and HHRA Reports

Background Information

(a) Correspondence dated June 30, 2001 RE: Peer Review of the REMASCO Energy Production Facilities Kingsville Project
   1) Intrinsik Human Health Risk Assessment REMASCO Gasifier Installations
   2) A.J. Chandler & Associates Ltd. Air Quality Assessment REMASCO Kingsville

(b) Intrinsik memo REMASCO HHRA – Response to Comments

(c) Correspondence from A.J. Chandler & Associates dated June 23, 2011 RE: Air Quality Study – REMASCO

2. **R. Orton-Pert, Director of Corporate Services** – Report dated August 11, 2011 RE: Agreement for Operation of Arena Concession

F. BY-LAWS

By-law 96-2011	Being a By-law to authorize the entering into of an Agreement with The Naked Fish Market Ltd. for the operation of the Arena Concession *To be read a first, second and third and final time*
By-law 97-2011	Being a By-law to confirm the proceedings of the Council of The Corporation of the Town of Kingsville at its July 25, 2011 Regular Meeting *To be read a first, second and third and final time*

G. ADJOURN

Minutes of Special Council Meeting Aug 15, 2011

MINUTES

CORPORATION OF THE TOWN OF KINGSVILLE

SPECIAL MEETING OF COUNCIL

Kingsville Council Chambers

2021 Division Road North, Kingsville, Ontario

MONDAY, AUGUST 15, 2011

A. CALL TO ORDER

Mayor Nelson Santos called the meeting to order with all members in attendance: Deputy Mayor Tamara Stomp, Councillors Ron Colasanti, Sandy McIntyre, Bob Peterson, Gord Queen, and Gail Stiffler. Also in attendance were CAO Dan DiGiovanni, Planner Danielle Truax, Manager of Parks and Recreation D. Wood and Director of Corporate Services / Clerk R. Orton-Pert.

B. COMMENCEMENT PRAYER

Councillor Queen led Council in the Opening Prayer.

C. DISCLOSURE OF PECUNIARY INTEREST

Mayor Santos reminded Council's Declaration to be made prior to the matter being discussed.

D. STAFF REPORTS

1. **D. Truax, Planner** - Report dated August 8, 2011 RE: Land Use Opinion & Peer Review

   Mr. Jim Gallant, P. Eng., VP Operations and Engineering, REMASCO, Mr. Gregory Crooks and Mr. Ruwan Jayasinghe, Stantec Consulting Ltd. were in attendance):

i) Correspondence from Jones Consulting Group Ltd. dated April 13, 2011 RE: Summary of Environmental Approval Processes

ii) Correspondence from Jones Consulting Group Ltd. dated August 10, 2011 RE: Planning Opinion on Zoning By-law Conformity

iii) Correspondence from Stantec Consulting Ltd. dated August 3, 2011 RE: Peer Review of the Revised REMASCO Air Quality and Human Health Risk Assessment (HHRA) Reports

Background Information

(a) Correspondence dated June 30, 2011 RE: Peer Review of the REMASCO Energy Production Facilities Kingsville Project

1) Intrinsik Human Health Risk Assessment REMASCO Gasifier Installations

2) A.J. Chandler & Associates Ltd. Air Quality Assessment REMASCO Kingsville

(b) Intrinsik memo REMASCO HHRA – Response to Comments

(c) Correspondence from A.J. Chandler & Associates dated June 23, 2011 RE: Air Quality Study – REMASCO

Planner Truax presented her report, which contained the third party reviews obtained from Stantec Consulting Ltd. and Jones Consulting Group Ltd. with respect to the various provincial approvals being sought by REMASCO under the *Environmental Assessment Act* (EAA) and *Environmental Protection Act* (EPA) relating to the operation of a Waste to Energy Facility.

Ms. Truax noted that the presentations commenced in 2007 and in 2011 an update report was provided, advising that the formal process under the EPA was to commence. Ms. Truax noted that the Jones Consulting reports have been summarized in Table 1.0 of her report. The municipality retained Stantec Consulting to review the documentation and participate in the process. Ms. Truax described the Flow Chart as prepared by Jones Consulting (Report 1i) which sets out the Screening Steps and the Elevation of the Project Status. The second Jones Report (Report1ii) provided their Planning Opinion on the Zoning By-law Conformity. Ms. Truax confirmed that *Planning Act* requirements are not relieved by environmental assessment.

Representatives from Stantec Consulting reviewed the process and the report provided and answered questions from Council.

Ms. Truax provided Council with her recommendation as contained in her report, however, noted that the Town has 60 days to review REMASCO's final documents following the Notice of Completion, rather than 30 days, as indicated in her report.

Ms. Truax noted that REMASCO has published a further Public Meeting Notice for further input. The public and Council are invited to such meeting on August 22, 2011. REMASCO personnel, consultants and members of the REMASCO Public Liaison Committee will be in attendance to address any questions, and or comments. Representatives from Stantec Consulting will also be in attendance.

Councillor Peterson asked if the Ministry of the Environment monitors the emissions.

Stantec representatives noted that MOE puts the onus on REMASCO to monitor the emissions through annual stack testing. A Certificate of Approval will be issued.

Mayor Santos questioned as to whether there is constant testing.

Stantec representatives noted that there is a recommendation that REMASCO follow similar testing as in the pilot project. If excess emissions are detected, these must be reported.

Councill Stiffler asked if there is an emergency plan to contain emissions in the event of a tornado storm event.

Stantec representative noted that the MOE would write terms into the Certificate of Approval. Typically a requirement for maintenance and contingencies would be included, but that the Town may want to recommend that REMASCO communicate any issues in this regard to the Town.

Ms. Truax noted that this issue is dealt with through the site plan process and MOE.

Councillor Stiffler noted that excess pellets are stored on the facility. She asked 1) what happens to excess pellets and 2) what happens to ash.

Ms. Truax noted that the Certificate of Approval document has identified the amount of pellets that can be stored and that this has been taken into consideration in land use approvals. The site plan indicates where the material can be stored on site. It is not a large area.

Councillor Stiffler asked is it contaminated?

Ms. Truax advised that the Solid Waste Authority has reviewed the bottom ash and is in a position to accept the same.

Councillor Colasanti asked how many months the operation will run.

Mr. Gallant noted that the facility will operate for approximately10 months out of the year. The issue is the desire of the greenhouse to heat with gas or liquid CO2. They are seeking to run 12 months out of the year, but in practicality that is not going to happen.

Councillor Colasanti noted that one must use a lot of hot water to keep fire hot to have clean emissions.

Mr. Gallant noted that is correct. A unit can be turned down, but the facility would not want to operate at a lower load. Measurements will be conducted at a lower load.

Councillor Stiffler noted that at page 5 of the Intrinsik report there is a suggestion that Intrinsik should review the Durham/York facility risk assessment and inquired as to the contents of that report. Stantec representatives noted that the report is the most recent report of a larger facility that processes municipal waste.

Councillor Stiffler asked if any random sampling of the pellets themselves was done.

Stantec representatives advised that pellets are created by waste received and sorted so it is controlled and segregated based on type of waste in order to have certain energy for burning. The facility also does testing of these pellets and are provided with assurances of pellets themselves.

Councillor Stiffler asked how often is that done.

Mr. Gallant advised that when the pellets are received, every load is analyzed. There are certificates of approval for each load received.

Councillor Stiffler asked what is being burned.

Stantec representatives advised that they do not have that information.

Mayor Santos asked that REMASCO provide a continuing update.

Councillor Stiffler asked who is Intrinsik?

Stantec representatives advised that Intrinsik is a company that has done risk assessment for 20 years.

Deputy Mayor Stomp asked what is in the pellets.

Mr. Gallant advised that 45% is post recyclable plastic 55% paper. The Certificate of Approval does not say what the material is, but talks about the compounds in material. The analysis is the BTU value, and indicates the level of sulphur, lead, chlorine and heavy metals. It lists all potential contaminants.

Deputy Mayor Stomp asked if there are heavy metals.

Mr. Gallant advised that there are heavy metals in everything, but what is relevant is the concentration. There is mercury in coal and that is a concern.

Deputy Mayor Stomp asked if the neighbours are going to see a colour of smoke coming from the stack.

Mr. Gallant advised that neighbours will only see steam.

Deputy Mayor Stomp asked if there will be an impact at all.

Stantec representatives advised that what is coming from stack added to current value should produce no affect. The facility will not tip the balance. This facility will not add to or tip any balance.

Deputy Mayor Stomp asked if the ash contains heavy metals.

Mr. Gallant clarified: 1) bottom ash – confirmed can be disposed in regular landfill 2) fly ash - not right to characterize as hazardous although it is managed as hazardous waste – about 3% of pellet.

Deputy Mayor Stomp asked if there is more than steam coming out of the stack?

Stantec representatives advised that there are always some trace contaminants – it is always steam, water vapour and trace contaminants--that is what was assessed.

Deputy Mayor Stomp indicated that the receptors contemplated in the report do not talk about someone right next door and no soil samples were taken.

Stantec representatives indicated that this is a proposed facility so one cannot measure what is not there – this is a proactive exercise.

Councillor Peterson asked what Council should tell neighbours about what other greenhouses are burning.

Stantec representatives advised that is is very difficult to say because they do not know how equipment is operating and how it is maintained.

Councillor Stiffler asked if the numbers in report were provided by REMASCO themselves.

Stantec representatives advised that the air quality reports contain the emissions provided by REMASCO to their own consultant as well as their building data.

Councillor Stiffler asked if the heating of greenhouse affected the food grown,

Stantec representatives advised that that was put through the model and no risk was found.

Councillor Stiffler asked if the Stantec representatives would you heat their own house with this fuel and both responded that they would.

658-2011 Moved by B. Peterson, seconded by G. Queen Council receive the Summary of Environmental Approval Processes prepared by Jones Consulting Group; the Planning Opinion and Zoning By-law Conformity review prepared by Jones Consulting Group; and the Review of REMASCO Air Quality and Human Health Risk Assessments prepared by Stantec Consulting Ltd. and the recommendations contained therein; and that upon the publication of the Notice of Completion by REMASCO, following which the Town has 60 days to review the final documents, direct Administration to bring forward a further report within those 30 days advising of final comments to be forwarded to the Ministry of the Environment; and direct Administration to forward comments with respect to the necessary land use approvals to REMASCO to be addressed and included within the Environmental Screening Report.

CARRIED

2. R. Orton-Pert, Director of Corporate Services – Report dated August 11, 2011
RE: Agreement for Operation of Arena Concession

CAO DiGiovanni noted that Mr. Taylor would be using the "Moosejaw" name.

659-2011 Moved by G. Queen, seconded by B. Peterson Council authorize the entering into Agreement with The Naked Fish Market Ltd. for the operation of the Arena Concession for a term of 8 months, commencing August 16, 2011 for the total sum of $3,200.000.

CARRIED

E. BY-LAWS

By-law 96-2011 Being a By-law to authorize the entering into of an Agreement with The Naked Fish Market Ltd. for the operation of the Arena Concession

660-2011 Moved by T. Stomp, seconded by B. Peterson Council read By-law 96-2011, being a by-law to authorize the entering into of an Agreement with The Naked Fish Market Ltd. for the operation of the Arena Concession a first, second and third and final time.

CARRIED

By-law 97-2011 Being a By-law to confirm the proceedings of the Council of The Corporation of the Town of Kingsville at its August 15, 2011 Special Meeting

661-2011 Moved by T. Stomp, seconded by R. Colasanti Council read By-law 97-2011, being a by-law to confirm the proceedings of the Council of The Corporation of the Town of Kingsville at its August 15, 2011 Special Meeting a first, second and third and final time.

CARRIED

G. ADJOURN

662-2011 Moved by R. Colasanti, seconded by B. Peterson to adjourn this Special Meeting of Council at 8:45 p.m.

CARRIED

MAYOR, Nelson Santos

CLERK, Ruth Orton-Pert

Staff Report to Council

THE CORPORATION OF THE TOWN OF KINGSVILLE
2021 DIVISION ROAD NORTH, KINGSVILLE, ON N9Y 2Y9
(519) 733 – 2305 (519) 733 – 8108 (FAX)

STAFF REPORT 2011

Memo To: **D. DiGiovanni, C.A.O.**
Memo From: **Danielle Truax, Planner**
Date: **August 8, 2011**
RE: **Land Use Opinion & Peer Review**
REMASCO - ESR Submissions

AIM

To present Council with the third party reviews obtained from Stantec Consulting Ltd. & Jones Consulting Group Ltd. with respect to the various Provincial approvals being sought by REMASCO under the *Environmental Assessment Act* (EAA) and *Environmental Protection Act* (EPA) relating to the operation of a Waste to Energy Facility.

BACKGROUND

The following reports prepared by third parties have been provided to Council for review:

1. Summary of Environmental Approval Processes
   Dated April 2011 prepared Jones Consulting Group;
2. Planning Opinion and Zoning By-law Conformity Review
   Dated August 2011prepared by Jones Consulting Group;
3. Review of REMASCO Air Quality and Human Health Risk Assessments
   Date August 2011 prepared by Stantec Consulting Ltd.

DISCUSSION

In 2011, REMASCO advised the municipality of applications made to the Ministry of the Environment (MOE) relating to the Waste to Energy facility currently located and operating at Southshore Greenhouse, as well as a future facility at Agriville. Applications have been submitted under the EPA and EAA. The Summary of Environmental Approval Processes (see Report No. 1 above) provides Council with information regarding both processes, the purpose of each approval and the municipality's role in providing input to each. A summary chart has been provided below, as Table 1.0.

Table 1.0

Approval		Purpose	Legislation	Municipality's Role
1.	Environmental Screening Process (ESP)	Approval of a Waste Management Project @ Southshore & Agriville	EAA	Notice of Commencement • Provide input during preparation of Environmental Screening Report Notice of Completion • Review and provide comment to ensure all issues have been addressed adequately • Work with MOE to amend ESR • Request Elevation "Bump-up"
2.	Amendment to Certificate of Approval	Authorization to release emissions thru operation of gasification system at Southshore & Agriville	EPA	• No formal appeal or consultation process to MOE • Proponent has sought Municipal comments with each application

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As noted by Jones, it is the municipality's role to participate in the environmental screening process to ensure that the information to be submitted to the MOE within the Environmental Screening Report by REMASCO is of a scope and nature to ensure all potential impacts have been identified and mitigated. The municipality has actively participated in the development of the Environmental Screening Checklist used to identify potential impacts and any further studies which must be completed in consideration of the project. In developing the Checklist the proponent has advised that the municipality that they have consulted with many outside agencies including ERCA. Additionally, due to the highly technical nature of the project the municipality has retained Stantec to review the ESR documentation prior to the submission to the MOE.

As per Jones's recommendation, the municipality has participated within the ESR process to identify any potential impacts as a result of the proposed project. A copy of the MOE Environmental Screening Process Flow Chart has been attached to this report as reference. Jones is satisfied that the Environmental Screening Process is sufficient for a comprehensive review based on the scale of the project and other factors which contribute to the control of potential impacts.

Within the Jones Report, it is recommended that upon the publication of the Notice of Completion by REMASCO, the municipality should be satisfied that the comments provided by the Stantec have been incorporated and addressed within the final Environmental Screening Report. The municipality should complete a review of the documentation and provide comments to the Ministry of Environment in support, to request an amendment to the ESR or to request an elevation request.

In reviewing the detailed project description provided by REMASCO (see Report No. 2 – Planning Opinion and Zoning By-law Conformity), Jones is in a position to support the interpretation previously taken by the municipality that the proposed facilities are directly related to the operation of the greenhouse and are not considered to be waste disposal sites. In reviewing the project it was noted that the current site consists of a number of separate properties currently operating as one greenhouse. In order to meet the strict interpretation of "accessory use", Southshore Greenhouse should be required to restrict the operation to service only the parcel where it is located. Southshore Greenhouse has acquired and assembled a number of parcels in the immediate area which are operated as one greenhouse. As suggested by Jones, Southshore should be required to consolidate the parcels or obtain a variance with respect to the definition of an accessory use. The variance would expand the definition of accessory use to include multiple properties operations related to the operation of Southshore Greenhouses which are located on both the south and north side of Seacliff Drive. Jones is in a position to support such an application.

REMASCO has acknowledged this conformity issue and has agreed to continue to operate only on the farm addressed as 1814 Seacliff Drive at this time. They also agree to obtain the necessary planning approvals prior to any expansion requiring heat to be transferred between properties as detailed in the ESR.

The report also brings forward two other suggestions that would require REMASCO to obtain approval for a zoning by-law amendment. The first is a site specific zoning amendment to allow the system to be treated as a heat distribution centre to other operations from this location only. REMASCO has indicated that it is not their intention to pursue this immediately and acknowledge that any greater use of the facility off-site will require that further land use assessments be reviewed by the Town. The second suggestion is that the Town undertakes a comprehensive zoning amendment to recognize gasification systems as permitted uses within the agricultural area.

It is important to note that any approval given under the EAA or EPA does not relieve the land owner from obtaining any other necessary approvals under legislation under the Planning Act.

Stantec's statement with respect to the documents presented by REMASCO for consideration under the EAA application has been attached to this report (see Report No. 3 – Review of REMASCO Air Quality and Human Health Risk Assessments). Stantec has stated that the data presented by REMASCO reasonably meets MOE standards. The following documents have been reviewed by Stantec Consulting Inc. The documents have been prepared by REMASCO as part of the Environmental Screening Process and have been attached to this report:

- Revised report entitled "Human Health Risk Assessment, REMASCO Gasifier Installations, Kingsville Ontario", dated June 30, 2011;
- Revised report entitled "Air Quality Assessment, REMASCO Kingsville", dated June 30, 2011;
- Intrinsik memo" REMASCO HHRA – Response to Comments" dated June 23, 2011;
- A.J. Chandler & Associates letter entitled "Air Quality Study – REMASCO", dated June 23, 2011; and,
- AERMOD input files supplied by A.J. Chandler & Associates on July 8, 2011.

****Aermod input files have not been provided as they are modeling files containing only data.**

RECOMMENDATION

1. That Council receives the following reports and any recommendations contained therein:
   i. Summary of Environmental Approval Processes prepared Jones Consulting Group;
   ii. Planning Opinion and Zoning By-law Conformity review prepared by Jones Consulting Group;
   iii. Review of REMASCO Air Quality and Human Health Risk Assessments prepared by Stantec Consulting Ltd.
2. Upon the publication of the Notice of Completion by REMASCO, the Town will have 30 days to review the final documents, staff is directed bring forward a further report prior to the 30 days advising of final comments to be forwarded to the Ministry of the Environment.
3. That comments with respect to the necessary land use approvals be forwarded to REMASCO to be addressed and included within the ESR submission.

Danielle Truax, Planner

Corporation of the Town of Kingsville
From the Desk of Dan DiGiovanni, CAO
This item to be forwarded to the Office of:

To be placed on the following agenda:
☑ *Regular Meeting of Council*
☐ *Civic Administration Meeting*
☐ *Other* _____

Signature Date Aug 11/2011

Planner's Initial Evaluation

JONES
CONSULTING GROUP LTD.
PLANNERS, ENGINEERS, SURVEYORS

April 13, 2011

Via email
dtruax@kingsville.ca

Ms. Danielle Truax
Planner
Town of Kingsville
2021 Division Road North
Kingsville, ON, N9Y 2Y9

Dear Ms. Truax:

Re: REMASCO & Southshore Greenhouses
Summary of Environmental Approval Processes
Our File: Kin-09395

1.0 Introduction

Thank you for the opportunity to assist the Town with its consideration of the REMASCO Energy from Waste Facility and its necessary approvals.

2.0 Methodology

For this review and summary, copies of all information provided to the Town from REMASCO were reviewed together with supplementary material from the proponent's website. In addition discussions were undertaken with staff from the Ministry of Environment following a review of applicable legislation. A review of Federal Environmental Assessment 'triggers' suggests that no environmental approvals are required from the Federal Government for the expansion of the facility.

3.0 Environmental Assessment Requirements

For the expansion of the REMASCO pilot project, there are two primary environmental approval processes. The first approval is the Environmental Screening Process (ESP) undertaken under the Ontario Environmental Assessment Act. The second environmental approval is the amendment of the current Certificate of Approval under the Ontario Environmental Protection Act. The first approval to be reviewed is the Environmental Screening Process since this process considers a wider range of potential land use impacts.

3.1 Ontario Environmental Assessment Act

Ontario Regulation 101/07 (the Regulation) under the Environmental Assessment Act applies to Waste Management Projects. The primary purpose of the Regulation is to apply a more standardized approach to waste management projects by designating classes of undertakings and what requirements of the Environmental Assessment Act apply.

