

Whitesand First Nation  
Cogeneration and Pellet Mill Project

Emission Summary and  
Dispersion Modelling Report

Sagatay Cogeneration LP

October 2014







**Whitesand First Nation  
Cogeneration and Pellet Mill Project**

**Emission Summary and Dispersion  
Modelling Report**

*Prepared By:*

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Neegan Burnside Ltd.  
292 Speedvale Avenue West Unit 20 Guelph ON N1H 1C4

*Prepared for:*

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Sagatay Cogeneration LP, with its General Partner, Sagatay  
Cogeneration Ltd., and Whitesand First Nation as agent

October 2014

File No: 300030895.0000

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## EMISSION SUMMARY AND DISPERSION MODELLING REPORT CHECKLIST

Company Name: Sagatay Cogeneration LP

Company Address: PO Box 68, Armstrong, Ontario, P0T 1A0

Location of Facility: Crown land in an unorganized territory of the  
Thunder Bay District near Whitesand First Nation & Armstrong ON

The attached Emission Summary and Dispersion Modeling Report was prepared in accordance with s.26 of O. Reg. 419/05 and the guidance in the MOE document "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated July, 2005 and "Air Dispersion Modelling Guideline for Ontario" dated July 2005 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact:	
Name:	<u>Craig Toset</u>
Title:	<u>Project Manager</u>
Phone Number:	<u>807-583-2177</u>
Signature:	<u></u>
Date:	<u>October 22, 2014</u>

Technical Contact:	
Name:	<u>Harvey Watson</u>
Representing:	<u>R. J. Burnside &amp; Associates Limited</u>
Phone Number:	<u>905-821-1800 x589</u>
Signature:	<u></u>
Date:	<u>October 22, 2014</u>

## EMISSION SUMMARY AND DISPERSION MODELLING REPORT CHECKLIST

Required Information		Submitted	Explanation/Reference
<b>Executive Summary and Emission Summary Table</b>			
1.1	Overview of ESDM Report	<input checked="" type="checkbox"/> Yes	Executive Summary
1.2	Emission Summary Table	<input checked="" type="checkbox"/> Yes	Executive Summary
<b>1.0 Introduction and Facility Description</b>			
1.1	Purpose and Scope of ESDM Report (when report only represents a portion of facility)	<input checked="" type="checkbox"/> Yes	Section 1.1
1.2	Description of Processes and NAICS code(s)	<input checked="" type="checkbox"/> Yes	Section 1.2
1.3	Description of Products and Raw Materials	<input checked="" type="checkbox"/> Yes	Section 1.3
1.4	Process Flow Diagram	<input checked="" type="checkbox"/> Yes	Section 1.4 & Figure E3
1.5	Operating Schedule	<input checked="" type="checkbox"/> Yes	Section 1.5
<b>2.0 Initial Identification of Sources and Contaminants</b>			
2.1	Sources and Contaminants Identification Table	<input checked="" type="checkbox"/> Yes	Section 2.1 & Table E1
<b>3.0 Assessment of the Significance of Contaminants and Sources</b>		<input checked="" type="checkbox"/> Yes	Section 3.0
3.1	Identification of Negligible Contaminants and Sources	<input checked="" type="checkbox"/> Yes	Section 3.1
3.2	Rationale for Assessment	<input checked="" type="checkbox"/> Yes	Section 3.2
<b>4.0 Operating Conditions, Emission Estimating and Data Quality</b>			
4.1	Description of operating conditions, for each significant contaminant that results in the maximum POI concentration for that contaminant	<input checked="" type="checkbox"/> Yes	Section 4.1 & App EA
4.2	Explanation of Method used to calculate the emission rate for each contaminant	<input checked="" type="checkbox"/> Yes	Section 4.2 & App EA
4.3	Sample calculation for each method	<input checked="" type="checkbox"/> Yes	Section 4.3 & App EA
4.4	Assessment of Data Quality for each emission rate	<input checked="" type="checkbox"/> Yes	Section 4.4 & App EA
<b>5.0 Source Summary Table and Property Plan</b>			
5.1	Source Summary Table	<input checked="" type="checkbox"/> Yes	Section 5.1 & Table E2
5.2	Site Plan (scalable)	<input checked="" type="checkbox"/> Yes	Section 5.2 & Figure E2
<b>6.0 Dispersion Modelling</b>			
6.1	Dispersion Modelling Input Summary Table	<input checked="" type="checkbox"/> Yes	Section 6.1 & Table E3
6.2	Land Use Zoning Designation Plan	<input type="checkbox"/> Yes	n/a
6.3	Dispersion Modelling Input and Output Files	<input checked="" type="checkbox"/> Yes	Section 6.3 & App EC
<b>7.0 Emission Summary Table and Conclusions</b>			
7.1	Emission Summary Table	<input checked="" type="checkbox"/> Yes	Section 7.1 & Table E4
7.2	Assessment of Contaminants with no MOE POI Limits	<input checked="" type="checkbox"/> Yes	Section 7.2
7.3	Conclusions	<input checked="" type="checkbox"/> Yes	Section 7.3
<b>Appendices (Provide supporting information or details such as...)</b>			
Supporting Calculations		<input checked="" type="checkbox"/> Yes	Appendix EA
Supporting Information for Assessment of Negligibility		<input checked="" type="checkbox"/> Yes	Appendix EB
Dispersion Modelling Printouts		<input checked="" type="checkbox"/> Yes	Appendix EC
		<input type="checkbox"/> Yes	
		<input type="checkbox"/> Yes	
		<input type="checkbox"/> Yes	
		<input type="checkbox"/> Yes	