The proposed REMASCO pilot project extension is defined under Part II, Section 11(1)(2) of the Regulation as follows:

> *The establishing of the following waste disposal sites is defined as a major commercial or business enterprise or activity and is designated as an undertaking to which the Act applies*
> *(2) thermal treatment site, if,*

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i) the site does not use coal, oil, or petroleum, as a fuel for thermal treatment at the site, and
ii) of the energy or fuel generated by the thermal treatment at the site that is used, not all of the energy or fuel is used to dispose of waste.

As a result of the above designation, the REMASCO project is subject to an Environmental Screening Process (ESP) and not a full environmental assessment. The requirements of the ESP will be discussed in more detail in the following sections of this letter.

After a thorough review of the Regulation and follow-up discussions with MOE staff, we are comfortable that the proposed project is subject to the Environmental Screening Process and not the more rigorous full environmental assessment process. As town staff and Council may recall, a similar regulation for Electricity Projects was established a number of years ago to provide for a less rigorous EA approval process for green energy projects.

Complementing Ontario Regulation 101/07 is a Ministry of Environment publication entitled "Guide to Environmental Assessment Requirements for Waste Management Projects" (PIBS 6168e) (the Guide). The Guide provides an excellent summary of the Environmental Assessment Act (EA Act) requirements and Environmental Screening Process. A copy of the document is attached for your reference.

3.2 Process Summary

The proposed waste management project is exempt from meeting the requirements of the EA Act but only on the basis that the proponent complies with and completes the Environmental Screening Process (ESP). The Guide emphasizes the following with respect to the requirements of the Environmental Screening Process:

Proponents who pursue the exemption provided for in the Waste Management Projects Regulation are legally required to comply with the provisions of the Environmental Screening Process.

The ESP is for a class of projects (in which REMASCO is defined) that have predictable environmental effects that can be readily mitigated. The ESP sets out the requirements for assessing the environmental effects of the waste management projects, including requirements for consultation with government agencies, and interested persons, including Aboriginal communities and for documenting the results of the ESP.

In light of the above, it would appear that a key role for the Municipality is to work with the approval authority (MOE) to ensure that the ESP is not only followed but is robust enough to ensure that all potential impacts are identified and specifically and thoroughly assessed for proper mitigation. Our general experience with ESPs is that the proponent driven process does not always result in thorough and accurate supporting documents, and, more importantly, specific mitigation measures. An underlying theme when reviewing the ESP documentation is that this project, like most energy production processes, will have environmental impacts. The question that needs to be answered in a fulsome manner is what will those impacts be and what specific mitigation measures will be used to ensure acceptable impacts for the residents of the Town of Kingsville and beyond.

The Town should assume an active role during the self assessment process and the drafting of the ESR since the documentation required to satisfy the ESP does not require approval by the Ministry of Environment. Communication between the Town and MOE

will ensure that MOE staff can provide comments and advice to the proponent to help ensure that the ESP is complete.

A key component of the 'proponent driven' ESP is consultation. MOE requires consultation that:

- Properly notifies potentially interested persons including those potentially affected by the project;
- Identify and assess the range of environmental (including socio-economic) effects of the project; and
- Address the concerns of interested persons that may be affected by some aspect of the project.

These objectives should be referred to in future in an ongoing manner as the project's documentation is reviewed.

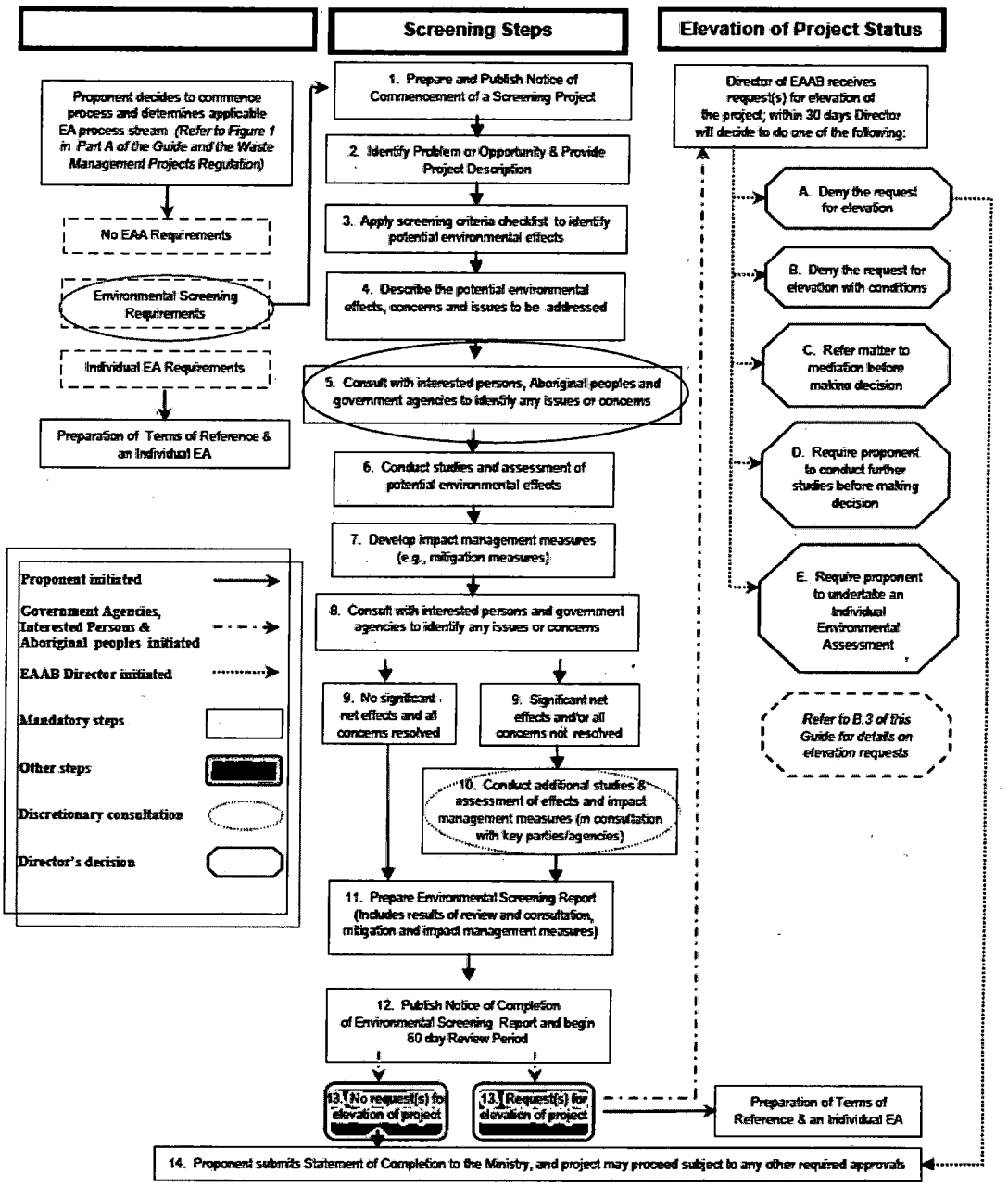

Figure 1: Details of the Environmental Screening Process. The green circle indicates the applicability of the ESP, while the green circle illustrates our opinion of where the process currently sits.(Guide to Environmental Assessment Requirements for Waste Management Projects, Pg 25)

We understand that the Notice of Commencement was published earlier this year together with a project description and subsequent public meeting. On this basis, the project appears to be at Step 5 in the Screening Step process as illustrated by the green circle in Figure 1.

As the Town continues to consult with the proponent, the Town should provide comments with respect to the adequacy of the applied Screening Criteria, Project Description and Potential Environmental Effects as undertaken by the proponent to satisfy Steps 1 through 4 of the ESP. We understand that a separate letter will be prepared by the Jones Consulting Group Ltd. assessing these steps together with other land use planning considerations.

The Guide also recognizes that other legislation applies to the establishment of waste management projects and that completion of the ESP does not relieve the proponent from their responsibility to obtain other approvals. Other applicable legislation to this project may include the Planning Act and the Environmental Protection Act.

3.3 Opportunity for Town & Stakeholder Input

While proponents are legally required to meet the requirements of the Environmental Screening Process, this process is a proponent driven, self-assessment process. Furthermore, the MOE does not typically consider local, County and Provincial Planning policies as demonstrated in a number of our reviews of ESPs associated with renewable energy projects. Furthermore, elevation requests are rarely granted.

The following is an overview of opportunities for Town and stakeholder input:

- Consulting with the proponent in Step 5 of the ESP process after documentation has been provided including the project description, screening criteria, and potential environmental effects.
- Work with the proponent during the studies and assessments supporting the project to address and identify any issues or concerns prior to the completion of the Environmental Screening Report (ESR).
- After the published Notice of completion (Step 12), the Town should undertake a full review of the documentation to ensure that its issues have been adequately addressed. Depending on the outcome of this review, the Town may seek to work with MOE and the proponent to see if the ESR can be amended accordingly. Failing this process, the Town may make a request to the Director of the Environmental Assessment and Approvals Branch (EAAB) to elevate the Project to a full environmental assessment.

If there is an elevation request, the following occurs:

- The Ministry is required to review the Screening/Review Report;
- Director of Environmental Assessment and Approvals Branch makes a decision on elevation requests;
- Minister can be requested to review the Director's decision.[1]

[1] Ibid.

Public participation in the Environmental Screening Process is summarized as follows:

- Proponent is responsible for designing and implementing an appropriate consultation program for the project.
- Purpose is to provide the public with an opportunity to receive information about and make meaningful input into the project review and development.
- Failure to carry out adequate public consultation or to address public issues and concerns may result in requests to elevate the project.
- Public consultation should be commenced early in the screening process and continue throughout the process as necessary.[2]

Public consultation associated with an Environmental Screening process usually consists of at least one open house together with required notices and a comment period (minimum 60 days) for the draft ESR.

During consultation with the proponent, the design of the consultation program could be refined to include opportunities for combined public meetings. For example, a public meeting for a rezoning application could be held during the consultation period of the draft Environmental Screening Report. This would allow for public comments at that meeting to be incorporated into both the implementing zoning by-law and final Environmental Screening Report.

Proponents seeking environmental approvals in the past have expressed concern that the EA process and approvals required under the Planning Act are duplicative processes. We do not agree with this suggestion on the basis that the Planning Act specifically states that all planning approvals must consider provincial policies including those related to natural heritage. For this reason the EAA states that the ESP can be conducted in conjunction with and/or coordinated with other approval requirements and that the ESP does not relieve the proponent from the responsibility of obtaining any necessary approvals under the other applicable legislation.

The Planning Act and EAA should be considered to complement each other rather than be duplicative processes. The processes, and the preparation of their supporting reports, can be run concurrently and the public meetings of the two processes can be integrated to minimize duplication and share common background information. In most cases, minor changes to the scope of key background studies will provide the necessary information to satisfy approval processes under both the Planning Act and EAA.

Once the Statement of Completion has been completed, the project must be implemented in the manner described in the ESR and any conditions imposed by the Director of the EAAB as a result of any bump-up request. This requirement for the proponent to follow the ESR underlines the importance of effective consultation to ensure the inclusion of measures to address any potential issues of the Town.

4.0 Certificate of Approval

The Ontario Environmental Protection Act (EPA) is founded upon the general prohibition against polluting (s. 6 prohibits "discharging" a "contaminant" "into the natural

[2] Ibid.

environment"), and gives the Minister of the Environment various powers and prohibitions against creating an adverse effect, such as the power to issue stop orders and control orders.[3]

Section 9 of the EPA provides for the issuance or amendment of a Certificate of Approval (C of A) by the Director, allowing for the construction, alteration, extension or replacement of a plant or equipment that may discharge a contaminant into the environment (other than water), or change the rate of such a discharge from a facility. Certificates of Approval can be seen generally as officially authorized exemptions from the general prohibition against discharging contaminants.[4] The regulations requiring Certificates of Approval may allow exemptions in particular situations.

Certificates of Approval are required for facilities that release emissions to the atmosphere, discharge contaminants to ground and surface water, provide potable water supplies, or store, transport, process or dispose of waste. Proponents of these types of activities are required to obtain Certificates of Approval to ensure that the environment will not be adversely affected.

The Ontario Ministry of the Environment is responsible for the development, administration and enforcement of environmental legislation. Documentation from the proponent indicates that an amendment to the current Certificate of Approval is required.

Our understanding of the Certificate of Approval process is that it is strictly an approval process between the Ministry of the Environment and the proponent. As a result, there are no third party consultation or appeal rights offered under the Certificate of Approval process. Therefore, any concerns regarding the air emissions of the facility will have to be directed through the ESR consultation process. The MOE could then decide if they would be willing to issue the amended Certificate of Approval in the absence of a completed ESR. A call has been made to the MOE to confirm this process. We will correct our current interpretation of the C of A process in our next report if required.

5.0 Potential Questions for the Town

The following initial comments that may interest the Town were identified in our preliminary review of the project documentation. Council may wish to consider these as they continue consultation with the applicant and become involved in the ESP and Planning Act processes:

- What will be the likely final project? After an initial pilot study, approval is now sought for an expanded pilot study. Incremental approvals may not be adequate in assessing the final cumulative impacts of a final larger project in future once the land use becomes more established.

- Clarification about the generation of fuel for off-site use. (i.e. energy not being used by the greenhouse operation).

- Storage and disposal of fly ash (as defined as hazardous waste)/bottom ash and implications for County solid waste management.

[3] www.uic.edu/sph/glakes/pcb/regs_ca_ontario.htm
[4] www.uic.edu/sph/glakes/pcb/regs_ca_ontario.htm

- Assessment of air quality emissions and consistency of fuel being used.

- Ensuring that the full range of supporting studies are completed including those addressing potential socio-economic impacts.

We understand that the above questions and further land use considerations will be examined in a subsequent report by the Jones Consulting Group once supporting documentation is received.

6.0 Moving Forward

The concept of the REMASCO project reflects unique opportunities to not only dispose of municipal solid waste, but also to generate energy that will directly displace the use of non-renewable energy forms. When reviewing projects of this nature, municipalities should consider the environmental merits of the proposal against the potential land use impacts using thorough and accurate supporting information and specific mitigation impacts.

In summary, the proponent is required to consult with interested persons and government agencies. As a result, the Town should participate fully at the key junctures in the ESP process to ensure that completed and final Environmental Screening Report (ESR) adequately addresses the full range of environmental effects including socio-economic ones. At the same time, the Town should expect that the mitigation measures put forward by the proponent are thorough, specific to the project and effective.

While an Elevation Request is possible at the completion of the ESR review period, it may not be granted. As a result, full participation in the completion of a well researched Environmental Study Report will be crucial in addressing the environmental impacts of the project.

We look forward to the circulation of the report, and if you have any questions or require additional information please contact me.

Sincerely,
on behalf of the
THE JONES CONSULTING GROUP LTD.

Tim Cane MCIP, RPP
Senior Planner

Planner's Final Comments

JONES
CONSULTING GROUP LTD.
PLANNERS, ENGINEERS, SURVEYORS

August 10, 2011

Via email
dtruax@kingsville.ca

Ms. Danielle Truax
Planner
Town of Kingsville
2021 Division Road North
Kingsville, ON, N9Y 2Y9

Dear Ms. Truax:

Re: REMASCO & Southshore Greenhouses
Planning Opinion on Zoning By-Law Conformity
Our File: KIN-09395

1.0 Introduction

Thank you for the opportunity to assist the Town with its consideration of the REMASCO Energy from Waste Facility and its necessary approvals. This letter follows our previous letter issued to you in April 2011 regarding the environmental approvals process for the above referenced project. The purpose of this letter is to assess the proposed REMASCO project against applicable planning legislation to determine if any planning approvals are required.

2.0 Methodology

For this letter, copies of all information provided to the Town from REMASCO were reviewed together with supplementary material from the proponent's website. This information was then used in reviewing the proposal against the Township of Gosfield South Comprehensive Zoning By-law 59-1988 dated March 2010.

For this review, a number of assumptions were made based on the material provided and discussions with Town and Provincial staff, including:

- In future there may be other applications on the subject lands to use energy from waste technology that may result in heat, electricity and/or other materials being produced. Any future expanded use may have potential land use impacts that will require an additional planning assessment at that time;
- The current REMASCO proposal does not create any products or energy to be used outside of the Mucci Group greenhouse operations; however, it does appear that the Southshore facility will be transferring heat and/or electricity to operations located on different lots;
- That the human health and air quality peer reviews undertaken by Stantec conclude there are no adverse effects generated by the current proposal;
- That the fuel supply (ENERPAX MSW fuel pellets) for the REMASCO project have uniform consistency and are produced under the terms and conditions of MOE's approval for the Dongara manufacturing facility. In other words, there will not be significant changes in the source fuel of the facility that would trigger potential land use impacts. Given the complexities and technical nature of waste

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management, then Town must rely on Provincial waste legislation and MOE's established approval processes.

If future changes to the facility are contemplated by the proponent, then a new planning assessment will have to be undertaken as part of any compliance exercise or additional planning approvals.

3.0 Conformity with the Township of Gosfield South Comprehensive Zoning By-law 59-1998

As summarized in Section 2.0 above, we understand that all of the fuel pellets being used at each facility are entirely for the generation of heat (and possibly electricity) to be used by the Southshore greenhouse operation located on multiple sites. The other site, known as Agriville, appears to be located on a single lot.

The only known by-product resulting from the gasification process will be ash to be landfilled at Essex Windsor Solid Waste Authority (EWSWA) subject to the ash meeting EWSWA criteria. If any other by-products from the gasification process are created and used off-site and/or by other greenhouse operations, including the production of heat and electricity, then additional planning approvals may be required subject to a full review of the processes/products by the Town.

The sites are currently zoned Agricultural 1 (A1) which permits Greenhouse uses provided they are serviced by municipal water. In addition, part of the Southshore facility south of County Road 20 is located in the Lakeshore East Residential (R3) Zone. For the purposes of this letter, we assume that the existing greenhouse operations conform to the zoning by-law with respect to the A1 zone and are a legal non-conforming use with respect to the R3 Zone together with any applicable regulations.

The A1 Zone also permits accessory uses for permitted greenhouse operations. Accessory Uses is a defined term in the Zoning By-law as follows:

> *When used to describe a use, building or structure, shall mean a use, a building or a structure that is normally incidental , subordinate and* ***exclusively*** *(emphasis added) devoted to a main use, building or structure and that is located on the same lot therewith, and includes a private garage which is not attached to the main building in any way but does not include a dwelling unit in an agricultural zones, a fence or a sign.*

The gasifier use as described above could be considered an accessory use because no by-products were being created and the energy (heat and possibly electricity) being used was solely for the existing greenhouse operation.

An issue does arise when interpreting the above definition for "accessory use". The definition is quite clear that the accessory use has to be "exclusively" for the main building "on the same lot". After a review of the material submitted to the Town by REMASCO it appears that the Southshore facility will be supplying heat (and possibly electricity) to a number of different greenhouses located on different lots. For the most part, these lots appear to abut the main facility except for greenhouse operations located across County Road 20. Based on this information, we do not consider the gasifier process to be an "Accessory Use" under the current zoning by-law definition.

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We understand that the applicant is undertaking a consolidation process of the various land holdings associated with the Southshore Greenhouse operation. Once those consolidations occur, then the greenhouse operations and gasifier process would conform to the Accessory Use definition. The exception to this conformity is for lands located south of County Road 20 that cannot be consolidated given the uncontiguous nature of the lots. As a result, any heat and/or electricity sent off-site to the greenhouse operations south of County Road 20 will require a planning approval (most likely a Minor Variance – refer to discussion below). The planning approval, in this situation, would generally be a planning conformity exercise with language in the zoning by-law for the existing/proposed operations.

The definition Of "Accessory Use" contained in the Gosfield South Zoning By-law is typical of many other comprehensive zoning by-laws in other municipalities; however, the definition does not contemplate the sharing of resources between different lots even though those lots may be part of the same operation. The Agriville site appears to meet the definition of Accessory Use based on the greenhouse operation being located entirely on a single lot.

As a result of not meeting the above definition for Accessory Use, in our opinion, the Southshore gasifier operation would be considered fall under the definition of a Waste Disposal Site or Processing Facility in the Zoning By-law that is defined as follows:

> *Shall mean any land, buildings or parts of buildings in which refuse or domestic or industrial waste is deposited or processed and any machinery or equipment or operation for the treatment or disposal of waste.*

When reviewing the supporting documentation from REMASCO, the gasifier process treats waste for the purposes of creating heat and electricity. The resultant production of ash as a by-product of the process would also suggest that the gasifier process is also assisting in the disposal of waste by reducing the volume of the ENERPAX fuel pellets having to go to landfill.

Assuming that the gasifier use is not an accessory use for the Southshore facility and is considered as a "Waste Disposal Site or Processing Facility", then Section 5.15 of the Zoning B-law regarding Prohibited Uses must be referred to. Section 5.15 prohibits any land, building and structure from being used as a Waste Disposal Site or Processing Facility. Furthermore, Section 5.15.3 states that any uses not listed as permitted in a particular zone shall also be considered prohibited in such zone. A review of the A1 and R3 zones does not list any use that would capture the gasifier process.

Please note that we have also reviewed the Green Energy Act and note that the exceptions provided by that legislation to the Planning Act do not apply to the REMASCO process because the proposed facility does not use fuel replenished by natural processes (and thus not a renewable energy facility of the purposes of the legislation).

4.0 Planning Application Options

As a result of the Southshore facility being considered a Waste Disposal Site or Processing Facility, a planning approval will be required for the proposed gasifier.

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If a further planning approval were not required (i.e. "accessory use" definition considered to apply), then the Town would effectively have no control over how and where the heat, (and possibly electricity and/or other by-products) could be used. The facility could theoretically expand with no further approvals to provide heat and electricity for any number of greenhouses in the local vicinity. At the same time, an expanded operation would increase the amount of waste ash and possibly become a burden on regional landfill facilities. Other adverse effects of an expanded operation could include storage constraints, increased truck traffic, and additional air emissions.

Approval options that we have considered include:

Application for Minor Variance

The proponent could apply for a site specific minor variance to expand the definition of Accessory Use to include greenhouse operations on multiple lots. The Committee of Adjustment would consider the application based on a report from Planning staff , public input, and information by the applicant. The application must meet the four tests of a minor variance in order to be successful. These tests are as follows on the basis the proposed use:

1. be considered "minor" based on the degree of adverse impact that would arise from an expanded definition for "accessory use";
2. be considered desirable for the appropriate development and use of the land. For example, is an amended definition the right direction for accessory uses on the site;;
3. maintain the general intent and purpose of the zoning by-law;
4. maintain the general intent and purpose of the official plan.

In our opinion, the application would meet the tests of a minor variance on the basis of:

- the adverse effects for the current Southshore proposal have been considered and are considered acceptable regardless of whether energy is used on the same lot or across multiple lots (as proposed).
- On the assumption that any adverse effects are acceptable, the gasifier use is desirable on the basis that it does not use fossil fuels and its energy source makes use of municipal solid waste that would otherwise be landfilled. The gasifier promotes a more sustainable greenhouse operation.
- The general intent and purpose of the Zoning By-law would be maintained on the basis that the Town appears to support greenhouse operations. It would appear that the Accessory Use and Waste Disposal Site or Processing Facility definitions may have been drafted at a time when larger greenhouse operations on multiple lots were not contemplated and when municipal solid waste fuel pellets were not an option for generating heat and/or electricity.
- The Official Plan does not contain specific policies related to accessory uses and greenhouse operations. In addition, there does not appear to be policies associated with the form of waste disposal being contemplated by the Southshore proposal.

A Minor Variance approval process would allow for third party participation and the ability of local residents and the applicant to appeal the decision and/or conditions of the Committee's decision to the Ontario Municipal Board (OMB). We recommend that

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any variance to the definition of "accessory use" be limited to the actual Southshore operation as proposed to avoid possible uncontrolled establishment and expansion of gasifier facilities at other locations in the Town.

Application for Zoning By-law Amendment (ZBA)

A ZBA represents an approval process under the Planning Act that could permit the Southshore operation on a site specific basis or provide general permissions for gasifier uses of a similar nature throughout the Town.

The benefits of a ZBA process is that there could be a more comprehensive review of the proposed use together with increased public consultation and Council consideration of the application.

Option 1 – Site Specific

A site specific rezoning application could allow the Southshore facility to transfer heat and electricity from the gasifier process for use on nearby lots forming part of the larger greenhouse operation. As part of the more comprehensive rezoning process, REMASCO may wish to seek approval for future gasifier operations on the Southshore site to serve an expanded area or include the production of other fuels for use off-site. A wider range of permitted uses now would possibly eliminate the need for subsequent approvals under the zoning by-law at a future date.

Option 2 - Town-Wide Comprehensive Zoning By-law Amendment

The second ZBA option for the Town would be to establish a new use under the comprehensive Zoning By-law that reflects gasifier uses and their ability to benefit other local greenhouse operations. This process would require the Town to consider a new definition for gasifier type uses and associated planning controls in order that they be permitted on a municipal-wide scale. A municipal-wide ZBA would allow for public input and Council approval to proactively deal with the effects of gasifier uses. The benefit of such a process would be to comprehensively consider the new land use, potential adverse impacts, and benefits for the Town and its stakeholders. By establishing clear land use controls for gasifier uses in the Zoning By-law, the Town would effectively control future gasifier uses and, if considered appropriate, streamline the installation of gasifiers at other greenhouse operations.

5.0 Conclusion

In summary, our review of the applicable planning legislation indicates that the Southshore portion of the REMASCO proposal will require some form of approval under the Planning Act. The current definition of "accessory use" attempts to minimize adverse impacts by specifically limiting accessory uses to the same lot as the primary use. Any changes to definitions in the Zoning By-law (either on a site specific or town-wide basis) will require planning approval together with its associated public input.

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If you have any questions or require additional information please contact me.

Sincerely,
on behalf of the
THE JONES CONSULTING GROUP LTD.

Tim Cane MCIP, RPP
Senior Planner

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Stantec Initial Review of Reports

Stantec Consulting Ltd.
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VIA E-MAIL: Danielle Truax – dtruax@kingsville.ca

File No.: 122120074

Danielle Truax
Planner
Planning Department
Town of Kingsville
2021 Division Rd N Kingsville, ON N9Y 2Y9

Attention: Danielle Truax

Dear Ms. Truax:

Reference: Peer Review of the REMASCO Energy Production Facilities Kingsville Project

Stantec Consulting Ltd. is pleased to provide the Town of Kingsville this peer review of the Air Quality and Human Health Risk Assessment prepared by REMASCO's consultants in support of the Screening Level Environmental Assessment for proposed gasifier installations in Kingsville, Ontario.

The following documents and associated appendices were provided to our team for review:

- DRAFT Air Quality Assessment REMASCO Kingsville. May 11, 2011. Prepared by AJ Chandler and Associates.
- Human Health Risk Assessment REMASCO Gasifier Installations Kingsville Ontario. Draft Report May 2011. Prepared by Intrinsik Environmental Sciences.

The Stantec reviewers approached this assignment with the objective of answering the following two questions:

1. Do the reports meet the anticipated expectations and technical requirements of Ontario Ministry of the Environment (MOE)?
2. Are the conclusions reached in the reports reasonable and scientifically defensible?

First general comments on the two reports are provided, and then Stantec has provided specific comments on suggestions for improvement or areas that require clarification on the two reports. The results of the air quality review are provided first, given that the HHRA requires these outputs for use in its assessment.

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Reference: Peer Review of the REMASCO Energy Production Facilities Kingsville Project

GENERAL COMMENTS

General Comments on the Air Quality Assessment

Generally, the report and analysis appears to have been professionally done and the methodology used would be expected to provide reasonable predictions of changes in ambient air quality. However, in some areas of the report, notably the model set-up sections, there was insufficient information provided for Stantec to provide a definitive assessment of the appropriateness of the modelling approach. We will require some additional data/explanations be provided to complete our review.

It has been Stantec's experience that the Ministry of the Environment (MOE) will expect/require that air quality reports that support environmental assessments contain the same level of detail as required for an Emission Summary and Dispersion Modelling (ESDM) report (although not required to follow the same format). Therefore, the report was assessed with respect to the methodology and information requirements discussed in the following relevant documents:

- O. Reg. 419/05: Local Air Quality;
- MOE Guideline A-10: Procedure for Preparing an Emission Summary and Dispersion Modelling Report, Version 3.0, March 2009;
- MOE Guideline A-11: Air Dispersion Modelling Guideline for Ontario, Ver 2.0, March 2009; and,
- Ontario's Ambient Air Quality Criteria, February 2008.

The air quality report does not provide the level of detail in some sections as is required by the MOE in Guidelines A-10 and A-11. We recommend that the report be expanded to include the information requirements specified in Guidelines A-10 and A-11, which will aid in expediting the report review with the MOE and allow Stantec to complete our review.

In some instances (e.g. meteorological processing, receptor grid spacing) the methodology used does not appear to follow standard MOE methodologies. Pre-consultation with the MOE on non-standard approaches is normally recommended to ensure that the approaches will be acceptable to the MOE. The report does not indicate if any pre-consultation was conducted. We recommend that the MOE be consulted prior to submission of the EA to aide in expediting the review by addressing any potential methodology questions by the MOE upfront.

In our review, Stantec has identified two areas of particular concern in the air quality assessment that could affect the predicted contaminant concentrations:

- There appear to be errors in some AERMET input parameters that may affect the meteorological data set used in the dispersion modelling. The magnitude of the changes and their impact on the results and conclusions of the study cannot be evaluated until this issue has been addressed.
- The effects of Thermal Internal Boundary Layer formation has not been addressed in the analysis. This could lead to potentially under predicting ground level concentrations.

Additional details on these two issues, as well as identification of some other areas of the report where additional information/discussion is required to complete our review are provided in the following section.

General Comments on the Human Health Risk Assessment

The human health risk assessment (HHRA) report is contingent on the data inputs provided from the air quality assessment. Therefore, all comments on the HHRA and its findings are subject to change based on the outcome of the further examination of the air quality report.

Overall, the HHRA follows standard approach and methodology that the MOE has come to expect in these types of submissions dealing with air emissions from facilities. The approach followed the standard risk assessment paradigm of Problem Formulation, Exposure Assessment, Hazard Assessment, Risk Characterization, Uncertainty Analysis and Conclusions. In addition, a brief screening level ecological risk assessment was included in the report.

The HHRA is a very well written report that is easy to follow and provides adequate details for reviewers to understand what decisions were made, what input parameters and exposure equations were used, and how conclusions were ultimately reached. Overall, we believe that the approach taken was a conservative one that likely errs on the side of caution. There are no major areas of concern that were uncovered during the report review. Stantec believes that there are some additional toxicity values that could be employed and believes that the chemical mixtures assessment requires refinement.

We believe that if our specific comments, as listed below, are incorporated into the assessment it would bolster the document in a manner that will improve the overall quality of the document.

DETAILED COMMENTS

AIR QUALITY

The following sub-sections provide detailed discussion of some sections of the AQ report where questions or concerns were noted by Stantec.

Section 2.4 Contaminants of Concern

Although typically not an issue for air quality assessments, REMASCO continuously monitors carbon monoxide and for completeness we recommend that this contaminant be included in the air quality assessment.

Section 4.1.3 Equipment Descriptions

Inclusion in this section of the process flow diagram presented in the open house would aide in describing the systems and be consistent with MOE Guideline A-10 requirements.

Section 4.2.2 Operating Scenario REMASCO Facilities

The use of time varying emissions to account for the annual variation in operations of the facilities is a reasonable approach and the assumptions used on how many boilers are in use at any given time appear reasonable.

To be consistent with MOE requirements specified in Guideline A-10, the emissions scenario used the assessment should correspond to worst-case (i.e. conservative) emissions. This section of the AQ report describes the monthly variation in emissions used for each REMASCO facility; however, it is unclear if the emissions scenario would meet this requirement. The cogen and boiler loads in a given month are provided but it is unclear whether these values are typical or worst case loads for each month. We would expect that depending on ambient conditions which can vary from year to year, that the boiler/cogen loads could vary for a given month and it is unclear whether the scenario presented accounts for the possible worst case loads in each month.

The emission inventory is also missing some key stack parameter information such as stack temperatures, UTM coordinates and stack heights. This data is required prior to Stantec completing our review. Inclusion of a stack summary table similar to the MOE requirements in Guideline A-10 is recommended. We also recommend that this section include a discussion of data quality and negligible sources to be consistent with MOE requirements.

Section 4.2.2 Operating Scenario REMASCO Facilities

On page 33 of the AQ report it is noted that: "*The Emission Rate Factor shown in the tables is effectively the ratio of the average calculated flow in the stack divided by the flow for the test condition of 19.127 MMBtu/h [3.45 Am3/s]. This assumes that the concentration of contaminants in the exhaust from the boilers will not vary with load.*"

This assumption requires some additional discussion. This statement seems to suggest that contaminant emission rates from the boilers were based on the stack measurement data (contaminant stack concentrations at 100% load) pro-rated by flow rate for lower loads. Depending on equipment, operation at less than full load can result in lower combustion efficiencies (and therefore potentially higher contaminant stack concentrations than those at full load). This could potentially lead to underestimates of stack emissions at lower loads. Some clarification of the expected combustion efficiencies of the boilers over the ranges of loads considered in the assessment needs to be provided to address this question.

Section 4.2 – Emissions Scenarios Considered

Boiler emissions during start-up/shut-down conditions nor process upsets have been addressed in the report. Start-up/shut-downs often have higher emission rates for some contaminants (coupled with lower exit velocities) than during normal operation and may result in higher short-term average ground level concentrations. Likewise process upsets (e.g. failure of emission control equipment) may result in significantly elevated emissions, which should be addressed in the AQ report.

Section 4.3.5 Using Emissions Factors....

"Since each facility will have its own profile of fuels used, some assumptions were made about fuel use, and these assumptions were applied across the 117 ha of greenhouse evaluated. Of the 30 BHP per acre, 30% of the total usage was assumed to be supplied by each of wood and natural gas, or 9 BHP/acre each. Coal was assumed to provide 25% of the usage, 7.5 BHP/acre. Oil was assumed to provide 15% of the usage or 4.5 BHP/acre."

Detailed discussion on the basis for these fuel use assumptions should be included. How were these numbers arrived at?

Section 5.1 Construction Emissions Control

It is recommended that REMASCO develop and implement a construction fugitive dust management plan that incorporates the commitments provided in this section, provides specifics for each activity (e.g. frequency of watering), and identifies the responsibilities of site personnel to implement and track that all mitigation measures are being implemented as required. The data requirements for dust management plans are discussed in greater detail in MOE Guideline A-10, Appendix E, Section 3.1.

Section 5.2 Operations Emissions Control

"In addition, REMASCO currently undertake daily testing for NOx, HCl, and SO2 using calibrated analysers. This equipment will continued to be used to monitoring flue gases in the five stacks that will be in operation when the full system is completed."

Further discussion is required on the equipment and methods used for this daily testing to determine if continuing monitoring with this method is adequate for the expanded facility and will meet Guideline A-7 requirements for testing of these parameters.

Section 6.2 – Emissions

On page 62 of the AQ report it is noted that "*Since it is convenient to use the test conditions to define the base emission rate, and the predicted concentrations will be proportional to the measured emission concentration for any contaminant, it is useful to define a unit emission rate that will reflect the operating conditions for each of the varying flow conditions."*

Further on in the same paragraph it is noted that *"To allow the predicted concentrations for all the contaminants to be pro-rated, these factors were used to derive the Emission Rate Factors shown in the tables for each stack."*

This explanation is somewhat unclear. We assume this means that because the emissions from all stacks were based on the stack testing results of the current REMASCO gasifier, the methodology used in the dispersion modelling was to model one contaminant specifically and then calculate the concentration at each receptor for all other contaminants based on the ratio of the stack emission rates for these two contaminants, as this ratio will be identical for each stack. Please confirm that this interpretation is correct.

Section 6.2 – Emissions

On page 62 of the report, the heights of the stacks on the existing greenhouse are noted as being 16-m above grade and typically the peaks of the greenhouses are about 7-m. Based on a review of the locale by Stantec using Google Earth, these values appear reasonable. Table 15 however, notes these stack heights to be 8-m and it needs to be clarified which height was used in the modelling. The use of the MOE methodology to address stacks with rain caps is a reasonable approach which will result in conservative predictions for non-capped stacks.

Section 6.2 – Deposition Parameters

The deposition methodology and inputs described in this section follow MOE/US EPA methodologies for most of the contaminants. It is noted in this section that deposition of particulates emitted from the stacks was assessed, but no rationale for excluding deposition of gaseous contaminants is provided.

Section 6.2 - Buildings

This section of the report provides a general description of the BPIP methodology but does not provide sufficient information to assess whether buildings were properly included in the modelling. We recommend that this section be modified to meet MOE the building/stack information requirements specified in Guideline A-10. A figure showing the REMASCO stack locations, building layouts and building heights should be included in this section (as was referenced in the March 11th draft of the air quality report provided to Stantec). A copy of the BPIP input file should be included in an appendix to the report or provided to Stantec separately for review.

Section 6.2 – Meteorological Data

Additional discussion and description of the approach and input values used in developing the surface and upper air data is required, as a non-standard approach was used. This section notes that a prognostic model (MM5) was used to develop pseudo surface and upper air stations in the vicinity of Kingsville. While this approach could produce a reasonable meteorological data set (and is similar to that used in other air quality studies), no discussion on the MM5 domain, input data, or model options are provided which would allow for a review of the accuracy/assumptions used in the approach. The location of the MM5 output point (UTM coordinates) should be included in the report and a figure showing the MM5 domain and model points would be useful.

Additionally, Section 6 provides insufficient information to allow for a review of the reasonableness of the resulting AERMET data set developed from the MM5 analysis. AERMOD dispersion modelling reports typically include (at a minimum) a wind rose showing the wind speed and wind directionality of the met data set used in the dispersion modelling. As a non-standard method was used, we would recommend that a wind speed histogram plot and plots of seasonal/diurnal variations in mixing layer heights and atmospheric stability be included in the report as an aide to gauging the reasonableness of the data. Sample AERMET input files should be included in an appendix.

It should be noted that MOE requires that non-standard methods be pre-approved by their department and if such pre-approval was not conducted, there is a potential that the methodology may not be accepted by the MOE.

No discussion of precipitation is included in this section. Details of the precipitation station(s) used, how the data was prepared, and a presentation of the resulting precipitation data used in the modelling needs to be included in the report to allow for the appropriateness and reasonableness of this data to be reviewed. Graphs of monthly total and maximum hourly precipitation values (per month) would provide a useful presentation of this data.

Section 6.2 - Terrain Characteristics

The methodology used to determine the weighted surface roughness, Bowen ratio and albedo do not appear follow MOE recommendations and therefore may not be acceptable to the MOE. MOE typically recommends weighting all three of these parameters in a 3-km radius around the site (and also notes that pre-approval is required for using a differing methodology). MOE does note in Guideline A-11 that a 1-km radius could be used in an urban environment, but we would not expect (based on review of the aerial photos of the study area) that this area would be classified as urban (unfortunately, no information to support an urban versus rural categorization as per MOE methodologies is provided in the report, although it is noted that cultivated land is extensive). The AQ report notes that surface roughness was weighted in a 1-km radius, while Bowen ratio and albedo were weighted in a 5-km radius. It is not explained why these values were chosen and why different radii were used.

The seasons defined in the AQ report differ from those required by the MOE (e.g. MOE requires spring to be defined as March - May while it is defined in the AQ report as April – May). While this will likely not result in significant changes in model predictions and a reasonable rationale to support the season ranges used is provided, there is a potential that this methodology may not be accepted by the MOE. Consultation with the MOE on this issue prior to submitting the AQ report for review is recommended.

Of particular concern is that there appear to be errors in the surface roughness and Bowen ratio data provided in Table 18. Surface roughness (Zo) values greater than 1.3-m are noted in this table for many directions and times of year. In both the MOE Guideline A-11 and the US EPA AERMET manual (which is noted in the AQ report as being the reference used for these data), the largest surface roughness provided for any landuse is 1.3-m. It would therefore not be realistic for the weighted surface roughness over a mix of open and built up landuses to be greater than this maximum value and given the generally open terrain shown in the aerial photos, we would expect the maximum Zo in any direction/month should be much less than 1.0-m.

Similarly for Bowen ratio, the maximum winter time Bowen ratio over all landuse types (for average moisture conditions) listed in the MOE and AERMET manuals is 0.5. In Table 12b, the largest weighted Bowen ratio listed in January (winter time) is 1.31 which cannot be correct based on the input values for the various landuses.