## Record of Revisions

Revision	Date	Description
0	December 18, 2013	Draft Report Submission for Consultation
1	October 17, 2014	Application to the Ministry of the Environment and Climate Change for Renewable Energy Approval and Environmental Compliance Approval



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## Appendices

A	Supporting Calculations
B	Supporting Information for Assessment of Negligibility
C	Dispersion Modelling Printouts



## Definitions

Whitesand Site <sup>1</sup>	Whitesand First Nation Armstrong, Ontario P0T 1A0
Acoustic Assessment	Procedure for assessing the noise impact of a Site on the local PORs
The ADMGO	“Air Dispersion Modelling Guideline for Ontario”, PIBS: 5165e
Air Dispersion Model	Air Dispersion Model described in Appendix to Ontario Regulation 346.
Application	Application for Approval (Air & Noise) form dated November 2005 document PIBS: 4173e
This Application	This document containing all the information as required by the ESDM Procedure Document.
CAS#	Chemical Abstract Society reference number
CofA	Certificate of Approval (Air & Noise) as issued by the Ontario Ministry of the Environment prior to 31 October 2011.
ECA	Environmental Compliance Approval as issued by the Ontario Ministry of the Environment after 31 October 2011.
EC	Engineering Calculation
EF	Emission Factor
ESDM	Emissions Summary and Dispersion Model
ESDM Procedure Document	“Procedure for Preparing an Emission Summary and Dispersion Modelling Report” dated March 2009, PIBS: 3614e03
ESDM Report Checklist	“Emission Summary and Dispersion Modelling Checklist”, dated November 2005, PIBS: 5357e
Information for an MGLC	“Supporting Information for a Maximum Ground Level Concentration Acceptability Request Supplement to Application for Approval”, dated 18 February 2005, PIBS: 4872e.pdf
Insignificant	Negligible

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<sup>1</sup> The term Site is used specifically to clearly indicate the difference between the term facility used in O.Reg. 419 and the term Site which refers to the specific address and everything inside the property boundary which is the focus of This Application. It was felt that using the term “Facility” for this specific location could lead to confusion. The term Site is consistent with the connotations in the “Environmental Compliance Approval”, and includes the full extent of the “Project Location” as defined by O.Reg. 359/09.