Section 6.2 - Receptor Grids

The AQ report notes that "*The model was set up with a uniform 100 m x 100 m receptor spacing extending south from 4661000 and east from 356000.*" This receptor spacing is inconsistent with the description provided in a draft of the AQ report provided to Stantec on March 11, 2011 for preliminary comment. In the March 11th draft, the receptor spacing is noted as "*The model was set up with receptors in a nested configuration that saw the spacing between receptors increase the further they were from the center of the site. Within 200 m of the center of the site the spacing used was 20 m; from 200 – 500 m the spacing went to 50 m; from 500 – 1000 m the spacing was 100 m; the spacing increased to 200 m from 1000 – 2000 m from the source center. After 2000 m from the source out to 5 km the space was 500 m and finally a 750 m spacing was used out to 10 km.*" The spacing described in the March 11th draft is consistent with MOE requirements in Guideline A-11 while the receptor spacing described in the May 11th version is not. The uniform 100 m x 100 m receptor spacing would be adequate for predicting the spatial variation of ground level concentrations for the other existing sources in the study area, but in order to assess compliance of the REMASCO facilities with MOE air quality criteria, a receptor grid consistent with MOE guidelines should be used in order to ensure that maximum GLCs are adequately predicted. We expect the MOE will require the modelling to be consistent with their guidelines prior to their acceptance of the report.

It is noted in Section 7 of the AQ report that the maximum predicted ground level concentrations (which were used in for comparison to MOE air quality criteria) occurred at a receptor located on the REMASCO property (on-property receptors are not required to be assessed by the MOE). Changing the receptor grid is unlikely to affect the compliance status of the facility, however, given the sparseness of receptors in proximity to the REMASCO facilities, it is uncertain if the values currently presented in the report would represent an overestimate of maximum off-property concentrations or not.

Section 6.2 – Special Receptors

The AQ report notes that the special receptors are plotted in Figure 6. The figure supplied to Stantec (Kingsville 27500 11x17_Landscape.pdf) which we assume to be Figure 6 (it is missing a figure number/title) does not show the special receptors.

Additional discussion on the rationale for selecting the special receptors needs to be included in the report. In the vicinity of the Remasco facilities it is unclear if the potentially most impacted residences have been selected. For the Southshore facility, two residences north and south of the facility were noted as being selected (this is based on the receptor description in Table 19 as the locations of the receptors were not shown in Figure 6). As predominant wind directions in Southern Ontario are typically southwesterly to northwesterly (as previously discussed, the report requires additional discussion on the site specific meteorology including defining wind directionality) it doesn't appear that residences (if any) in the predominantly downwind directions (northeast to southeast) from the facilities have been included, which would be needed to ensure worst-case impacts are identified. We recommend including a discussion of the locations/distances of the nearest residences in all compass directions from each site be included in the report, along with the rationale for the receptors selected.

The AQ report identifies 13 special receptors were used in the assessment. This number differs from that specified in the open house presentation supplied to Stantec (16 receptors noted) and this difference should be explained in the AQ report.

Section 6.3 Modelling Runs

It is noted on page 71 that the ozone limiting method (OLM) was used in the assessment of cumulative NOx emissions from the study area (existing sources and Remasco). A background ozone concentration of 40 ppb is stated as being used in the OLM (it is not noted what averaging period this is for, but was assumed to be hourly). This value differs from the ambient ozone monitoring data presented in Section 3.4, Table 3, in which the lowest 90th percentile hourly ozone concentration is 48 ppb and the lowest maximum value is 93 ppb. As a higher background ozone level will generally result in higher ambient NO_2 levels, an explanation of the rationale and applicability of the value used should be provided.

Section 6.3 Modelling Runs

Since the Remasco facilities are located in proximity to Lake Erie, the effect on plume dispersion of thermal internal boundary layers (TIBL) during on-shore winds needs to be addressed in the report. In pre-consultation between Stantec and Chandler Associates in March 2011, Stantec noted this as a concern with the modelling approach and recommended that reasonable approach to determining the potential effect of TIBLs on the AERMOD dispersion predictions would be to use the US EPA SCREEN3 model (which has to option to include or exclude this effect) to assess the potential impacts of TIBLs on maximum predicted ground level concentrations. This does not appear to have been done and no data has been provided in the report to as to whether TIBL formation will significantly affect the predicted ground level concentrations. As the formation of TIBLs can in some cases result in significant increases in ground level concentrations relative to non-TIBL conditions, this effect should be evaluated, reported and the AERMOD predictions appropriately adjusted (if required).

Section 7.2.3 Comparison to Standards

The AQ report does not discuss the methodology used to determine the background concentration values, but based on the background $PM_{2.5}$ concentrations discussed in this section, it is assumed that 90th percentile hourly, 90th percentile 24-hour and annual average concentrations from the Windsor ambient monitoring data were used. In this section it is noted:

"The concentrations include the monitored ambient concentration numbers reported by the MoE. For NO2 the hourly ambient contribution to the total is 40 ug/m3; for the daily value it is 58 ug/m3; and for the annual level it is 21.5 ug/m3."

The background NO_2 levels noted above do not match any of the data presented in Section 3.6, Table 6 and appear to be incorrect / inconsistent. This would therefore be expected to affect the cumulative NO_2 predictions.

Reference: Peer Review of the REMASCO Energy Production Facilities Kingsville Project

Section 9.2.2 Monitoring

This section notes that emissions monitoring that is currently performed for the existing facility (continuous monitoring for opacity, CO, O_2 and temperatures), but does not indicate what monitoring is suggested for the new/upgraded facilities with respect to the current version of MOE Guideline A-7 (October 2010), which was released subsequent to the permitting of the current REMASCO facilities. Guideline A-7 notes that:

Parameters that will be considered for continuous monitoring include:

- *temperature*
- *organic matter*
- *carbon monoxide*
- *residual oxygen*
- *volumetric flow rate of the flue gas*
- *hydrogen chloride*
- *sulphur dioxide*
- *nitrogen oxides*
- *opacity*
- *particulate matter*

Other parameters that may also be considered for continuous or long-term monitoring include:

- *carbon dioxide*
- *hydrogen fluoride*
- *mercury*
- *dioxins and furans*

A discussion of the continuous monitoring parameters that REMASCO is expecting to monitor for the new/expanded facilities should be included in this section. Section 5.2 of the AQ report (see comment above) suggests that REMASCO is expecting to conduct discrete daily sampling of NOx, HCl, and SO2. This methodology may not meet the requirements of Guideline A-7, which requires either compliance source testing or continuous monitoring. Based on the dispersion model predictions, which show elevated NO_2 levels in the Kingsville area, we recommend that at a minimum NOx be considered for continuous monitoring along with the parameters currently monitored.

HUMAN HEALTH RISK ASSESSMENT

Introduction

HHRA Comment 1.

Towards the end of the section there is a list of references used by Intrinsik to complete the HHRA. It is suggested that the MOE Air Standard Branch documentation on derivation of air quality guidelines also be included in this list.

2.4.2 Interpretation of Risk Estimates

HHRA Comment 2

Within this section there is discussion about the use of a Concentration Ratio (CR) benchmark of 1.0 for the inhalation exposure pathway on a 1-hr and 24-hr basis and that the authors chose a CR ratio of 0.2 for chronic exposures. However, for those chemicals that have published inhalation reference concentrations we believe that it is also acceptable to benchmark these exposures at 1.0. This is because the toxicity reference values are specific to that exposure pathway and independent of exposure from other routes.

3.1.1 The Surrounding Area

HHRA Comment 3

As previously mentioned in the Air Quality review, the figures showing the "sensitive" receptor locations were not very well labeled or clear (including updated figures provided to us). Stantec believes that the unnumbered table on page 18 of the report would benefit from an additional column that provides that actual distance from the facilities to these receptors. In general the figures (even the updated ones provided to us) are poorly labeled, do not show actually location of the project clearly, and require editing prior to final versions being released.

HHRA Comment 4

Again similar to the Air Quality review, Stantec believes that additional special receptor locations should be considered in the immediate vicinity of the facilities. An additional 4-6 residential receptors should be considered on predominant downwind side of the facilities. This would provide additional assurance that residences surrounding the facilities will be protected.

3.2 Chemical Characterization

HHRA Comment 5

Stantec concurs that the list of chemicals of concern (COC) appears reasonable. However, given that the fuel to be employed is municipal solid waste pellets and that the facility will be required to meet MOE A-7 guidelines, then Stantec suggests that this section requires additional discussion on why the approximate 100 chemicals recently investigated for the Durham/York Residual Waste Study were not carried forward in this assessment. The reviewers suggest that the authors review the Durham/York risk assessment and the assessment that they previously prepared for the Algonquin facility, and justify why not all of these chemicals

are required for consideration in this case. It could be as simple as evaluating the significance of the hazard quotient (HQ) and incremental lifetime cancer risks (ILCR) predictions for these facilities that are several orders of magnitude larger than the proposed operation to determine if any were approaching their applicable benchmarks.

HHRA Comment 6

Stantec believes that consideration should be given to modeling and evaluating carbon monoxide (CO), given that it is an A-7 contaminant and has relevant published human toxicological values. There is no mention in the report about why it was excluded.

HHRA Comment 7

Stantec requires clarification as to whether benzo(a)pyrene itself was modeled and carried forward from the air quality assessment or whether the total loading of potentially carcinogenic PAHs was used. If it was just B(a)P then there is a potential that carcinogenic risk may have been underestimated.

3.3 Receptor Characterization

HHRA Comment 8

It is noted by the reviewers that a 30 year deposition period was used to evaluate the multi-media exposures. This is a good example of the conservative nature of this risk assessment.

Figure 3-4 Conceptual Site Model (CSM)

HHRA Comment 9

The reviewer assumed that the dark blue shading was to be representative of primary exposure pathway, while the light blue shading is that of secondary pathways. The significance of the shading should be clarified on the figure.

4.0 Exposure Assessment

HHRA Comment 10

Intrinsik should be explicit in the text that the Microsoft Excel model is an internal model developed by the company, based on the published exposure calculations. As the text reads at this point it could be construed as a commercially available model. Stantec acknowledges that the in-house developed Intrinsik model has been approved by a number of regulatory agencies, including the MOE, for conducting this type of work.

4.1 Estimation of Ambient Ground-Level Air Concentrations

Table 4-1

HHRA Comment 11

It would significantly aid the readers of the document if the receptor locations in these tables could be grouped as per the categories of receptors being evaluated (e.g., residential, community, etc.) with headers. It

is understood that there are space constraints and hence the reason the abbreviated location names are used, but grouping them would provide clarity of receptor type.

4.2 Estimation of Soil and Home Garden Produce Concentrations

HHRA Comment 12

It was unclear from review of the text as to how exactly the values were arrived at for estimating predicted concentrations of COCs in greenhouse grown vegetables. For example, was it assumed that the deposition at the MPOI was actually drawn into the greenhouse ventilation system and depositing on plants? Please provide clarity on this exposure. Regardless of approach used, the reviewers believe that this would be a source of considerable uncertainly and likely a significant overestimation of any actual chemical loading to greenhouse grown vegetables.

4.4. Cumulative Air Concentrations

HHRA Comment 13

From our review of Table 4-8 it appears that by bringing these new facilities on-line that there would be a potential overall decrease in NO_2 and $PM_{2.5}$ concentrations in the local airshed. If this is the case we believe that it is a point worthy of more attention within the text of the document.

5.0 Hazard Assessment

HHRA Comment 14

Stantec has reviewed and confirmed the majority of the toxicity reference values (TRVs) used by Intrinsik. However, we offer the following comments:

1. Cadmium 24-hr value is reported as 0.25 $\mu g/m^3$ from the MOE, 2008. However, there is a more conservative and more appropriate value listed in that document and it is an order of magnitude lower at 0.025 $\mu g/m^3$ which should be considered for use.
2. Overall, Stantec has retrieved several additional 1 hr and 24 hr TRVs that could be considered in this assessment. We suggest that Intrinsik review the Durham / York EFW facility risk assessment available at http://www.durhamyorkwaste.ca/amended_ea_study_doc.htm for details. We believe that these additional TRVs should be employed in the risk assessment.
3. In Table 5-2, an inhalation TRV was derived by Intrinsik based on route to route extrapolation from a systemic TRV. However, WHO 2005 does provide a more conservative chronic RfC equivalent value of 0.5 $\mu g/m^3$ that should be considered.

6.0 Risk Characterization

HHRA Comment 15

Stantec does not agree with Intrinsik's approach that suggests for the chemical mixtures one should benchmark these results in a similar manner as to individual chemical exposure. We believe that this is too

conservative. However, given that HCl was modeled to be driving the cumulative chemical mixture effect at the MPOI Stantec believes that further investigation and a better explanation is warranted to assure the public that this would not result in an undue risk to health.

The following are suggestions:

1. It is our understanding that the HCl was modeled using existing stack measurement data that was greater than the MOE A-7 guideline. Stantec believes that the authors should remodel the HCl in a sensitivity analysis at the A-7 output value that they will be held to in the Certificate of Approval. This should result in lower ground level HCl concentrations.
2. Provide a frequency analysis of how many days these exceedances would be expect.
3. Provide a more in depth discussion for the toxicological basis of the respiratory irritants that you have added together. Please indicate the uncertainty factors that comprise the TRV and discuss to what extent there is conservatism layered into all of the values.
4. Under the chronic inhalation assessment we do not feel that if you are going to benchmark the chemical mixtures that 0.2 would be appropriate. As indicated in a previous comment at most this should be a CR benchmark of 1.0. This would then result in the respiratory irritants not being of concern under this scenario.

6.3.3 Milk Consumer Scenario

HHRA Comment 15

Stantec was unclear as to the rationale that local toddlers would not be exposed to locally produced milk. We suggest that Intrinsik reconsider adding the milk intake into the cumulative multi-media exposure assessment for the facilities for local toddlers.

6.4 Cumulative Assessment Results

HHRA Comment 16

Stantec believes that the proponent did a reasonable job in assessing these cumulative effects. However, given that NO_2 and $PM_{2.5}$ were listed as respiratory irritants in the chemical mixtures section, they should also be added together in the cumulative effects assessment.

9.0 Screening Level Ecological Risk Assessment

HHRA Comment 17

Overall this brief section does a good job of describing how the project emissions will not pose an ecological risk. No additional comments are made on this section.

Appendix B – Technical Information

HHRA Comment 18

The worked example for benzene appears to contain a few calculation errors. In section B-1.5.1, the predicted concentration of benzene was estimated to be 5.16 E-06 mg/kg ww; however based, on the equation as presented and the values for each parameter, the concentration should be 3.19E-07 mg/kg ww. It is recognized that this value is lower than that in the risk assessment. In section B-1.6, the predicted concentration of dioxins/furans in forage should be 1.24E-09, not the reported 1.17E-09.

Stantec suggests that Intrinsik review their worked examples to confirm if these are indeed errors and if so were they carried forward in their spreadsheet model.

OVERALL CONCLUSIONS

It is clear that considerable effort went into the preparation of both the Air Quality and the HHRA reports. Stantec believes that additional justification in text and potential additional air modeling is required at this point prior to submission to the MOE. We believe that the HHRA as well written and scientifically defensible, so it could be updated in an expeditious manner if new air quality data is generated.

CLOSURE

We trust this information is satisfactory for your present requirements. Should you have any questions or require any additional information, please do not hesitate to contact u . At this point given that our formal review has been completed on the draft reports we would be open to direct discussions with REMASCO's consultants to resolve any outstanding issues.

Sincerely,

STANTEC CONSULTING LTD.

Original Signed By

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HUMAN HEALTH RISK ASSESSMENT REMASCO GASIFIER INSTALLATIONS KINGSVILLE ON

The following document provides responses to comments received from Stantec Consulting Ltd. on June 10, 2011 and June 16, 2011 regarding the Human Health Risk Assessment REMASCO Gasifier Installations Kingsville Ontario (Draft Report dated May 2011).

General Comments on the Human Health Risk Assessment (June 10, 2011)

The human health risk assessment (HHRA) report is contingent on the data inputs provided from the air quality assessment. Therefore, all comments on the HHRA and its findings are subject to change based on the outcome of the further examination of the air quality report.

Overall, the HHRA follows standard approach and methodology that the MOE has come to expect in these types of submissions dealing with air emissions from facilities. The approach followed the standard risk assessment paradigm of Problem Formulation, Exposure Assessment, Hazard Assessment, Risk Characterization, Uncertainty Analysis and Conclusions. In addition, a brief screening level ecological risk assessment was included in the report.

The HHRA is a very well written report that is easy to follow and provides adequate details for reviewers to understand what decisions were made, what input parameters and exposure equations were used, and how conclusions were ultimately reached. Overall, we believe that the approach taken was a conservative one that likely errs on the side of caution. There are no major areas of concern that were uncovered during the report review. Stantec believes that there are some additional toxicity values that could be employed and believes that the chemical mixtures assessment requires refinement.

We believe that if our specific comments, as listed below, are incorporated into the assessment it would bolster the document in a manner that will improve the overall quality of the document.

Response

No response required.

Introduction

HHRA Comment 1.

Towards the end of the section there is a list of references used by Intrinsik to complete the HHRA. It is suggested that the MOE Air Standard Branch documentation on derivation of air quality guidelines also be included in this list.

Response

Agreed, the following reference has been added:

MOE. 2009. Guideline for the Implementation of Air Standards in Ontario (GIASO). Version 2.0. PIBS # 5166e02. March 2009.

PRESENTED TO KINGSVILLE COUNCIL
JUL 15 '11

2.4.2 Interpretation of Risk Estimates

HHRA Comment 2

Within this section there is discussion about the use of a Concentration Ratio (CR) benchmark of 1.0 for the inhalation exposure pathway on a 1-hr and 24-hr basis and that the authors chose a CR ratio of 0.2 for chronic exposures. However, for those chemicals that have published inhalation reference concentrations we believe that it is also acceptable to benchmark these exposures at 1.0. This is because the toxicity reference values are specific to that exposure pathway and independent of exposure from other routes.

Response

Agreed, this change will be made to the document. It should be noted that none of the chronic CR values exceed 0.2 or 1.0 benchmarks.

3.1.1 The Surrounding Area

HHRA Comment 3

As previously mentioned in the Air Quality review, the figures showing the "sensitive" receptor locations were not very well labeled or clear (including updated figures provided to us). Stantec believes that the unnumbered table on page 18 of the report would benefit from an additional column that provides that actual distance from the facilities to these receptors. In general the figures (even the updated ones provided to us) are poorly labeled, do not show actually location of the project clearly, and require editing prior to final versions being released.

Response

Revised figures will be provided in the final report. The unnumbered table on page 18, now numbered Table 3-1, has been modified as requested.

HHRA Comment 4

Again similar to the Air Quality review, Stantec believes that additional special receptor locations should be considered in the immediate vicinity of the facilities. An additional 4-6 residential receptors should be considered on predominant downwind side of the facilities. This would provide additional assurance that residences surrounding the facilities will be protected.

Response

See response to this issue in the response to Air Quality comments.

3.2 Chemical Characterization

HHRA Comment 5

Stantec concurs that the list of chemicals of concern (COC) appears reasonable. However, given that the fuel to be employed is municipal solid waste pellets and that the facility will be required to meet MOE A-7 guidelines, then Stantec suggests that this section requires additional discussion on why the approximate 100 chemicals recently investigated for the Durham/York Residual Waste Study were not carried forward in this assessment. The reviewers suggest that the authors review the Durham/York risk assessment and the assessment that they previously prepared for the Algonquin facility, and justify why not all of these chemicals are required for consideration in this case. It could be as simple as evaluating the significance of the hazard quotient (HQ) and incremental lifetime cancer risks (ILCR) predictions for these facilities

that are several orders of magnitude larger than the proposed operation to determine if any were approaching their applicable benchmarks.

Response

Agreed, this section has been modified as requested.

HHRA Comment 6
Stantec believes that consideration should be given to modeling and evaluating carbon monoxide (CO), given that it is an A-7 contaminant and has relevant published human toxicological values. There is no mention in the report about why it was excluded.

Response

Carbon monoxide (CO) was excluded due to its very low emission rate as discussed in the Air Quality Assessment. Section 3.2 has been modified to discuss CO.

HHRA Comment 7
Stantec requires clarification as to whether benzo(a)pyrene itself was modeled and carried forward from the air quality assessment or whether the total loading of potentially carcinogenic PAHs was used. If it was just B(a)P then there is a potential that carcinogenic risk may have been underestimated.

Response

Benzo(a)pyrene was selected to be representative of the carcinogenic PAHs. We acknowledge that this underestimates carcinogenic risk; however, given the three to four orders of magnitude of safety in all B(a)P carcinogenic risk estimates, we are confident that consideration additional carcinogenic PAHs would not affect the conclusions of the HHRA. This issue will be addressed in the uncertainties section of the report.

3.3 Receptor Characterization
HHRA Comment 8
It is noted by the reviewers that a 30 year deposition period was used to evaluate the multi-media exposures. This is a good example of the conservative nature of this risk assessment.

Response

No response required.

Figure 3-4 Conceptual Site Model (CSM)
HHRA Comment 9
The reviewer assumed that the dark blue shading was to be representative of primary exposure pathway, while the light blue shading is that of secondary pathways. The significance of the shading should be clarified on the figure.

Response

The significance of the shading will be clarified. The dark shading was intended to represent Air only pathways, while the light shading represented multi-media pathways.

4.0 Exposure Assessment

HHRA Comment 10

Intrinsik should be explicit in the text that the Microsoft Excel model is an internal model developed by the company, based on the published exposure calculations. As the text reads at this point it could be construed as a commercially available model. Stantec acknowledges that the in-house developed Intrinsik model has been approved by a number of regulatory agencies, including the MOE, for conducting this type of work.

Response

Agreed, this has been clarified. It should be noted that while the model is Intrinsik's in-house model, it is not considered proprietary and it can be made available for review by Stantec and/or MOE.

4.1 Estimation of Ambient Ground-Level Air Concentrations

Table 4-1

HHRA Comment 11

It would significantly aid the readers of the document if the receptor locations in these tables could be grouped as per the categories of receptors being evaluated (e.g., residential, community, etc.) with headers. It is understood that there are space constraints and hence the reason the abbreviated location names are used, but grouping them would provide clarity of receptor type.

Response

Agreed, the categories of receptor locations will be grouped as requested.

4.2 Estimation of Soil and Home Garden Produce Concentrations

HHRA Comment 12

It was unclear from review of the text as to how exactly the values were arrived at for estimating predicted concentrations of COCs in greenhouse grown vegetables. For example, was it assumed that the deposition at the MPOI was actually drawn into the greenhouse ventilation system and depositing on plants? Please provide clarity on this exposure. Regardless of approach used, the reviewers believe that this would be a source of considerable uncertainly and likely a significant overestimation of any actual chemical loading to greenhouse grown vegetables.

Response

The review is correct in their interpretation of how predicted concentrations of COCs in greenhouse grown vegetables were estimated. This will be clarified in the report and the considerable uncertainty/conservatism that this approach introduces will be discussed in the uncertainties section of the report.

4.4. Cumulative Air Concentrations

HHRA Comment 13

From our review of Table 4-8 it appears that by bringing these new facilities on-line that there would be a potential overall decrease in NO2 and PM2.5 concentrations in the local airshed. If this is the case we believe that it is a point worthy of more attention within the text of the document.

Response

Agreed, the discussion of this issue will be supplemented.

5.0 Hazard Assessment

HHRA Comment 14

Stantec has reviewed and confirmed the majority of the toxicity reference values (TRVs) used by Intrinsik. However, we offer the following comments:

1. Cadmium 24-hr value is reported as 0.25 g/m3 from the MOE, 2008. However, there is a more conservative and more appropriate value listed in that document and it is an order of magnitude lower at 0.025 g/m3 which should be considered for use.

2. Overall, Stantec has retrieved several additional 1 hr and 24 hr TRVs that could be considered in this assessment. We suggest that Intrinsik review the Durham / York EFW facility risk assessment available at http://www.durhamyorkwaste.ca/amended_ea_study_doc.htm for details. We believe that these additional TRVs should be employed in the risk assessment.

3. In Table 5-2, an inhalation TRV was derived by Intrinsik based on route to route extrapolation from a systemic TRV. However, WHO 2005 does provide a more conservative chronic RfC equivalent value of 0.5 g/m3 that should be considered.

Response

1. *Cadmium: Agreed, the report has been modified to reflect this change.*
2. *Additional TRVs: Agreed, several TRVs have been added to the assessment*
3. *Table 5-2: Agreed, the suggested TRV (for lead) has been utilized.*

6.0 Risk Characterization

HHRA Comment 15

Stantec does not agree with Intrinsik's approach that suggests for the chemical mixtures one should benchmark these results in a similar manner as to individual chemical exposure. We believe that this is too conservative. However, given that HCl was modeled to be driving the cumulative chemical mixture effect at the MPOI Stantec believes that further investigation and a better explanation is warranted to assure the public that this would not result in an undue risk to health.

The following are suggestions:

1. It is our understanding that the HCl was modeled using existing stack measurement data that was greater than the MOE A-7 guideline. Stantec believes that the authors should remodel the HCl in a sensitivity analysis at the A-7 output value that they will be held to in the Certificate of Approval. This should result in lower ground level HCl concentrations.

2. Provide a frequency analysis of how many days these exceedances would be expect.

3. Provide a more in depth discussion for the toxicological basis of the respiratory irritants that you have added together. Please indicate the uncertainty factors that comprise the TRV and discuss to what extent there is conservatism layered into all of the values.

4. Under the chronic inhalation assessment we do not feel that if you are going to benchmark the chemical mixtures that 0.2 would be appropriate. As indicated in a previous comment at

most this should be a CR benchmark of 1.0. This would then result in the respiratory irritants not being of concern under this scenario.

Response

We agree with Stantec's comment; however, it should be noted that revisions to the Air Quality modeling, in response to Stantec's review of the Air Quality report have resolved this issue. No further clarification or discussion is required.

6.3.3 Milk Consumer Scenario

HHRA Comment 15

Stantec was unclear as to the rationale that local toddlers would not be exposed to locally produced milk. We suggest that Intrinsik reconsider adding the milk intake into the cumulative multi-media exposure assessment for the facilities for local toddlers.

Response

Agreed, this modification has been made to the multi-media evaluation.

6.4 Cumulative Assessment Results

HHRA Comment 16

Stantec believes that the proponent did a reasonable job in assessing these cumulative effects. However, given that NO2 and PM2.5 were listed as respiratory irritants in the chemical mixtures section, they should also be added together in the cumulative effects assessment.

Response

Agreed, this modification has been made to the cumulative effects assessment.

9.0 Screening Level Ecological Risk Assessment

HHRA Comment 17

Overall this brief section does a good job of describing how the project emissions will not pose an ecological risk. No additional comments are made on this section.

Response

No response required.

Appendix B – Technical Information

HHRA Comment 18

The worked example for benzene appears to contain a few calculation errors. In section B-1.5.1, the predicted concentration of benzene was estimated to be 5.16 E-06 mg/kg ww; however based, on the equation as presented and the values for each parameter, the concentration should be 3.19E-07 mg/kg ww. It is recognized that this value is lower than that in the risk assessment. In section B-1.6, the predicted concentration of dioxins/furans in forage should be 1.24E-09, not the reported 1.17E-09.

Stantec suggests that Intrinsik review their worked examples to confirm if these are indeed errors and if so were they carried forward in their spreadsheet model.

Response

Section B-1.5.1: The reviewers are correct. The chemical-specific dry vapour and particle deposition rate (D = 2.33x10^{-4} mg/m^2/year) presented in the worked example was carried forward from a previous version of the air modelling data. The value should have been presented as 3.77 x10^{-4} mg/m^2/year (as shown in Table B-3 of Appendix B). Using the corrected dry vapour and particle deposition rate in the worked example, the predicted concentration of benzene in home-grown above ground leafy plants as a result of direct deposition does work out to be 5.16x10^{-6} mg/kg ww. This error is only found in the worked example and was not carried forward into the HHRA spreadsheet model. Appendix B has been updated accordingly.

Section B-1.6: The reviewers appear to be incorrect in their calculations. We have confirmed that the predicted concentration of dioxins/furans in forage should be 1.17E-09 mg/kg dw as was originally reported. It appears as though in their review of our calculations Stantec may used the Tp value for silage (i.e., 0.16 year as opposed to the value of 0.12 year for forage) which would explain how they came to the concentration of 1.24E-09 mg/kg dw.

Supplemental Comment Provided June 16, 2011

With respect to *HHRA Comment 13*, Table 6-9 also shows the trend that by bringing the new facilities online there is a potential decrease in NO2 and PM2.5. Additional text regarding this trend is worthwhile bringing attention to.

Response

Agreed, the discussion of this issue will be supplemented.

With respect to *HHRA Comment 14*, point three, the chronic inhalation TRV in question is for lead, which is not explicitly stated. The lead inhalation TRV used by Intrinsik is listed as 6.5 µg/m3 and is derived from a dose extrapolation. The World Health Organization (2005) does provide a more conservative inhalation TRV of 0.5 µg/m3, with a critical effect related to blood lead levels. In addition, dose extrapolation has also been used to derive the inhalation TRV for 2,3,7,8-TCDD TEQ. For transparency, the original source of the oral TRV (i.e., JECFA, 2001; HC, 2009) should be stated in Table 5-2.

Response

Agreed, the suggested TRV (for lead) has been utilized and the source reference for TCDD will be added.

One additional comment is suggested to improve readability of the report. In Section 3.3 (Receptor Characterization), after the five discrete life stages are mentioned, it should also be mentioned that these life stages are assessed in the HHRA as a lifetime (composite) receptor. Later in the report reference is given to a lifetime (composite) receptor (i.e., Section 6.3.1); however, without clarification in the preceding sections as to what this receptor is, it may cause some confusion to a non-technical reader. Note, a lifetime (composite) receptor is discussed in Appendix B, 2.2.1.

Response

Agreed, this discussion will be clarified.

June 23, 2011

Chandler response to Intrinsik Comments

Stantec Consulting Ltd.
203 - 3430 South Service Road
BURLINGTON, ON L7N 3T9

Attn: Mr. G. Crooks, M.Eng. P.Eng.
Principal

Dear Mr. Crooks:

SUBJECT: Air Quality Study - REMASCO

I have received and reviewed your comments on the above mentioned report. In light of those comments I have prepared the following comments. Recognizing the general comments concerning format and available information are also repeated in specific items in the detail comments the response only deals with the section numbered comments. The responses follow the order of the review. For convenience where sections were added to the report, the editorial changes have been extracted and included in this letter.

Section 2.4 Contaminants of Concern – the omission of carbon monoxide data

The following explanation has been included in the document.

One substance excluded from the list is carbon monoxide [CO]. This contaminant is monitored on a continuous basis at the facility. All test data collected at the facility shows that operating conditions the CO levels at the facility are much less than the A-7 guideline of 35 ppm. Recognizing that there is significant dilution from the stack to the point of impingement it was concluded that under no circumstance would CO levels approach the one hour limits of O.Reg. 419/05, 6,000 ug/m^3 for a single source, nor the ambient criteria level of 30 ppm and the substance was excluded from the list.

Section 4.1.3 Equipment Descriptions

The reviewer suggests that the document would benefit from a process flow diagram.

The project process flow diagram Figure 4-1 has been added to the report. Please see attachments.

Section 4.2.2 Operating Scenarios

The reviewer agrees that it is appropriate to assess the operation of the facilities on the basis of the anticipated boiler loads but questions if the assessed scenarios represent "worst case" operations. It would appear that the concern is the ensure that the emissions assumptions are conservative and unlikely to be exceeded.

The reviewer also notes that the MoE has a recommended form for providing stack data which includes physical stack characteristics and flow data.

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On the issue of operating scenarios, the following information has been revised or added to the report.

4.2.2 Operating Scenario REMASCO Facilities

In the full scale operation, as described in the project description, REMASCO intend to install five 500 HP boilers on the Southshore Greenhouse site, and four 500 HP boilers on the Agriville site in addition to the two 400 HP boilers currently on the Southshore site. The new units on the Southshore site will be divided into two groups:

1. The existing building with one 500 HP and the existing two 400 HP boilers and one stack;
2. The new power plant building with four 500 HP boilers and two stacks; and,
3. The Agriville site with four 500 HP boilers and two stacks.

Three of the boilers in the power house will be high pressure units to generate steam to drive the turbine, and they will supply heat to the storage system when they operate. These units will run year round to generate power. The amount of heat provided by the high pressure boilers will be sufficient to maintain operating temperatures in the heat storage system during the warmer months of the year. This means that the low pressure boilers will not need to operate during some months. Furthermore, since the plants in the greenhouse benefit from elevated levels of CO_2 during part of their growth cycle, gas fired boilers in the greenhouses are run to produce heat and their exhaust, containing CO_2, is discharged into the greenhouse. This further reduces the heating load on the low pressure boilers.

The basic emission parameters for the stacks, when operated at full load, are shown in Table 11. Any time the load is reduced on a boiler the stack gas flow decreases because less fuel is fed to the gasifier and less air is introduced to the system. Reducing the flow reduces the velocity at the exit of the stack and influences the plume rise of the gases leaving the stack. These issues are discussed in the following sections.

Table 11 Basic REMASCO Stack Characteristics (full load flow data)

Source ID	Description	Stack Characteristics						
		Volumetric Flow [Am^3/s]	Temperature [^oC]	Inner Diameter [m]	Height above Grade [m]	Height above Roof [m]	UTM Coordinates of Location [m]	
							E	N
SS1	Existing SS	11.21	142	0.91	21.34	12.8	362,344.6	4,656,145.2
SS21	Co-gen 1	8.63	142	0.81	21.34	12.8	358,393.0	4,656,586.2
SS22	Co-gen 2	8.63	142	0.81	21.34	12.8	362,394.7	4,656,586.1
AG1	Agriville1	8.09	142	0.81	21.34	12.8	362,342.1	4,656,232.1
AG2	Agriville2	8.09	142	0.81	21.34	12.8	362,344.3	4,656,226.7

Emissions under Reduced Input

The REMASCO gasifiers are different than conventional mass burner waste incinerators in that they are smaller, were designed with multiple stage combustion and use extensive amounts of recirculated flue gas to promote and preserve relatively high velocities inside the ducts. This velocity ensures a high level of turbulence and hence better mixing to promote good combustion even under load reduced conditions. This has been evidenced at the facility by very low CO emission levels even under part load operation.

These characteristics allow the gasifiers to be operated with good combustion efficiency at higher turndown ratios than most mass burner incinerators.

In the typical mass burn furnace reducing the total air supplied to the system reduces the penetration of the combustion air into the main combustion gas area in the furnace leading to some of the combustion gases bypassing the air being added. This results in an increase in the amount of products of incomplete combustion leaving the system.

While the typical mass burn furnace operates as 9 – 10% oxygen levels, 70-90% excess air, the REMASCO gasifier operates at approximately 20% excess air with oxygen levels in the 3 -5% range at the boiler outlet. Reducing the flow to match the firing rate in the REMASCO unit thus has less effect on the total air flow than it would in the mass burn furnace. Unfortunately, reducing flow under reduced loads decreases turbulence and the mixing in a combustion system even though the effective residence time increases. It has been demonstrated in furnaces that the more the turbulence is reduced the poorer the combustion efficiency. This has been attributed to gases bypassing the main flame and high temperature zones and not being affected by the combustion reactions. This is typical of any combustion device; however, with high internal velocity, and less excess air the design features of the REMASCO unit make it less susceptible to reduced combustion efficiency at lower throughput.

The REMASCO mixing chamber throat is only 0.6 m in diameter and is equipped with a series of air jets around the circumference that induce two counter rotating vortices of combustion air and recirculated flue gas as the extra air is injected. Before the gases enter the secondary chamber, there is a third stage of air addition. In both cases, the scale of the system limits the impact of reduced throughput.

Carbon monoxide levels in exhaust gas streams are frequently used as a marker of combustion performance. Low CO levels indicate good combustion. In the literature CO levels in excess of 100 ppm have been associated with the increased production of products of incomplete combustion, ie poor combustion performance. In the REMASCO system the drop off in combustion efficiency occurring when the oxygen level gets below 2.5% is marked by an increase in CO levels. Over the range of operating conditions that the units have been tested at the CO level seldom exceeds 4 ppm and the typical values recorded by the facility instrumentation are 1 ppm or less. The 4 hour average CO upper limit that the MoE considers acceptable is 35 ppm as listed in Guideline A-7. The other indicator of combustion performance that the MoE use is total hydrocarbon level expressed as methane. The criteria for this parameter is 50 ppm in a ten minute average. Measurements of THC recorded during testing at the REMASCO facility are consistently below 8 ppm. CO and THC levels that are this low are associated with high combustion efficiency.

Combustion engineers frequently suggest that the temperature of the gas stream, the level of turbulence in that stream, and duration that the gases are at the high temperature as being the factors that lead to good combustion efficiency. Should the temperatures be maintained at a level in excess of 1,000^{O}C, a decreasing the flow would raise the residence time and should result in a greater reduction in the concentration of the products of incomplete combustion. This is not always the case since turbulence levels must be maintained to ensure good mixing, or more materials will bypass the reaction zone and be left in the exhaust stream. This relationship holds throughout the active combustion zones. After the

gases leave these zones, the destruction reactions cease, and the residual products of incomplete combustion are released. Hence, with poor destruction CO, the most refractory of all the contaminants, can be found at substantially higher concentrations.

There is one reaction however that does not benefit from increased residence time in the areas of the combustion system where the temperature is in the 250 – 450^{O}C range, the *de novo* reactions that are responsible to the reformation of PCDD/F downstream of the combustion zone. At temperatures in this range the literature indicates that the *de novo* synthesis reactions will create more PCDD/F as the residence time is extended. Below this temperature range the reaction is very, very slow, and above this range more PCDD/F is destroyed than created. This temperature range is usually found in the waste heat recovery boiler on waste incineration facilities. It is recommended in several references that operators attempt to transition this temperature range as fast as possible to minimize the *de novo* reactions.

One more difference between a typical waste incinerator and the REMASCO system it the nature of the fuel. The ENERPAX fuel pellets are an engineered fuel produced from residual MSW. As such they have a very uniform composition, and they burn at a very uniform rate. In a typical waste incinerator the waste is a highly variable with any specific sample containing a different mixture of the major carbon bearing components such as plastics, paper, and food scraps as well as water. These variations mean that some waste must be dried before it burns and some wastes flash almost instantaneously to a mixture of combustible gases. The ENERPAX pellets are dense and uniform in size so they are consumed at a relatively steady rate and do not overload the combustion system at one moment and result in more excess air than necessary being in the system the next minute. This uniform reaction rate lends itself to a very stable process that does not suffer wide fluctuations that can be exacerbated by reducing the fuel firing rate.

Experience suggests that the assumption made about the reduction of emissions during turndown operations is appropriate however REMASCO will commit to testing the fully approved system under part load.

Operating Scenario Selection

A historically reliable guideline in the local greenhouse industry calls for 30 boiler horsepower of heating capacity for each acre of greenhouse. This has been shown to be sufficient to provide the heating needs of the facilities on all but the coldest days of the winter. Consequently, most greenhouses are equipped with surplus natural gas fired boiler capacity to provide supplemental heat during the very cold weather.

Tables 12 and 13 [*note the table numbers have been changed due to the added Table 11]* were based upon the average boiler loads by month for the Southshore facility's existing boilers. This load is shown in the 2nd column of the table.

The development of a co-generation facility at Southshore results in the co-generation system producing heat year-round as part of the electricity generation process. That heat offsets some of the heating required at Southshore and results in the heating loads at Southshore being split between the existing

gasifier facility and the co-generation facility, thus there are 2 scenarios for Southshore in Table 13, but the sum of both is sufficient to meet the heating profile for the site.

Considering the Agriville site, it was anticipated that 4 units would be installed in the final configuration. The average load for the facility in column 2 can thus be distributed to the 4 gasifiers to provide individual operating scenarios for the units. Some assumptions must be made concerning how the load should be proportioned between the units.

A solid fuel fired boiler is best operated in the base load mode, ie it runs at a steady rate taking as much of the load as can reasonably be expected at all times throughout the typical heating season. Should the load increase beyond the capability of all the base loaded solid fuel boilers, that increase is best absorbed by operating one or more of the gas fired boilers. Should the load decrease, solid fuel boilers can be taken off line. The cost effective way to design and operate a boiler plant with a wide range of potential loads is to install multiple units and operate them at as close to the full firing rate as possible because this is the point where maximum thermal efficiency is achieved. Should the load reduce and a unit be taken off line, the balance of the on-line units would meet the load by operating at as high a capacity as possible. The ultimate flexibility would be to install many units so the incremental change in load can be absorbed by changing the status of one boiler. In reality, this would require too many small boilers thus some nominal turndown capacity should be installed for each boiler. Setting an appropriate turndown ratio is done on the basis of cost and expected load variations, while considering when the boiler's operation may become unstable. It is recognized that thermal performance will generally suffer at lower firing rates.

For this evaluation, the maximum turndown was set at 65% load. It was further assumed that all the gasifiers on line at any time would be operated at the same reduced load. When the load drops to 75% at Agriville, one of the units could be shutdown, and the remaining load would be provided by the other three units. When three units drop to 66% another unit can be shutdown and the two remaining units can absorb the load. Recognizing that lower flue gas flows reduce the effective plume rise the other operating assumption included in the report was to maintain the stack gas flow as high as possible at any time. Thus, the shutdown sequence attempts to maintain the throughput through one pair as high as possible until 2 of the 4 units are shut down.

The approach in the assessment was developed as a reasonable estimate of operational status that maximized the use of the gasifiers year round.