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## List of MOE POI Limits

Schedule 3 of “SUMMARY of STANDARDS and GUIDELINES to support Ontario Regulation 419: Air Pollution – Local Air Quality (including Schedule 6 of O.Reg. 419 on UPPER RISK THRESHOLDS)” Dated April 2012, PIBS: 6569e01

And

“Jurisdictional Screening Level (JSL) List, A Screening Tool for Ontario Regulation 419: Air Pollution – Local Air Quality”, 6547e.pdf dated February 2008.

MB

Mass Balance

MOE

Ontario Ministry of the Environment

NOx

Nitrogen Oxides

O.Reg. 346

Ontario Regulation 346

O.Reg. 419

Ontario Regulation 419/05

TSP

Total Suspended Particulate

PM

Particulate Matter

POI

Point of Impingement (Contaminant)

POR

Point of Reception (Noise)

Products of Combustion

Contaminants emitted as a result of burning natural gas

Significant

Non-negligible

Source ID

The alphanumeric string assigned to a discharge point otherwise known as a “source reference number” in the “Acme Example” PIBS: 5987e.pdf.

VOC

Volatile Organic Compound

## Executive Summary

This Emission Summary and Dispersion Modelling (“ESDM”) report was prepared to support an application for a Renewable Energy Approval (“REA”) and Environmental Compliance Approval (“ECA”). The ESDM report was prepared in accordance with s.26 of Ontario Regulation 419/05 (“O.Reg. 419”) and the ESDM Procedure Document to support the REA and ECA applications.

Sagatay Cogeneration LP, with its General Partner, Sagatay Cogeneration Ltd., and Whitesand First Nation (Whitesand) as agent, will operate a biomass fuelled electrical power and heat 3.6 MW cogeneration plant and a solid wood fuel pellet plant located in an unorganized territory of the Thunder Bay District near Whitesand First Nation and Armstrong, Ontario. The unorganized territory is administered by the Armstrong Local Service Board and is located on the traditional territory of Whitesand First Nation. The Site is located in an area previously used as an industrial site. The main processes will be electrical power generation and solid wood fuel pellet production.

The Site is subject to s.20 of O.Reg. 419 so the modelling impact of contaminant emissions has been assessed as the worst case maximum Point of Impingement (“POI”) concentrations against Schedule 3 criteria using the appropriate averaging period.

The Site is expected to emit products of combustion and particulate matter (“PM”).

The maximum POI concentrations were calculated based on the operating conditions where all significant sources are operating simultaneously at their individual maximum rates of production. The maximum emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with s.11 of O.Reg. 419 and the data quality assessment follows the process outlined in the requirements of the ESDM Procedure Document.

A POI concentration for each significant contaminant emitted from the Site was calculated based on the calculated emission rates and the output from the Air Dispersion Model; the results are presented in the following Emissions Summary Table in accordance with s.26 of O.Reg. 419.

The POI concentrations listed in the Emissions Summary Table were compared against the “SUMMARY of STANDARDS and GUIDELINES to support Ontario Regulation 419: Air Pollution – Local Air Quality (including Schedule 6 of O.Reg. 419 on UPPER RISK THRESHOLDS)” dated April 2012, PIBS: 6569e01 and “Jurisdictional Screening Level (JSL) List, A Screening Tool for Ontario Regulation 419: Air Pollution – Local Air Quality”, PIBS: 6547e (“List of MOE POI Limits”).

Of the contaminants listed in **Table E4** that have limits in the List of Ministry POI Limits, all the predicted POI concentrations are below the corresponding limits. For example, the 24-hour POI concentration for particulate matter is  $60.17 \mu\text{g}/\text{m}^3$  at 50.1% of the guideline of  $120 \mu\text{g}/\text{m}^3$ .