Section 4.2 - Emission Scenarios Considered

The reviewer raises the issue of start-up and shutdown conditions and the possibility of process upsets.
The following section has been added to the report.

Start-up and Shutdown Operations and Upsets

Aside from the operating flexibility that allows the REMASCO gasifier to operate at high combustion efficiency across a broader firing range than a typical mass burn waste incinerator, there are other benefits related to the design of these units. Being smaller than conventional mass burn units, it is easier

to control the start up and shut down of the system, thus minimizing the potential for increased emissions during these operational phases.

The secondary chamber of the gasifier is raised to 1,000^{O}C before any ENERPAX pellets are introduced into the gasifier. This is accomplished by operating a natural gas burner that fires into the mixing chamber. This raises the temperature in the zones downstream of the mixing chamber: secondary chamber, heat recovery boiler, and fabric filter. When the secondary chamber reaches the appropriate temperature, the ENERPAX pellets start to be introduced into the gasifier. They are ignited by a second gas burner.

As noted in the equipment descriptions, the grate in the gasifier has multiple zones where air is added to the system. Pellets are deposited and ignited on the feed end of the grate are moved towards the outlet end of the gasifier as they sit on the grate. The air added under the grate provides agitation of the pellets, but it is only introduced when the grate in that zone is covered with pellets.

The gasification of the pellets raises the operating temperatures in the system even further, so that the firing rate of the natural gas burner can be reduced as the quantity of pellets on the hearth increases. The firing rate of the gas burner in the mixing chamber is adjusted to maintain the appropriate secondary temperature. When the pellets on the bed maintain the secondary temperature without the help of the burner, the burner can be shutdown.

All gases leaving the secondary chamber pass through the boiler, and the fabric filter, with some of this flow being returned to the system and the rest being discharged to the atmosphere. There are no bypasses around the system and any particulate matter released from the combustion system is trapped in the fabric filter. Lower flow rates during start-up ensure that the fabric filter system operates at optimal levels at all times.

When it comes time to shut the gasifier down, the process is repeated in the reverse order. The feed to the gasifier is stopped and the first zone of the grate is slowly uncovered as the pellets are transported towards the discharge end of the chamber. As the temperature drops due to lowering input the mixing chamber burner comes on to maintain the appropriate temperature. When the majority of the first section of the grate is emptied, the air to that section is turned off. The grate continues to move pellets down the length of the gasifier, and since much of the pellet is consumed on the early section of the grate, the burner firing rate must increase to maintain temperature. When the 3rd zone is empty the air to that section is reduced, and the burner ramps up even higher. The burner maintains the operating temperature in the secondary chamber until all the ash is discharged from the grate. At that time the burner can be shut off and air continues to be introduced to cool the components. When the temperature drops to the appropriate point, the fans can be shut off and the gasifier doors are opened to allow further cooling.
The steady increase in firing rate and decline as the waste feed is shut off reduces rapid transitions in the system, and limits startup and shutdown emissions. Operating experience suggests that the grate can be fully charged with pellets within about 2 hours of introducing the first pellets. Shutdown is typically accomplished within 1 hour from the cessation of pellet feed. This operation is unlike the typical mass burn incinerator which is much larger. The large size of mass burn units makes it difficult to achieve

reasonable operating temperatures before waste is added to their burning grate. This contributes to potential start up and shut down emissions from such units, but these conditions can be circumvented in the REMASCO gasifier.

The other potential upset scenario is a failure in the Air Pollution Control system. The performance of baghouses, their ability to remove particulate matter from the gas stream, does deteriorate over time, typically between 24 and 36 months. Single bags may fail when a hole is ripped in them due to cleaning operations, or a failure in the material. Such failures can be identified by a rapid increase in opacity in the stack gases. An opacity monitor is installed in each stack for the purposes of identifying sudden failures, or the long term degradation in performance. When the base opacity reading slowly increases after each successive cleaning it is a fairly good indicator that the bags need replacing. A sudden increase indicates a bag failure, and the system can be taken into shutdown so the offending bag can be identified and blocked off. If 10% of the bags in the fabric filter are blocked off the operator should consider scheduling an outage to replace all the bags.
To address these situations, process upsets were evaluated. There is little data to assess the emissions that could occur under any of these transitory situations, however, to model the potential upset conditions the study team followed the approach suggested by the California Air Resources Board[1] as recommended by the US EPA[2].

> ***Estimating Emissions from Process Upsets:*** To represent stack emission rates during process upsets, multiply the emission rate developed from the trial burn data by 2.8 for organics and 1.45 for metals. These factors are derived by assuming that emissions during process upsets are 10 times greater than emissions measured during the trial burn. Since the unit doesn't operate under upset conditions continually, the factor is adjusted to account for only the period of time, on an annual basis that the unit operates under upset conditions. For organic compounds, the facility is assumed to operate as measured during the trial burn 80 percent of the year and operate under upset conditions 20 percent of the year [(0.80)(1)+(0.20)(10)=2.8]. For metals, the combustor is assumed to operate as measured during the trial burn 95 percent of the year and operate under upset conditions the remaining 5 percent of the year [(0.95)(1)+(0.05)(10)=1.45].

This approach addresses upsets from hazardous waste incinerators which are different from the REMASCO gasifier since the fuel is different. Note the US EPA state:

> It is possible for unburned hazardous waste to be emitted through the stack as a result of various process upsets, such as start-ups, shutdowns, and malfunctions of the combustion unit or APCS. Emissions can also be caused by operating upsets in other areas of the facility (e.g., an upset in a reactor which vents gases to a boiler burning hazardous waste could trigger a process upset in the boiler, resulting in increased emissions). U.S. EPA (1994i) indicates that upsets aren't generally expected to significantly increase stack emissions over the lifetime of the facility.

The burning of hazardous waste, particularly liquid hazardous waste with high calorific value, or for that matter with extremely low calorific value is significantly different than any solid waste incinerator where

[1] California Air Resources Board. 1990. "Health Risk Assessment Guidelines for Nonhazardous Waste Incinerators." Prepared by the Stationary Source Division of the Air Resources Board and the California Department of Health Services.
[2] US EPA, 2005. Human Health Risk Assessment for Hazardous Waste Combustion Facilities Final Sept. Chapter 2, http://www.epa.gov/epawaste/hazard/tsd/td/combust/finalmact/ssra/05hhrap2.pdf

the major issue is the calorific value of the plastics introduced and their propensity to flash upon charging to the hot incinerator. Burning a consistent fuel such as the ENERPAX pellets results in a process that is not easily upset.

That said, the potential for upsets was considered following the CARB recommendations, however these were modified recognizing that a solid waste incinerator has different combustion characteristics that does a hazardous liquid waste incinerator. For all but the criteria air contaminants, oxides of nitrogen, sulphur dioxide and hydrogen chloride the 1 hour maximum due to upsets, the factor of 10 was employed. For the annual values, no distinction was made between organic and inorganic contaminants and the 2.8 factor was employed for all but the above listed criteria air contaminants. The CARB recommendation is silent on the approach for the 24 hour upset factor so the operational aspects of the REMASCO facility was reviewed to determine if it should be treated in a manner similar to CARB's approach to the annual upset factor. It was determined that if there was an upset that would force the facility to be closed, that could be done within 1 hour from the time it was determined that there was a need to shut down. During a shutdown, fuel feed is curtailed and the emissions would be anticipated to drop as soon as shutdown commenced. To err on the side of caution, it was assumed that it would take 4 hours to shut the facility down so during any 24 hour period only one sixth of the time would be spent operating at the 10 times emission factor. Applying the CARB approach for the annual numbers, it was determined that a suitable multiplier for the 24 hour average concentration would be 2.5 times the base rate.

With respect to the criteria air contaminants the 10 times factor for the one hour situation was considered to be overly conservative. Test data from the facility, general literature data, and specific emission test data from the Brampton solid waste incinerator were considered in setting conservative estimates of emissions for NO_x and SO_2.

For NO_x the upper bound on emissions is a function of the combustion system because all control of NO_x is provided by controlling the combustion characteristics. Data on NO_x emissions from waste incinerators is available in the CCME Guidelines[3] shows the mean uncontrolled NO_x value measured during 377 tests was 142 ppm @ 11% O_2. The testing data from the Brampton MSW incinerator before the implementation of NO_x control used for the environmental assessment for the expansionof that facility produced an upper confidence estimate of the NO_x emissions of 246 ppm @ 11% O_2. The maximum emission value recorded at the REMASCO facility during the various test programs conducted during the Pilot Project was 160 ppm @ 11% O_2. Based upon these data, a multiplier of 2.15 times the normal operating level was used for the 1 hour upset NO_x level for the REMASCO facility. The modelled value equates to an emission level of 247 ppm @ 11% O_2.
For sulphur dioxide emissions the maximum that can be released from the facility is limited by the amount of sulphur in the fuel. Analytical data for the ENERPAX pellets has reported sulphur concentrations ranging from 0.07 percent by weight to 0.2 percent by weight and averages approximately 0.1%. The original guarantee offered by the pellet manufacturer suggested that the sulphur content would be less than 0.05%. The nature of the sulphur found in the pellets also influences the release of

[3] CCME, 1988. Supporting Technical Appendix for the Canadian Operating and Emission Guidelines for MSW Incinerators. October. Published by CCME at IP-95 in May, 1989.

sulphur during the gasification process. The IAWG report[4] suggests that approximately 35% of the sulphur in the feed will report to the bottom ash in the incinerator. Data from early testing at the REMASCO facility[5] showed that sulphur in the pellets was 0.08% while the average ratio of sulphates in the bottom ash compared to the pellets was 0.37 which agrees with the IAWG data that suggests sulphur will be retained in the bottom ash. This suggests that the uncontrolled sulphur emissions will be on the order of 0.065% of the feed sulphur rate. Assuming that a 400 boiler HP gasifier consumed 862 kg/hour of pellets, the estimated uncontrolled sulphur release rate would be 0.56 kg/h or 0.16 g/s sulphur, which translates to 0.32 g/s of SO_2. This value is approximately 7 times the emission rate used for normal operation. The multiplier for SO_2 used for upset operation is 7 times.

This expansion of the discussion has been included in the report, and a table of the maximum concentrations under upset conditions is provided in the report along with a discussion in Chapter 7.

Section 4.3.5 Emission Factors for the Existing Greenhouse Boiler Operations

The reviewer suggests that more explanation be provided for the operating firing rates incorporated into the cumulative assessment portion of the report.

The following reflects changes made in this section of the report.

As the report discusses, a review of existing air quality in the Kingsville area would not be complete without attempting to address the operations of boilers that supply heat to the 117 ha of greenhouses that were included in the study. Recognizing that it was necessary to quantify those emissions, the study team used the standard design requirement of 30 boiler HP per acre for heating systems.

The area of each greenhouse in the study area was determined from the Municipality's internet maps which include aerial photographs that showing the location and size of the greenhouses and a tool for measuring the area covered in any part of the map. Based upon the area, and the desired boiler capacity, the firing rate for that site was determined.

In almost every large greenhouse there are some gas fired boilers used to provide CO_2 for the plants, and heating. These units are typically operated during the day when the heating load is lowest, and the heat they generate is transferred to the water storage systems. At night, when it is colder, different boilers in the space are employed to provide sufficient heat to optimize the use of stored heat and the instantaneous heat from the boiler systems. As the weather gets colder, some of the main heat boilers are brought on line and operate 24 hours per day to cover both the extra daytime heat requirements and ensure that there is sufficient heat at night. The main heat generating boilers use different fuels, oil, wood, coal, or natural gas. Their combustion products are discharged to the atmosphere because some of these fuels are not as clean as natural gas, and CO_2 is not required at night.

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[4] IAWG, 1997. Municipal Solid Waste Incinerator Residues. Published by Elsevier ISBN 0-444-82563-0

[5] I. Coyle, F. Preto and R. Dureau, 2008. Emissions Testing at a Novel Waste-to-Energy Converter. A report prepared by the Industrial Innovation Group, CANMET Energy Technology Centre – Ottawa under the auspices of
Natural Resources Canada.

Local knowledge or observation of operations can identify the predominant fuel type used at some of the greenhouses and thus the area of greenhouses in the study area that are heated with a particular fuel can be quantified. Allowing that some percentage of the fuel used at most of the large greenhouses will be the natural gas used for CO_2 production, that was also factored into the percentage fuel use assumptions. While the predominant fuel used at each of the greenhouses can be identified, circumstances can change and the fuel mix could be altered because cheaper fuel is available. Recognizing that the purpose of the cumulative assessment was to estimate background levels, it was considered inappropriate to associate specific fuels with specific facilities. Rather it was decided that all the greenhouses would be modelled with a composite mix of the fuels.

The mix was based upon the greenhouse area that was associated with a specific fuel type. The area of the greenhouse was compared to the total area and the fuels divided based upon that area. The results of the estimates were that 30% of the acreage was fuelled by wood; 25% by coal; 30% was allocated to natural gas including that portion of the large greenhouses that have CO_2 generating boilers, and the balance 15% was assumed to be fuelled by oil. At any specific time this mix can change due to opportunities to purchase cheaper fuels, but in the long term this proportion should be reflective of fuel use and can be used for modelling.

This expansion of the discussion in the section has been included in the report.

Section 5.1 Control of Construction Emissions

The reviewer suggests that a fugitive dust construction management plan be incorporated into this section of the report.

In response it should be noted that in the Environmental Screening Report REMASCO has undertaken to incorporate dust control measures in any construction contracts that are issued for buildings on the sites. Until the actual construction details for the various sites are known, it is considered premature to undertake developing such a document for several reasons. The affected construction area is very small in all cases which minimizes the potential for large continuous fugitive emissions. Secondarily, the municipality requires that dust control measures be implemented for any construction projects on greenhouse properties so developing another plan is somewhat redundant.

To further explain the approach to construction related emissions I offer the following paragraphs.

The gasifier equipment at Agriville will be installed in existing buildings and no construction will take place outside, with the possible exception of truck unloading and pellet storage facilities should the existing wood room not prove adequate. At Southshore the 3rd gasifier will be installed in the existing building and only a new baghouse will be located outside. This structure required a minimal amount of foundation construction outside. In both these cases the outside construction will last a maximum of 4 – 6 weeks depending upon weather.

The Southshore co-generation building will require that a larger foundation be constructed, but if experience on the existing REMASCO building is any indication, the construction period will be 8 – 10 weeks during which time the actual disturbance of the soil in the area will be very limited.

The areas where construction will occur are either existing fields or existing traffic areas on the sites. Existing traffic areas at Southshore consist of gravel roads that are maintained on a regular basis to minimize dust emissions and limit vehicle access problems. The entrance way from Seacliff to the first of the greenhouses has recently been paved to further reduce dust emissions and to act as a surface that will liberate dust from vehicle wheels before they reach the road thereby minimizing tracking onto surrounding roads. At Agriville the Municipality has required that on-site roads be paved to minimize dust emissions.

Given these measures and the commitment to ensure that contractors will minimize dust emissions during construction, REMASCO has not included any further comments in the report.

Section 5.2 Operations Emissions Control

The reviewer requested further information on monitoring.

Rather than including information in the Air Quality report, REMASCO anticipate that this issue will be the subject of the Certificate of Approval process. REMASCO's position on monitoring is reflected in the following paragraphs. (Note this section is also appropriate for the response to the review comments on §9.2.2)

The existing CofA REMASCO contains the following clauses:

> 52. The Company shall ensure that the operation of the Combustor complies with the following limits:
> (1) the temperature in the combustion chamber, as recorded by the continuous temperature monitoring system, shall be at least 1000 degrees Celsius at all times, and the residence time, of the products of combustion and the combustion air, in the combustion chamber shall be not less than one (1) second.
>
> 53. The Company shall monitor the emissions and operation of the Combustor in accordance with the following requirements:
>
> Source Testing
> (1) The Company shall perform Source Testing in accordance with the procedure in the attached Schedule "B", to determine the rate of emission of the Test Contaminants from the Combustor.
>
> Continuous Monitoring
> (2) The Company shall install, conduct and maintain a program to continuously monitor the emperature, opacity, carbon monoxide and oxygen in the flue gas of the Combustor. The continuous monitoring system shall be equipped with continuous recording devices and shall comply with the requirements outlined in the attached Schedule "D".
>
> Daily Monitoring
> (3) The Company shall undertake monitoring of the following contaminants using hand-held monitors no less frequently than once per day while the Combustor is in operation:
> (a) nitrogen oxides;
> (b) hydrogen chloride; and
> (c) sulphur dioxide.

REMASCO will be proposing some minor changes to these procedures in the CofA application. There are a number of reasons for this approach.

First and foremost, the fuel being using in the gasifiers, while classified as a waste for very good reasons, does not have the characteristics of a waste. It is an engineered fuel manufactured from waste materials. As noted earlier the material is very uniform in properties, add is consumed at a relatively constant rate in the gasifiers.

Test and operating data from the commercial units displays little variability from test to test except for some readily explainable differences when the facility was set to run in different ways.

Furthermore, the waste is characterised as it is produced. The manufacturer sub-samples and tests batches of pellets every day and each shipment forwarded is accompanied by laboratory sheets showing the composition of major constituents.

Since sulphur dioxide emissions are a function of the sulphur fed to the gasifier in the pellets and the pellets are characterised, complex real-time monitoring for SO_2 will not produce any more useful data than is already being collected. The current SO_2 sampling method is a modified version of US EPA Method 6A - A gas sample is extracted from a sampling point in the stack. The SO_2 fraction is measured by the barium-thorin titration method.

Much in the same way, chlorine in the pellets is characterised for each batch shipped. There is no other chlorine in the feed but the daily checks that are being conducted ensure that the control system is handling the HCl generated in the system to an appropriate level. The current method is based upon EPS1/RM/1B and D4327-84 which essentially collects the HCl in an aqueous solution and uses a titration method to determine the quantity of chloride ions present in solution. This value is then translated to a concentration of HCl.

The facility is equipped with flue gas re-circulation that allows the NO_x levels to be controlled to any point that the operator is required to meet. This system reduces the amount of oxygen fed to the combustion zones of the gasifier and thereby promoting a staged combustion situation that limits the formation of NO_x. Daily measurements of NO_x coupled with continuous measurements of oxygen in the system as a surrogate for NO_x at other times provides an effective way of ensuring the performance of the systems.

NO_x is currently being monitored with a hand held instrument on a daily basis. Experience with the system suggests that the NO_x emission level can be tightly controlled based upon the secondary chamber temperature. The Proponent is currently investigating whether it is appropriate to use this parameter to adjust combustion air injection rates to recuce the rate of increase of the secondary chamber temperature, thereby possibly reducing NO_x emissions. During the annual testing longer term monitoring of NO_x emissions can be undertaken to show the efficacy of the other methods.

Traditionally the application of monitoring systems at waste incinerators has been an issue that is negotiated between the proponent and the MoE. The small capacity of the REMASCO gasifiers and the fact that the ENERPAX pellets are a quality controlled uniform fuel has resulted in very little fluctuation in either the operating conditions or the emissions from the facility on a day to day basis.

Considering that the gasifiers are equipped with process monitors that address the oxygen, temperature, opacity and carbon monoxide levels, and that measurements have been taken daily for NO_x, HCl, and SO_2 the majority of the parameters listed in A-7 are monitored. Given REMASCO's historical stack testing results, the combined impact of APC systems on both SO_2 and HCl emissions, the load by load pellet analysis data available, and the consistent low level of sulphur found in the pellets, the proponent does not consider the measurement or monitoring of SO_2 to be necessary.

Section 6.2 Emissions

The wording could be clearer, we agree, however the Reviewer has grasped the essence of the paragraph. *This has been clarified in the document as shown in the following paragraphs.*

Emissions

REMASCO - The model allows one to specify the type of sources (point, area, volume). The REMASCO stacks were defined as point sources.

Point sources are defined in terms of the size of the stack (diameter, height); the stack gas characteristics (volumetric flow, and temperature); and, the rate of release of different contaminants in grams per second. As discussed in §4.2, the emissions data for the facilities was developed from the stack sampling conducted according to MoE direction.

The flow and emission data from the 2010 testing program formed the basis of the emission characteristics entered into the model, except as pointed out earlier for HCl where the A-7 emission limit was used for the modelling. The heating output of the boiler during testing was 400 Boiler HP and the actual stack flow rate was 3.45 m^3/s. Assuming the stack flow is proportional to the boiler output, the flow can be adjusted by pro-rating the test value to the actual operating rate required for the month as described in the Operating Scenarios in §4.2.2. Table 132 lists the stack gas volumetric flow for the different months at the Southshore facility, and Table 12 provides the same data for Agriville.