Table E4:  
Emissions Summary Table  
(Rev2)

CAS#	Contaminant	Total Emission Rate (g/s)	Dispersion Model Used	Max POI Value (µg/m³)	Location of		Averaging Period Modelled (h)	Averaging Period of Criterion (h)	Max POI Value Converted to Criterion Period (µg/m³)	Criteria (µg/m³)	Limiting Effect	Regulation Schedule #	Percentage of Criteria or Likelihood of adverse effect (%)
					X (m)	Y (m)							
0-03-3	Pentachlorodibenzo-p-furans	7.7645E-11	AERMOD-m	1.10964E-09	354191	5572230	24	24	1.10964E-09	0		0	Neg
50-00-0	Formaldehyde	0.00414676	AERMOD-m	0.528224	354177	5572216	24	24	0.528224	65	Health	Schedule 3	0.8%
50-32-8	Benzo(a)pyrene - all sources	4.8066E-07	AERMOD-m	6.86921E-06	354191	5572230	24	24	6.86921E-06	0.005	Assessment Va	Schedule 3	0.1%
50-32-8	Benzo(a)pyrene - all sources	4.8066E-07	AERMOD-m	5.81987E-07	354219	5572309	8760	8760	5.81987E-07	0.00001	Health	Schedule 3	5.8%
51-28-5	2,4-Dinitrophenol	3.3277E-08	AERMOD-m	4.7556E-07	354191	5572230	24	24	4.7556E-07	0		0	Neg
53-70-3	Dibenzo(a,h)anthracene	1.6823E-09	AERMOD-m	2.40422E-08	354191	5572230	24	24	2.40422E-08	0		0	Neg
56-23-5	Carbon tetrachloride	8.3191E-06	AERMOD-m	0.00011889	354191	5572230	24	24	0.00011889	2.4	Health	Schedule 3	0.0%
56-55-3	Benzo(a)anthracene	1.2017E-08	AERMOD-m	1.7173E-07	354191	5572230	24	24	1.7173E-07	0		0	Neg
65-85-0	Benzoic Acid	8.6889E-09	AERMOD-m	1.24174E-07	354191	5572230	24	24	1.24174E-07	700	Health	Guideline	0.0%
66-25-1	Hexanaldehyde	1.2941E-06	AERMOD-m	0.000018494	354191	5572230	24	24	0.000018494	2	JSL	JSL	0.0%
67-64-1	Acetone	3.5125E-05	AERMOD-m	0.000501981	354191	5572230	24	24	0.000501981	11880	Health	Schedule 3	0.0%
67-66-3	Chloroform	5.1764E-06	AERMOD-m	7.39761E-05	354191	5572230	24	24	7.39761E-05	1	Health	Schedule 3	0.0%
71-43-2	Benzene	0.00077645	AERMOD-m	0.0110964	354191	5572230	24	24	0.0110964	100	Assessment Va	Schedule 3	0.0%
71-43-2	Benzene	0.00077645	AERMOD-m	0.000940134	354219	5572309	8760	8760	0.000940134	0.45	Health	Schedule 3	0.2%
71-55-6	1,1,1-Trichloroethane	5.731E-06	AERMOD-m	8.19021E-05	354191	5572230	24	24	8.19021E-05	115000	Health	Schedule 3	0.0%
74-82-8	Methane	0.00388227	AERMOD-m	0.055482	354191	5572230	24	24	0.055482	0		0	Neg
74-83-9	Bromomethane	2.773E-06	AERMOD-m	0.00003963	354191	5572230	24	24	0.00003963	1350	Health	Guideline	0.0%
74-87-3	Methyl Chloride	4.252E-06	AERMOD-m	6.07661E-05	354191	5572230	24	24	6.07661E-05	320	Health	Schedule 3	0.0%
75-01-4	Vinyl chloride	3.3277E-06	AERMOD-m	4.75561E-05	354191	5572230	24	24	4.75561E-05	1	Health	Schedule 3	0.0%
75-07-0	Acetaldehyde	0.00015344	AERMOD-m	0.004058	354059	5571849	1	0.5	0.004927203	500	Health	Schedule 3	0.0%
75-07-0	Acetaldehyde	0.00015344	AERMOD-m	0.00219286	354191	5572230	24	24	0.00219286	500	Health	Schedule 3	0.0%
75-09-2	Dichloromethane	5.3612E-05	AERMOD-m	0.000766181	354191	5572230	24	24	0.000766181	220	Health	Schedule 3	0.0%
75-69-4	CFC-11	7.5797E-06	AERMOD-m	0.000108322	354191	5572230	24	24	0.000108322	6000	Health	Guideline	0.0%
78-84-2	Isobutyraldehyde	2.2184E-06	AERMOD-m	0.000031704	354191	5572230	24	24	0.000031704	56	JSL	JSL	0.0%