As noted in the discussion of Tables 12 and 13 earlier in the report, the characterisation of the stacks was associated with the monthly operating scenarios. That is, for each month of the year, the operating conditions in each of the 7 stacks associated with the REMASCO operations were determined, and the stack was modelled as operating at that rate for the complete month. Thus the flow from the stacks was assumed to vary on a monthly basis and with that the velocity of the gases exiting the stack were assumed vary. The flows and velocities are shown in Tables 12 and 13 by month based upon all stacks being 0.81 m in diameter with the exception of the stack for the three low pressure units at Southshore which was 0.91 m in diameter. All REMASCO stacks were modelled with a height of 21.34 m above grade. The stack exit temperature under all operating conditions was assumed to be 142^OC or 288^OF, typical of stack gas temperatures during testing.

The emission data in Tables 8, 9 and 10 represent the various contaminant emission rates derived from the operation of one 400 HP boiler at 100% load [19.127 MMBtu/hr input and 3.45 Am^3/s flow]. The emission concentration measured during the testing was assumed to be representative of the performance of the systems regardless of the load on the gasifier. This implies that the emission rate will

vary as the exhaust flow changes because the emission rate is the product of the flow and the concentration. While the approach discussed in the paragraphs above accounts for the changes in dispersion induced by different stack flow rates but does not address the changes in emission rate.

The emission rate variations are proportional to the flow based upon the assumption of constant concentration, thus for each stack operating condition a specific emission rate can be calculated based upon the flow from the 400 boiler HP load situation.

The mathematics of the dispersion model directly link the predicted concentrations to the emission rate. That is, if the emission rate were to double, the model would predict that the concentration at the receptors would be twice as high. This relationship allows the modeller to undertake a single model run and simply multiply the output by the ratio of the emission rate to the modelled emission rate. When modelling multiple sources though one must be careful to use the appropriate unit emission rate in the model. In this case, the unit emission rate was assumed to be that of one 400 boiler HP gasifier and all the operations were related to this situation. For a stack with two 500 boiler HP gasifiers on line, the unit emission rate was 2.5 – simply the ratio of the installed capacity to the base capacity (1000/400=2.5). As the flow varies, the unit emission rate was reduced to reflect this relationship. The unit emission rate of 2.5 was applied to the co-generation stacks at Southshore and the stacks at Agriville. The unit emission rate for the full load at the existing Southshore facility is 3.25 since the total capacity is 1300 boiler HP. This was simply adjusted for each flow situation.

To allow the predicted concentrations for all the contaminants to be calculated the values resulting from the unit emission rate were multiplied by the actual emission rate in Tables 8, 9 and 10 to determine the point of impingement values for each contaminant.

Section 6.2 Stack Heights
The reviewer questioned what stack heights were used for the modelling since there is an inconsistency in the text and Table 15.

Table 15 (now 16) contained incorrect stack heights for the community's greenhouse stacks. It should have been 16 m and the Table has been changed. All REMASCO stacks were modelled at 21.34 m height.

Details of the REMASCO stacks have been included as Table 11 in the text.

Section 6.2 Deposition of Gases
In discussions with the HHRA study team it was concluded that SO_2 and NO_2 deposition data would not be useful for the study and the deposition of gases was not included in the study. While PAHs could be important to the HHRA, these were modelled as particulate emissions since these materials are generally attached to particulate matter, not found as a gaseous contaminant.

No discussion of this has been included in the report.

Section 6.2 Buildings
The reviewer asked for details of the buildings used in the modelling.

In our experience the MoE require that the AERMOD files be forwarded with Certificate of Approval applications, so it has not been our practice to insert such data in the application support information.

Copies of the site plans from the AERMOD files for both the Southshore and Agriville sites are attached to this memo, as is a copy of the AERMOD .sup file concerning the BPIP.

Section 6.2 Meteorological Data
The reviewer had questions about the meteorological data files used for modelling.

The information obtained from Lakes Environmental who compiled on a 12 km by 12 km grid spacing. The data set has been reviewed by the MoE. The MoE has determined that the precipitation data was satisfactory, the seasonal values agree well with data collected at stations in the vicinity, although the effect of a storm appears to have influence one month of data.

Due to the proximity of the lake, the wind speed data may be influenced by the low surface roughness height of the lake. It appears that the wind direction data is reasonable, however the wind speed data used for the modelling could be biased high. The MoE recommended that some sensitivity runs be undertaken to quantify how much the wind speed influences the modelling results. They recommended that the wind speeds be decreased by 25% and that any wind speeds below 1 m/s after that correction be adjusted to 1 m/s. The revised surface wind data can then be run through the AERMET program to develop an adjusted meteorological file for use in AERMOD. The model can be run using this revised met data, and the results compared to determine both the direction and the amount of the change.

Section 6.2 Terrain Characteristics
The reviewer's comments concerning the surface factors are appreciated. The data was reviewed and updated, and the AERMET calculations were re-run with the revised factors. The modelling was also repeated with the new meteorological data.

The report includes the updated surface characteristics and the results of the revised modelling.

Section 6.2 Receptor Grids
The reviewer notes that given the use of the modelling data for an application, the MoE typically require a different receptor grid arrangement than that presented in the report.

The following paragraph explaining the rationale for the selected receptor grid has been included in the revised report.

This receptor pattern is different than the MoE typically require for a air approval application. In those documents it is recommended that the nested receptor grid have 20 m, 50 m, 100 m, 200 m and 500 m separation at distances of 200 m, 500 m, 1000 m, 2000 m, and 5000 m from the source box. Since the REMASCO sources are on properties that measure in excess of 400 m in both directions, and the sources are close together, in very few instances would the 20 m spacing be required beyond the property line. Furthermore, the 500 m spacing was viewed as being too wide for the area between the two source locations that are approximately 4.2 km apart. Most importantly, with the presence of numerous existing

greenhouse sources in the area, a tighter spacing was determined to be capable of providing a better understanding of the variations in levels in the community. The specific modelling for the REMASCO sources was completed with 20 m spacing within 40 m of the property line around both of the sites. A total of 11,327 receptors were evaluated by the model.

Section 6.2 Special Receptors

We apologize for the omission of Figure 6 (now Figure 7 as the Wind Rose is now included in the Report) from the package submitted for review. This was an oversight. It is attached to this memo.

As to the explanation of the apparent difference in the number of receptor points:

For the public meeting a second file attached, Kingsville Area.pdf, shows 16 push pins designating locations in the community. These locations include the 2 REMASCO site locations, Southshore and Agriville and the site of a proposed 7000 boiler HP, 300 tpd wood fired facility that has been proposed west of Ruthven. These 3 locations are not receptors, they are sources and therefore not in the receptor list. Given the paucity of data on the wood fired facility, the cumulative assessment did not include this source.

As the text now explains in more detail, the number of locations considered for sensitive receptors was restricted by defining residential locations with the highest estimated concentrations around each of the REMASCO sites. Any residential site with a lower level would thus be expected to have a reduced exposure. The schools, senior citizen's home, and the major recreational facility were included in the list along with the most relevant crop lands. The Colisanti facility was included because it is a popular family excursion site.

Secton 6.3 Modelling Runs

Ozone parameters – The NO_x predictions for the REMASCO sources satisfy the MoE O.Reg. 419/05 criteria. For the purposes of the Approval application outlined in A-10 these values are satisfactory. However, for an Environmental Assessment and the comparison of the potential cumulative impacts it is necessary to compare NO_2 values to the ambient air quality criteria. To do this one must take into consideration the reactions that can occur in the atmosphere to convert NO_x to NO_2.

The following information has been included in the report.

The study employed the ozone limiting method in the NO_x modelling of the cumulative impacts whereby a portion of the NO_x present in the atmosphere is assumed to be converted, on a one to one basis, by the ozone present. While model allows hourly ozone data to be used for this calculation in the absence of such data the model can use a representative value for ozone in the atmosphere and apply it for each hour of each year modelled. The value that was used as a conservative estimate of the annual level was the Port Stanley 90^{th} percentile of the hourly values reported. Port Stanley has the highest number for any of the ozone monitoring locations around the project area, 54 ppb. As explained in the text, ozone levels have both a seasonal and diurnal variation. The ozone levels are higher in the summer when the NO_x emission levels are lower, and the opposite is true in the winter season. The ozone levels also vary diurnally with the maximum values being found in the afternoon, while the maximum hourly

concentrations from the REMASCO sources were identified to occur in the late winter evening conditions when ozone levels would be below the peak values for the day.

Section 6.3 Modelling Runs TIBL

The issue of potential shoreline fumigation has been addressed in the report. Using the same emission characteristics as used for the main modelling, 21.34 m stack height, and the plume characteristics for the maximum exhaust rate was input to SCREEN3 which found that the plume does not rise high enough to being affected by the TIBL, thus no shoreline fumigation calculations were completed, and the AERMOD results do not need to be adjusted for this effect.

A discussion of the TIBL and the way it was approached has been included in the report.

Lake Breeze Effects

The REMASCO facilities are to be located within 2,000 m of the shoreline of Lake Erie. As such, these zones are subject to the effects of on-shore breezes during certain periods of the day. The breezes are created by a temperature differential created as the land warms up more than the lake. Under these circumstances releases to the atmosphere close to the lake can be trapped in the thermally created air flow and levels can increase. This condition is frequently referred to a shoreline fumigation. To assess the potential for such effects, SCREEN3, a US EPA model approved for use by the MoE, was employed to determine if this effect could cause REMASCO emissions to be trapped. The inputs to the model include the stack height, gas exit characteristics, and the distance from the lake. The model simulates meteorological conditions including the creation of the thermal internal boundary layer in the on shore region, and determines if the plume from the stacks would be influenced under any circumstances. This model was run for both the Southshore and the Agriville sites because the distance from the shoreline is different: 1100 m for Southshore, and 1800 m for Agriville.

In §7 the following has been added:

It is important to note that the SCREEN3 results determined that the plume height from both the Agriville and Southshore sources were below the height of the Thermal Internal Boundary Layer at their respective distances from the shoreline and thus determination of shoreline fumigation was not required. The AERMOD results are thus representative of the worst case results that could be expected.

Section 7.2.3 Comparison to Standards

The second paragraph in this section should have noted that the values were the average of the Windsor and Chatham data from the previous tables. *This section has edited.*

Table 24 shows the estimated cumulative concentrations of NO_2 and $PM_{2.5}$ at the sensitive receptors for various averaging times. The concentrations include the contribution of other sources in the community as represented by the average values of monitored ambient concentrations reported by the MoE. These are the averages of the Chatham and Windsor data presented in Chapter 3. The averages for the two sites were assumed to be more representative than selecting either of the sites alone. The local source profiles will vary in the two communities, and while neither might be representative of the situation in Kingsville the average is more likely to be reflective of levels than either of the extremes. For NO_2 the hourly ambient contribution to the total is 40 ug/m^3; for the daily value it is 58 ug/m^3; and for the annual

level it is 22.1 ug/m^3. $PM_{2.5}$ ambient concentrations added to the modelled values were 17 ug/m^3 for 24 hours and 8.2 ug/m^3 for the annual value.

Section 9.2.2 Monitoring

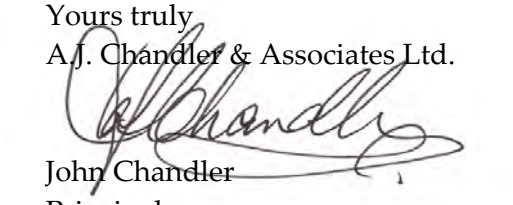
It should be noted that, the statement at the end of this section is somewhat misleading because the model that predicted elevated levels of NO_2 in the community was the one executed for the cumulative impact assessment, and as shown in that evaluation, when the REMASCO facilities go into operation, the community level of this contaminant is expected to be reduced.

That said, the issue of the anticipated monitoring requirements for the REMASCO facilities has been discussed in the response to comments in §5.2 earlier in this report. REMASCO would propose to continue with the monitoring regime currently being used at the facility, with the exception of SO_2, based upon the combustion characteristics of the gasifiers, the nature of the fuel and the size of the gasifiers.

The revisions to the report are currently being completed according to the responses noted above. It would note that with the revised surface characteristics, the maximum values predicted by the model have decreased from those in the draft version of the report forwarded for review. I anticipate that the revised report should be available to forward to you on June 24th, 2010. The results of the sensitivity study with the MoE revised met data will be forwarded as soon as they are completed.

Should you have any questions concerning the report please do not hesitate to contact me.

Yours truly
A.J. Chandler & Associates Ltd.



John Chandler
Principal

CC: Jim Gallant REMASCO
Danielle Truax, Kingsville
Elliot Segal, Intrinsik

Attachments to letter as PDF files:

Figure 4-1 Process Flow Sheet
Site Plan Agriville from AERMOD
Site Plan Southshore from AERMOD
Table 18 - revised surface characteristics
Figure 6 - receptor locations
Kingsville Google plot showing receptors
Screen Out files for TIBL runs

Attached to email as electronic file: AERMOD.sup file for BPIP data

Stantec Final Review Comments

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August 03, 2011
File: 122120074

Planning Department
Town of Kingsville
2021 Division Rd N, Kingsville, ON N9Y 2Y9

Attention: **Danielle Truax**

Dear Danielle:

Reference: **Peer Review of the Revised REMASCO Air Quality and HHRA Reports**

Stantec Consulting Limited (Stantec) has conducted a thorough review of the documents from Intrinsik Environmental Sciences Inc. and A.J. Chandler & Associates Ltd. responding to the comments and issues raised in our peer review comments (letters dated June 10, 2011 and June 16, 2011). These documents included:

- Revised report entitled "Human Health Risk Assessment, REMASCO Gasifier Installations, Kingsville Ontario", dated June 30, 2011;
- Revised report entitled "Air Quality Assessment, REMASCO Kingsville", dated June 30, 2011;
- Intrinsik memo" REMASCO HHRA – Response to Comments" dated June 23, 2011;
- A.J. Chandler & Associates letter entitled "Air Quality Study – REMASCO", dated June 23, 2011; and,
- AERMOD input files supplied by A.J. Chandler & Associates on July 8, 2011.

The revised reports and other associated data supplied by Intrinsik and Chandler & Associates have addressed all questions, comments and concerns noted in our original review to our satisfaction. Based on our review, it is our opinion that the revised air quality and human health risk assessments conducted for the proposed REMASCO facilities follow current regulatory requirements and most recent scientific practices. It is our opinion, based on the data presented in these reports, that the results of the analysis presented in the these reports provide reasonable predictions of air quality and human health effects in the study area due to the proposed REMASCO facilities.

Reference: Peer Review of the Revised REMASCO Air Quality and HHRA Reports

Respectfully,

STANTEC CONSULTING LTD.

Original Signed by G. Crooks

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Acoustic Assessment Report

NOISE IMPACT ASSESSMENT
PROPOSED GASIFICATION SYSTEM
REMASCO

FOR

A.J. CHANDLER & ASSOCIATES LIMITED

PREPARED BY

SAM N. KULENDRAN, B.A.Sc.

CHECKED BY

JOHN E. COULTER, B.A. Sc., P. ENG.

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JULY 5, 2011

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1.0 INTRODUCTION AND BACKGROUND

At the request of A.J. Chandler and Associates Limited, J. E. Coulter Associates Limited has reviewed the potential for noise impacts from the proposed REMASCO gasification systems to be located at two greenhouse sites in Kingsville, Ontario.

Most greenhouses in the Kingsville area have a boiler plant to supply heat to the facility. These boilers have traditionally been fuelled by natural gas, coal, bunker oil, or wood. The REMASCO project seeks to use gasified pellets, formed from waste, to provide both heat and electricity to the greenhouses. The REMASCO system will be installed at two locations:

- Southshore, 1746 Seacliff Drive E, Kingsville, N9Y 2M6; and,
- Agriville, 1600 Kratz Road, Kingsville, N9Y 0A1.

At Southshore, a total of 7 REMASCO boilers will be installed, with 4 REMASCO boilers to be installed at Agriville. Each REMASCO system features an emergency generator, which has been evaluated for noise during its testing times only. The overall noise from the REMASCO systems is evaluated for its potential noise impact on adjacent sensitive receptors. Please see Figure 1 Appendix A for the site plans.

2.0 SOUND LEVEL CRITERIA

The REMASCO boilers and emergency generators are evaluated under the Ministry of the Environment's *NPC-205* "Sound Level Limits for Stationary Sources in Class 1 and 2 Areas (Urban)" and *NPC-232* "Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)". This assessment is consistent with that required for both Environmental Assessments and Certificates of Approval, though the detail currently available would not be sufficient if a C of A is required.

Within the Class 2 area guidelines, the hourly equivalent (1hr L_{eq}) sound level from stationary sources is compared to the 1hr L_{eq} of the ambient sound or the minimum exclusion criteria (50dB daytime, 45dB evening, 45dB nighttime), whichever is greater. For Class 3 areas, the minimum criteria drop to (45dB daytime, 40dB evening, 40dB nighttime). The ambient sound level is comprised of the noise generated from roadway sources and excludes sources such as railways and aircraft. Typically, the quietest ambient sound level period is used as an evaluation of the worst-case situation. If the facility's sound level can remain below the quietest ambient sound level during that period, then the facility is likely to meet the guidelines during all periods of the day. Where the facility exceeds the guidelines, noise control needs to be implemented.

Given the size and expanse of the greenhouse facilities, several different receptors can be identified as sensitive. Depending on their exposure to the main roadways in Kingsville, these receptors can be classified as either Class 2 (Urban) or Class 3 (Rural). The traffic on these roads is insufficient to rise above the minimum exclusion criteria for all periods. The minimum criteria are again summarized below.

	One Hour L_{eq} (dBA)	
Time of Day	**Class 2 Area**	**Class 3 Area**
0700-1900	50	45
1900-2300	45	40
2300-0700	45	40

3.0 LOCATION OF SENSITIVE RECEPTORS AND NOISE SOURCES

The noise impact assessment can be subdivided into two sections addressing the noise sources and receptors at the Agriville and Southshore sites, as neither will ever effect the same receptor given their distances.

3.1 Agriville

The Agriville site will eventually include up to 4 REMASCO boilers and a 350kW emergency generator. There are potentially two sensitive receptors located to the north and to the west of the site. The receptor to the north, across Concession Road 2E, is identified as Agriville POR1. This receptor is closest to the proposed location of the REMASCO facility and thus represents a sensitive receptor. As it is located on a well-travelled road, Agriville POR1 falls under the Class 2 designation. Please refer to Figure 2 in Appendix A for a plan showing the main noise sources and sensitive receptors.

3.2 Southshore

The Southshore site currently has 2 REMASCO boilers and a 350kW emergency generator, and will include up to 5 more boilers. The most sensitive receptor is located to the northwest, on the south side of Concession Road 2E, and is identified as Southshore POR2. Figure 3 in Appendix A shows the main noise sources and sensitive receptors.

4.0 DESCRIPTION OF NOISE SOURCES

Each site is comprised of similar noise sources but in different quantity/magnitude.

4.1 REMASCO Boilers

The REMASCO boilers take pelletized waste and through a gasification process, heat hot water via boilers. Each boiler requires pellets to be fed into the gasification system. The set of two existing REMASCO boilers incorporates a pellet storage tank that uses bucket elevators to distribute pellets to the two boilers. Each of these boilers in turn incorporates a dust collector system. In the proposed co-generation facility, a steam turbine coupled with a generator will be used to provide electricity. The boilers, steam turbine, gasification system, and fan for the dust collector will remain inside a metal-clad building. The baghouses for the dust collectors are located outside. The dust collector fans exhaust to the outside air via large vertical stacks approximately 21m high. The dominant noise source, assuming doors and access hatches remain closed, will be the bucket elevator and the dust collector fans.

The REMASCO boiler system is intended to run 24 hours a day, 7 days a week. The bucket elevator is assumed to run for 20 min out of a every hour throughout the day and night. Hence, if the nighttime guideline levels are met, the daytime guidelines would also be met as the facility would produce a constant amount of noise on an hourly averaged basis.

4.2 Emergency Generators

Both sites incorporate emergency generators. It is assumed that Agriville will have the same type of generator as Southshore. Sound levels can be estimated for these generators based on their rated power output and fuel type. The estimation procedure is usually conservative and will need to be confirmed with the manufacturer's sound levels during Detailed Design. All generators are located inside the REMASCO buildings with ducted cooling air discharge. Fresh air is usually

provided via the facility in general (i.e., there is no separate ducted fresh air intake for the generators.) Since these generators are for emergency use, only the daytime test activity is evaluated.

5.0 EVALUATION OF REMASCO SYSTEM

The REMASCO dust collector fans and bucket elevators were measured during a site visit. At Southshore POR2, the closest receptor to REMASCO, the sound levels were measured at 48dBA. This agrees with the 110dB PWLA rating provided by the fan manufacturer. The fans are tonal, and so a 5dB correction is added to the measured sound level. The bucket elevator was found to produce 68dBA at 20m.