78-87-5	1,2-Dichloropropane	6.1007E-06	AERMOD-m	8.71861E-05	354191	5572230	24	24	8.71861E-05	2400	Odour	Guideline	0.0%
78-93-3	Methyl ethyl ketone	9.983E-07	AERMOD-m	1.42668E-05	354191	5572230	24	24	1.42668E-05	1000	Health	Schedule 3	0.0%
79-01-6	Trichloroethylene	5.5461E-06	AERMOD-m	7.92601E-05	354191	5572230	24	24	7.92601E-05	12	Health	Schedule 3	0.0%
83-32-9	PAH - Acenaphthene	1.6823E-07	AERMOD-m	2.40422E-06	354191	5572230	24	24	2.40422E-06	0		0	Neg
85-01-8	Phenanthrene	1.2941E-06	AERMOD-m	0.000018494	354191	5572230	24	24	0.000018494	0		0	Neg
86-73-7	PAH - Fluorene	6.2856E-07	AERMOD-m	8.98281E-06	354191	5572230	24	24	8.98281E-06	0		0	Neg
86-74-8	Dibenzopyrrole	3.3277E-07	AERMOD-m	4.7556E-06	354191	5572230	24	24	4.7556E-06	40	JSL	JSL	0.0%
87-86-5	Pentachlorophenol	9.4284E-09	AERMOD-m	1.34742E-07	354191	5572230	24	24	1.34742E-07	20	Health	Guideline	0.0%
88-06-2	2,4,6-trichlorophenol	4.0671E-09	AERMOD-m	5.81241E-08	354191	5572230	24	24	5.81241E-08	1.5	JSL	JSL	0.0%
88-75-5	2-Nitrophenol	4.4369E-08	AERMOD-m	6.34081E-07	354191	5572230	24	24	6.34081E-07	0		0	Neg
91-20-3	Naphthalene	1.7932E-05	AERMOD-m	0.000474246	354059	5571849	1	0.1667	0.00078318	50	Odour	Guideline	0.0%
91-20-3	Naphthalene	1.7932E-05	AERMOD-m	0.000256274	354191	5572230	24	24	0.000256274	22.5	Health	Guideline	0.0%
91-57-6	2-Methyl Naphthalene	2.9579E-08	AERMOD-m	4.2272E-07	354191	5572230	24	24	4.2272E-07	10	JSL	JSL	0.0%
91-58-7	2-Chloronaphthalene	4.4369E-10	AERMOD-m	6.34081E-09	354191	5572230	24	24	6.34081E-09	0		0	Neg
95-47-6	o-Xylene	4.6217E-06	AERMOD-m	6.60501E-05	354191	5572230	24	24	6.60501E-05	100	JSL	JSL	0.0%
95-57-8	2-Chlorophenol	4.4369E-09	AERMOD-m	6.34081E-08	354191	5572230	24	24	6.34081E-08	0.8	JSL	JSL	0.0%
98-86-2	Acetophenone	5.9158E-10	AERMOD-m	1.56452E-08	354059	5571849	1	1	1.56452E-08	1167	Health	Guideline	0.0%
100-02-7	p-Nitrophenol	2.0336E-08	AERMOD-m	2.9062E-07	354191	5572230	24	24	2.9062E-07	4	JSL	JSL	0.0%
100-41-4	Ethylbenzene	5.731E-06	AERMOD-m	8.19021E-05	354191	5572230	24	24	8.19021E-05	1000	Health	Schedule 3	0.0%
100-42-5	Styrene	0.00035125	AERMOD-m	0.00501981	354191	5572230	24	24	0.00501981	400	Health	Schedule 3	0.0%
100-52-7	Benzaldehyde	1.5714E-07	AERMOD-m	2.2457E-06	354191	5572230	24	24	2.2457E-06	2	JSL	JSL	0.0%
104-87-0	p-Tolualdehyde	2.0336E-06	AERMOD-m	0.000029062	354191	5572230	24	24	0.000029062	0		0	Neg
107-02-8	Acrolein	0.00073948	AERMOD-m	0.019557	354059	5571849	1	1	0.019557	4.5	Health	Schedule 3	0.4%
107-02-8	Acrolein	0.00073948	AERMOD-m	0.010568	354191	5572230	24	24	0.010568	0.4	Health	Schedule 3	2.6%
107-06-2	1,2-Dichloroethane / Ethylene dichloride	5.3612E-06	AERMOD-m	7.66181E-05	354191	5572230	24	24	7.66181E-05	2	Health	Schedule 3	0.0%
108-88-3	Toluene	0.00017008	AERMOD-m	0.00243064	354191	5572230	24	24	0.00243064	2000	Odour	Guideline	0.0%
108-90-7	Chlorobenzene	6.1007E-06	AERMOD-m	0.000161342	354059	5571849	1	0.1667	0.00026644	4500	Odour	Guideline	0.0%
108-90-7	Chlorobenzene	6.1007E-06	AERMOD-m	0.000161342	354059	5571849	1	1	0.000161342	3500	Health	Guideline	0.0%

Table E4:  
Emissions Summary Table  
(Rev2)

CAS#	Contaminant	Total Emission Rate (g/s)	Dispersion Model Used	Max POI Value (µg/m³)	Location of		Averaging Period Modelled (h)	Averaging Period of Criterion (h)	Max POI Value Converted to Criterion Period (µg/m³)	Criteria (µg/m³)	Limiting Effect	Regulation Schedule #	Percentage of Criteria or Likelihood of adverse effect (%)
					X (m)	Y (m)							
108-95-2	Phenol	9.4284E-06	AERMOD-m	0.000134742	354191	5572230	24	24	0.000134742	30	Health	Schedule 3	0.0%
117-81-7	Bis(2-ethylhexyl) phthalate	8.6889E-09	AERMOD-m	1.24174E-07	354191	5572230	24	24	1.24174E-07	50	Health	Schedule 3	0.0%
120-12-7	Anthracene	5.5461E-07	AERMOD-m	7.92601E-06	354191	5572230	24	24	7.92601E-06	0.2	JSL	JSL	0.0%
123-38-6	Propionaldehyde	1.1277E-05	AERMOD-m	0.000298237	354059	5571849	1	0.1667	0.000492515	10	Odour	Guideline	0.0%
123-73-9	Crotonaldehyde	1.8302E-06	AERMOD-m	2.61558E-05	354191	5572230	24	24	2.61558E-05	3.4	JSL	JSL	0.0%
124-38-9	Carbon Dioxide	36.0496261	AERMOD-m	515.190613	354191	5572230	24	24	515.190613	21000	JSL	JSL	2.5%
127-18-4	Tetrachloroethylene	7.0251E-06	AERMOD-m	0.000100396	354191	5572230	24	24	0.000100396	360	Health	Schedule 3	0.0%
129-00-0	Pyrene	6.8402E-07	AERMOD-m	9.77541E-06	354191	5572230	24	24	9.77541E-06	0.2	JSL	JSL	0.0%
191-24-2	Benzo(g,h,i)perylene	1.7193E-08	AERMOD-m	2.45706E-07	354191	5572230	24	24	2.45706E-07	1.2	JSL	JSL	0.0%
192-97-2	Benzo(e)pyrene	4.8066E-10	AERMOD-m	6.86921E-09	354191	5572230	24	24	6.86921E-09	0		0	Neg
193-39-5	Indeno(1,2,3-c,d)pyrene	1.6084E-08	AERMOD-m	2.29854E-07	354191	5572230	24	24	2.29854E-07	0		0	Neg
198-55-0	Perylene	9.6132E-11	AERMOD-m	1.37384E-09	354191	5572230	24	24	1.37384E-09	0		0	Neg
205-99-2	Benzo(b)fluoranthene	1.8487E-08	AERMOD-m	2.642E-07	354191	5572230	24	24	2.642E-07	0		0	Neg
206-44-0	Fluoranthene	2.9579E-07	AERMOD-m	4.2272E-06	354191	5572230	24	24	4.2272E-06	140	JSL	JSL	0.0%
207-08-9	Benzo(k)fluoranthene	6.6553E-09	AERMOD-m	9.51121E-08	354191	5572230	24	24	9.51121E-08	0		0	Neg
208-96-8	Acenaphthylene	9.2435E-07	AERMOD-m	0.00001321	354191	5572230	24	24	0.00001321	3.5	JSL	JSL	0.0%
218-01-9	Benzo(a)phenanthrene	7.0251E-09	AERMOD-m	1.00396E-07	354191	5572230	24	24	1.00396E-07	0		0	Neg