5.1 Southshore

With the addition of 5 more dust collector systems of a similar nature, the sound level would rise to 58dBA, including the tonality correction. The bucket elevator would produce about 39dBA at Southshore POR2, accounting for the fact that it does not run constantly. Given the absence of any substantial road traffic, the guideline limit would be 45dBA during the daytime and 40dBA during the nighttime at this location. The overall sound level during the nighttime would then be 58dB. The cumulative noise from the bucket elevator and dust collectors would be 58dB. The dust collector fans will require 20dB of attenuation and the bucket elevator may require some minor silencing as well (i.e., damping of the structure) to reduce its noise by about 2dB. Once these mitigation measures are in place, the overall sound level will be about 40dBA, meeting the criterion level during the nighttime.

The 350kW generator, installed inside the REMASCO facility, is located closest to Southshore POR2. A typical 350KW generator would produce approximately 43dBA at this receptor. Given a daytime limit of 45dBA, and assuming the mitigation measures for the dust collector and bucket elevator have been implemented, the combined noise from the facility (generator, bucket elevator, and dust collectors) would be 45dBA during the daytime. Hence, the generator does not require further noise control provided the cooling air exhaust does not point towards the houses. The details of the generator calculations and the generator's combustion exhaust muffler are provided in Appendix B.

5.2 Agriville

With 4 dust collector fans, the sound level at the nearest receptor, Agriville POR1, would be 62dBA, including tonality. The bucket elevator would produce about 42dBA, provided it operated in a similar manner to the bucket elevator at Southshore (i.e., no more than 20 min per hour). The overall sound level would then be about 62dBA during the nighttime . The limiting sound level for this receptor would be 45dBA during the nighttime. Implementing the same control measures as Southshore (20dB dust collector reduction and 2dB bucket elevator reduction) would result in an overall sound level of 44dBA during the nighttime.

During the daytime, a typical 350KW generator would produce approximately 48dBA at Agriville POR1. Assuming the mitigation measures for the dust collector and bucket elevator have been implemented, the combined noise from the facility (generator, bucket elevator, and dust collectors) would be 49dBA during the daytime. Given a daytime limit of 50dBA, the generator does not require further noise control, provided the generator's cooling air exhaust does not point towards the houses.

6.0 RECOMMENDED NOISE CONTROL

Of the noise sources evaluated, the noise from the dust collector fans is the primary issue. At the worst case, the dust collector fan alone exceeds the guidelines by about 18dB. Prior to the implementation of this project, the dust collector fan discharge will need to be quieted down by approximately 20dB to ensure the overall noise of the facility meets the guidelines at both Southshore and Agriville. The use of silencers or alternate fan selections or a combination of the two may be necessary. This item will likely need to be resolved during the detailed design stage.

The bucket elevators alone do not exceed the guideline levels. Considering the cumulative noise from the facility, however, each of Agriville's and Southshore's bucket elevators will need to be quieted by about 2dB. This can usually be accomplished by damping the structure with Blachford AntiVibe or rubber compounds

The generators should be considered in more detail during the Certificate of Approval application process.

APPENDIX A - FIGURES

FIGURE 1
SITE PLAN

FIGURE 2
AGRIVILLE

FIGURE 3
SOUTHSHORE

APPENDIX B - CALCULATIONS

GAS GENERATOR CALCULATION PROGRAMME **J.E. COULTER ASSOCIATES LIMITED**

v1.79

SOURCE ROOM ABSORPTION CALCULATION SHEET

Identification: **Agriville 350kW**

Units (f or m): **m**

Length:	**10.0** m	Room Volume:	1000	cu.m.	
Width:	**10.0** m	Total Surface Area (S):	600	m²	
Height:	**10.0** m	Surface Area unaccounted for:	0	m²	0%

Surface Type	Surface Area (m²)	OCTAVE BAND FREQUENCY (Hz) 63	125	250	500	1000	2000	4000	8000
Floor	**100**	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
% of Absorption:		16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
Ceiling	**100**	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
% of Absorption:		16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
North Wall	**100**	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
% of Absorption:		16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
South Wall	**100**	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
% of Absorption:		16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
East Wall	**100**	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
% of Absorption:		16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
West Wall	**100**	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**	**0.02**	**0.02**	**0.02**
% of Absorption:		16.7	16.7	16.7	16.7	16.7	16.7	16.7	16.7
Door	**0**	**0.01**	**0.01**	**0.05**	**0.05**	**0.04**	**0.04**	**0.04**	**0.04**
% of Absorption:		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Opening	**0**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
% of Absorption:		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

SUMMARY

	Octave Band Frequency (Hz) 63	125	250	500	1000	2000	4000	8000
Room Absorption (m²):	6	6	6	12	12	12	12	12
Room Constant (m²):	6	6	6	12	12	12	12	12
Average Absorption:	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02
Room Effect (10*log(4/R), dB):	-2	-2	-2	-5	-5	-5	-5	-5

Total Surface Area: 600 m²

DIESEL GENERATOR INPUT PARAMETERS

INTAKE

Intake to Receiver:	**250.0**	m	
Intake Opening Area:	**1.0**	m²	
Is intake louvre located at junction of 1,2 or 3 surfaces?	**1**		Assumes louvre located at centre of wall
Angle, Receiver to Intake Opening (0° = on axis):	**90**	°	

EXHAUST

Exhaust to Receiver:	**250.0**	m	
Exhaust Opening Area:	**1.0**	m²	
Is exhaust louvre located at junction of 1,2 or 3 surface	**1**		Assumes louvre located at centre of wall
Angle, Receiver to Exhaust Opening (0° = on axis):	**90**	°	
Exhaust Ducted (Y/N):	**Y**		Assumes 60% opening
Distance from Generator to Opening:	**2.0**	m	

RECIPROCATING ENGINE DATA

Number of Diesel Generators (same specification):	**1**	
Continuous Rating of Engine (382 kW):	**510**	HP
Exhaust Pipe Length:	**4**	m
Engine Speed:	**1,800**	rpm

AIR INTAKE TO ENGINE

1. With Turbocharger
2. Without Turbocharger

Enter Choice (1-2 **1**

ENGINE FUEL

1. Natural Gas only
2. Liquid Fuel only
3. Gas and/or Liquid Fuel

Enter Choice (1-3):	**2**	
Operation time (min.):	**60**	minutes/hour

DIESEL GENERATOR (CASE RADIATION)

INTAKE	Octave Band Frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	"A"
Diesel Gen PWL for 1 Generator (dB):	109	113	113	112	112	111	105	98	
Speed Correction:	0	0	0	0	0	0	0	0	
Engine Fuel Correction:	0	0	0	0	0	0	0	0	
NET PWL (Case Radiation):	109	113	113	112	112	111	105	98	117
DIRECT FIELD (D.F.)									
Source PWL (dB):	109	113	113	112	112	111	105	98	
Distance Adj. (Generator-Wall):	-17	-17	-17	-17	-17	-17	-17	-17	
SPL @ Wall:	92	96	96	95	95	94	88	81	
Intake Area Adjustment (dB):	0	0	0	0	0	0	0	0	
Reverb to Free Field Corr.:	-6	-6	-6	-6	-6	-6	-6	-6	
PWL @ Opening (Direct Field):	86	90	90	89	89	88	82	75	94
REVERBERANT FIELD (R.F.)									
Source PWL (dB):	109	113	113	112	112	111	105	98	
Room Effect (dB):	-2	-2	-2	-5	-5	-5	-5	-5	
SPL @ Wall:	107	111	111	107	107	106	100	93	
Intake Area Adjustment (dB):	0	0	0	0	0	0	0	0	
Reverb to Free Field Corr.:	-6	-6	-6	-6	-6	-6	-6	-6	
PWL @ Opening (Reverberant Field):	101	105	105	101	101	100	94	87	106
TOTAL PWL (D.F. + R.F.) @OPENING:	101	105	105	101	101	100	94	87	
Distance Correction to Recvr:	-59	-59	-59	-59	-59	-59	-59	-59	
Acoustic Louvre Insertion Loss:	0	0	0	0	0	0	0	0	
Directivity (90°):	0	0	-5	-8	-8	-12	-12	-12	
ISO Ground Effect (Ground + Air Absorp.):	0	0	0	0	0	0	0	0	
ISO Ground Reflection Adjustment:	0	0	0	0	0	0	0	0	
Other:	0	0	0	0	0	0	0	0	
Other:	0	0	0	0	0	0	0	0	
Other:	0	0	0	0	0	0	0	0	
Mitigated SPL (dB, Lin) @ Receiver:	43	47	41	34	34	29	23	16	
Mitigated SPL (dBA) @ Receiver:	16	30	33	31	34	31	24	15	
Energy Contribution (%):	1%	13%	22%	15%	31%	14%	3%	0%	

SUMMARY

Unmitigated SPL:	39.3 dBA
Mitigated SPL:	**39.3 dBA**
Insertion Loss:	0.0 dB

DIESEL GENERATOR (RADIATOR FACE + FAN)

EXHAUST	**Octave Band Frequency (Hz)**							
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Radiator Face PWL for 1 Generator (dB):	107	111	111	110	110	109	103	96
DIRECT FIELD (D.F.)								
Source PWL (dB):	107	111	111	110	110	109	103	96
Distance Adj. (Generator-Wall):	-17	-17	-17	-17	-17	-17	-17	-17
SPL @ Wall:	90	94	94	93	93	92	86	79
Exhaust Area Adjustment (dB):	0	0	0	0	0	0	0	0
Reverb to Free Field Corr.:	-6	-6	-6	-6	-6	-6	-6	-6
PWL @ Opening (Direct Field):	84	88	88	87	87	86	80	73
REVERBERANT FIELD (R.F.)								
Source PWL (dB):	107	111	111	110	110	109	103	96
Room Effect (dB):	-2	-2	-2	-5	-5	-5	-5	-5
SPL @ Wall:	105	109	109	105	105	104	98	91
Exhaust Area Adjustment (dB):	0	0	0	0	0	0	0	0
Reverb to Free Field Corr.:	-6	-6	-6	-6	-6	-6	-6	-6
PWL @ Opening (Reverberant Field):	99	103	103	99	99	98	92	85
PWL (D.F. + R.F.) @OPENING:	99	103	103	99	99	98	92	85
PWL (Fan):	94	102	104	102	101	98	92	74
Total PWL:	100	106	107	104	103	101	95	85
Other:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Other:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Other:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Directivity (90°):	0	0	-8	-8	-8	-12	-12	-12
Distance Correction to Receiver:	-59	-59	-59	-59	-59	-59	-59	-59
ISO Ground Effect (Ground + Air Absorp.):	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
ISO Ground Reflection Adjustment:	0	0	0	0	0	0	0	0
Mitigated SPL (dB, Lin) @ Receiver:	**41**	**47**	**39**	**37**	**36**	**30**	**24**	**15**
Mitigated SPL (dBA) @ Receiver:	15	31	31	33	36	31	25	13
Energy Contribution (%):	0%	11%	12%	21%	39%	13%	3%	0%

SUMMARY

Unmitigated SPL:	40.2	dBA
Mitigated SPL:	**40.2**	**dBA**
Insertion Loss:	0.0	dB

COMBUSTION EXHAUST

Receiver Location:	Agriville 350kW	
Stack to Receiver Angle (0, 45, 90, 135°):	**90**	°
Distance from combustion exhaust stack to receiver:	**250.0**	m
Is exhaust stack located at junction of 0, 1, 2 or 3 surfaces'	**1**	Assumes stack is close to 1 surface

Approximate Dimension of Combustion Exhaust Pipe

1. Over 3 x 3m
2. 1 x 1m to 3 x 3m
3. Under 1 x 1m

Choice (1-3): **1**

	Octave Band Frequency (Hz)								
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**"A"**
PWL Combustion Exhaust for 1 Generator (dB):	136	142	138	130	126	120	110	102	134
Turbocharger Correction:	-6	-6	-6	-6	-6	-6	-6	-6	
Pipe Attenuation (Length = 4 m):	-0	-0	-0	-0	-1	-1	-1	-1	
Stack Directivity (90°):	-3	-3	-3	-9	-9	-14	-14	-14	
Distance + Reflection Correction:	-56	-56	-56	-56	-56	-56	-56	-56	
ISO Ground Effect (Ground + Air Absorp.):	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
ISO Ground Reflection Adjustment:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Unmitigated SPL (dB, Lin) @ Receiver:	71	77	73	59	54	43	33	25	66
Model SM2	**-5**	**-15**	**-27**	**-30**	**-25**	**-23**	**-20**	**-20**	
Other:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Other:	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
Mitigated SPL (dB, Lin) @ Receiver:	**66**	**62**	**46**	**29**	**29**	**20**	**13**	**6**	
Mitigated SPL (dBA) @ Receiver:	39	46	37	25	29	21	14	4	
Energy Contribution (%):	17%	70%	10%	1%	2%	0%	0%	0%	

SUMMARY

Unmitigated SPL:	66.4	dBA
Mitigated SPL:	**47.1**	**dBA**
Insertion Loss:	19.3	dB

BASE PWL CALCULATION PROCEDURE (ASHRAE) 1984 Volume Systems

Units (f or m): **f**

FAN DATA

Flow Rate:	**10,000**	cfm
Static Pressure Drop:	**1.00**	in.
Operating Speed:	**1,800**	rpm

EFFICIENCY

Operating Efficiency:	**80**	%
Peak Efficiency:	**100**	%

Note: PWL for Inlet or Outlet

	Octave Band Frequency (Hz)							
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Reference Sound Power for Fan Type:	48	51	58	56	55	52	46	28
CFM/S.P. Adjustments:	40	40	40	40	40	40	40	40
Efficiency Correction:	6	6	6	6	6	6	6	6
BFI Correction:	0	5	0	0	0	0	0	0
Sound Power (dB re 1pW): (see Radiator Face Sheet for further details)	94	102	104	102	101	98	92	74

REFERENCE SOUND LEVELS FOR VARIOUS FAN TYPES

Choose Fan Type (1-11): **11**

1. Centrifugal Air Foil, backward:	> 36 in.	7. Vaneaxial	> 40 in.
2. Centrifugal curved, backward:	< 36 in.	8. Vaneaxial	< 40 in.
3. Forward curved:	All	9. Tubeaxial	> 40 in.
		10. Tubeaxial	< 40 in.
4. Radial blade, Pressure Blower:	> 40 in.		
5. Radial blade, Pressure Blower:	20 in. to 40 in.		
6. Radial blade, Pressure Blower:	< 20	11. Propeller Cooling tower:	All

SUMMARY OF DIESEL GENERATOR SOUND CALCULATIONS v1.79

Agriville 350kW
–

	Unmitigated SPL	Mitigated SPL
DIESEL GENERATOR (Total of 1)		
Case Radiation (Intake):	39.3 dBA	39.3 dBA
Radiator + Fan (Discharge):	40.2	40.2
Combined SPL:	42.7 dBA	42.7 dBA
Time Correction (60 out of 60 minutes):	0.0	0.0
Net SPL @ Receiver (Leq 1 hr):	**42.7** dB Leq	**42.7** dB Leq
Insertion Loss:	0.0 dB	
COMBUSTION EXHAUST:	66.4 dBA	47.1 dBA
Time Correction (60 out of 60 min):	0.0	0.0
Net SPL @ Receiver:	**66.4** dB Leq	**47.1** dB Leq
Insertion Loss:	19.3 dB	
Final SPL for 1 Diesel Generator @Receiver:	**66.4 dBA**	**48.4 dBA**
Noise Criterion (dB Leq):	50.0 dBA	50.0 dBA
Noise Excess (dB):	16.4 dB	-1.6 dB

Prepared by:

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ISO 9613-2 (1st EDITION) OCTAVE BAND GROUND EFFECT MODEL v. 4.01

Project:	**Southshore Basic ID Fan for Dust Collector**			
Location:	-			
		SPL (No Barrier)		
Source to Receiver:	**450.00** m	**45.4 dBA**		
Source Height:	**21.00** m			
Source Base Elev:	**0.00** m			
Top of Source Elev:	21.00 m	Foliage depth, A(foilage):	**0.00** m	
Receiver Height:	**4.50** m	Housing depth:	**0.00** m	
Receiver Base Elev:	**0.00** m	Housing density A(housing):	**0.00** %	
Top of Receiver Elev.:	4.50 m	Industrial depth, A(site):	**0.00** m	
Receiver to B1:	**0.00** m	Barrier Thickness:	**0.00** m	
Barrier Height (B1):	**0.00** m	Barrier Length (N/A):	**999.00** m	
B1 Base Elevation:	**0.00** m	LOS (B1):	4.500 m	
Top of B1:	0.00 m			
Receiver to B2 (N/A) -->	**0.00** m	Barrier Length (N/A):	**999.00** m	
Barrier Height (B2):	**0.00** m			
B2 Base Elevation:	**0.00** m			
Temp. (-20°C to +50°C):	**20** °C	Rel. Humidity (10-90%):	**50** %	
Source Zone, Hard Ground:	**450.0** m	Receiver Zone, Hard Ground	**0.0** m	
Source Zone:	450.0 m	Receiver Zone:	135.0 m	
Middle Zone, Hard Ground:	**0.0** m			
Middle Zone (N/A):	0.0 m			
Is Source a Wind Turbine? (Y/N):	**N**			
Class 1 Area (Default):	**1**			

Ground Attenuation	Octave Band Frequency (Hz)							
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
G(source):	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G(middle), Not Applicable:	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
G(receiver):	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
A(source):	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5
A(middle):	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A(receiver):	-1.5	3.3	1.4	0.0	0.0	0.0	0.0	0.0
A(ground):	**-3.0**	**1.8**	**-0.1**	**-1.5**	**-1.5**	**-1.5**	**-1.5**	**-1.5**

Use PWL or SPL (P/S)?	Octave Band Frequency (Hz)								
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**"A"**
p									
Source PWL (dB re pW):	**113.0**	**114.0**	**111.0**	**108.0**	**104.0**	**101.0**	**96.0**	**93.0**	110.1
Source Directivity (dB):	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	
Total PWL (dB re pW):	**113.0**	**114.0**	**111.0**	**108.0**	**104.0**	**101.0**	**96.0**	**93.0**	
A(divergence, re 450m):	64.1	64.1	64.1	64.1	64.1	64.1	64.1	64.1	
A(Barrier, None):	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
A(ground):	-3.0	1.8	-0.1	-1.5	-1.5	-1.5	-1.5	-1.5	
A(air), Temp: 20°C & R.H.: 50%	0.1	0.2	0.6	1.2	2.1	4.4	13.2	46.8	
A(foliage):	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
A(housing):	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
A(site):	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
A(misc):	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	
Net SPL (unweighted):	51.9	47.9	46.5	44.2	39.3	34.0	20.2	-16.4	
"A" Weighting:	-26.2	-16.1	-8.6	-3.2	0.0	1.2	1.0	-1.1	
Net SPL @ Receiver:	**25.7**	**31.8**	**37.9**	**41.0**	**39.3**	**35.2**	**21.2**	**-17.5**	
Energy Contribution (%):	1%	4%	18%	36%	25%	10%	0%	0%	

Unmitigated SPL: **45.4 dBA**

04-Jul-11
05:27 PM

Notes:

	63	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**
Max A(ground, no barrier): using A(r) & A(s) = 1.5m:	0.0	10.7	14.0	10.0	1.3	0.0	0.0	0.0

320° 47.47

Daltec Industries Ltd.

Version 2.0

Date: 9/30/2008

Customer: JC Millrights
Quotation No.: 08Q09038-6
Model: IE-23-DMW
Fan Arrangment: 8
Flow: 10,000 acfm
Fan Speed: 1757 rpm
Wheel Dia.: 40 in.
Percent Width: 90 %
Static Efficiency: 65.1 %
Operating Temp.: 320 F
Baro. Pressure: 29.93 in. Hg

Project: Dust Collector
Customer Ref. No.: Remasco
Fan Tag No.:
Fan Class.: 19K
Static Pressure Rise: 20 in.wg
Power: 47.47 hp @ 320°F
Tip Speed: 18399 ft/min
Outlet Velocity: 3404 ft/min.
Elevation: 0 ft
Inlet Density: 0.051 lb/ft^3
Relative Humidity: 0%

Total Sound Power Levels (ref 10^-12 Watts)

Octave Band	1	2	3	4	5	6	7	8
dB Level	113	114	111	108	104	101	96	93

Single Value LwA: 110 dBA *Estimated Sound Pressure Level: 100 dBA

Sound Pressure Level @ 3 ft. from the sound source in a free field (ref 2x10^-5 Pa, Q=1)

*Sound Pressure Level based on a non Ducted Inlet and Outlet