529-20-4	o-Tolualdehyde	1.3311E-06	AERMOD-m	1.90224E-05	354191	5572230	24	24	1.90224E-05	0		0	Neg
540-49-8	1,2-Dibromoethene	1.0168E-05	AERMOD-m	0.00014531	354191	5572230	24	24	0.00014531	0		0	Neg
630-08-0	Carbon monoxide	0.11092193	AERMOD-m	2.933482	354059	5571849	1	0.5	3.561818838	6000	Health	Schedule 3	0.1%
1746-01-6	2,3,7,8-tetrachlorodibenzo-para-dioxin	8.6889E-11	AERMOD-m	1.24174E-09	354191	5572230	24	24	1.24174E-09	0.000005	Assessment Va	Schedule 3	0.0%
1746-01-6	2,3,7,8-tetrachlorodibenzo-para-dioxin	8.6889E-11	AERMOD-m	1.05205E-10	354219	5572309	8760	8760	1.05205E-10	1E-07	Health	Schedule 3	0.1%
2050-67-1	Dichlorobiphenyl	1.368E-10	AERMOD-m	1.95508E-09	354191	5572230	24	24	1.95508E-09	0		0	Neg
2051-24-3	Decachlorobiphenyl	4.9915E-11	AERMOD-m	7.13341E-10	354191	5572230	24	24	7.13341E-10	0		0	Neg
2974-90-5	Dichlorobiphenyl	1.368E-10	AERMOD-m	1.95508E-09	354191	5572230	24	24	1.95508E-09	0		0	Neg
3268-87-9	Octachlorodibenzo-p-dioxin	1.2201E-08	AERMOD-m	1.74372E-07	354191	5572230	24	24	1.74372E-07	0		0	Neg
7439-89-6	Iron	0.00018302	AERMOD-m	0.00261558	354191	5572230	24	24	0.00261558	0		0	Neg
7439-92-1	Lead	8.8738E-06	AERMOD-m	0.000126816	354191	5572230	24	24	0.000126816	0.5	Health	Schedule 3	0.0%
7439-92-1	Lead	8.8738E-06	AERMOD-m	2.08806E-05	354199	5572289	720	720	2.08806E-05	0.2	Health	Schedule 3	0.0%
7439-96-5	Manganese	0.00029579	AERMOD-m	0.0042272	354191	5572230	24	24	0.0042272	0.4	Health	Schedule 3	1.1%
7439-97-6	Mercury	6.4704E-07	AERMOD-m	9.24701E-06	354191	5572230	24	24	9.24701E-06	0.5	Health	Schedule 3	0.0%
7439-98-7	Molybdenum	3.8823E-07	AERMOD-m	5.54821E-06	354191	5572230	24	24	5.54821E-06	120	Particulate	Guideline	0.0%
7440-02-0	Nickel	6.1007E-06	AERMOD-m	8.71861E-05	354191	5572230	24	24	8.71861E-05	2	Assessment Va	Schedule 3	0.0%
7440-02-0	Nickel	6.1007E-06	AERMOD-m	7.38677E-06	354219	5572309	8760	8760	7.38677E-06	0.04	Health	Schedule 3	0.0%
7440-09-7	Potassium	0.00720993	AERMOD-m	0.103038	354191	5572230	24	24	0.103038	8	JSL	JSL	1.3%
7440-22-4	Silver	0.00031428	AERMOD-m	0.0044914	354191	5572230	24	24	0.0044914	1	Health	Schedule 3	0.4%
7440-23-5	Sodium	6.6553E-05	AERMOD-m	0.000951121	354191	5572230	24	24	0.000951121	0		0	Neg
7440-24-6	Strontium	1.8487E-06	AERMOD-m	0.00002642	354191	5572230	24	24	0.00002642	120	Particulate	Guideline	0.0%
7440-31-5	Tin	4.252E-06	AERMOD-m	6.07661E-05	354191	5572230	24	24	6.07661E-05	10	Health	Schedule 3	0.0%
7440-32-6	Titanium	3.6974E-06	AERMOD-m	5.28401E-05	354191	5572230	24	24	5.28401E-05	120	Particulate	Schedule 3	0.0%
7440-36-0	Antimony	1.4605E-06	AERMOD-m	2.08718E-05	354191	5572230	24	24	2.08718E-05	25	Health	Schedule 3	0.0%
7440-38-2	Arsenic	4.0671E-06	AERMOD-m	5.81241E-05	354191	5572230	24	24	5.81241E-05	0.3	Health	Guideline	0.0%
7440-39-3	Barium - total water soluble	3.1428E-05	AERMOD-m	0.00044914	354191	5572230	24	24	0.00044914	10	Health	Guideline	0.0%
7440-41-7	Beryllium (And its compounds)	2.0336E-07	AERMOD-m	2.9062E-06	354191	5572230	24	24	2.9062E-06	0.01	Health	Schedule 3	0.0%
7440-43-9	Cadmium	7.5797E-07	AERMOD-m	1.08322E-05	354191	5572230	24	24	1.08322E-05	0.025	Health	Schedule 3	0.0%
7440-47-3	Chromium (metallic, II, III)	3.8823E-06	AERMOD-m	5.54821E-05	354191	5572230	24	24	5.54821E-05	0.5	Health	Schedule 3	0.0%
7440-48-4	Cobalt	1.2017E-06	AERMOD-m	0.000017173	354191	5572230	24	24	0.000017173	0.1	Health	Guideline	0.0%
7440-50-8	Copper	9.0586E-06	AERMOD-m	0.000129458	354191	5572230	24	24	0.000129458	50	Health	Schedule 3	0.0%
7440-62-2	Vanadium	1.8117E-07	AERMOD-m	2.58916E-06	354191	5572230	24	24	2.58916E-06	2	Health	Schedule 3	0.0%
7440-65-5	Yttrium	5.5461E-08	AERMOD-m	7.92601E-07	354191	5572230	24	24	7.92601E-07	2.4	JSL	JSL	0.0%
7440-66-6	Zinc	7.7645E-05	AERMOD-m	0.00110964	354191	5572230	24	24	0.00110964	120	Particulate	Schedule 3	0.0%

Table E4:  
Emissions Summary Table  
(Rev2)

CAS#	Contaminant	Total Emission Rate (g/s)	Dispersion Model Used	Max POI Value (µg/m³)	Location of		Averaging Period Modelled (h)	Averaging Period of Criterion (h)	Max POI Value Converted to Criterion Period (µg/m³)	Criteria (µg/m³)	Limiting Effect	Regulation Schedule #	Percentage of Criteria or Likelihood of adverse effect (%)
					X (m)	Y (m)							
7647-01-0	Hydrochloric acid	0.00351253	AERMOD-m	0.050198	354191	5572230	24	24	0.050198	20	Health	Schedule 3	0.3%
7723-14-0	Phosphorus, white	4.9915E-06	AERMOD-m	7.13341E-05	354191	5572230	24	24	7.13341E-05	0.35	JSL	JSL	0.0%
7782-49-2	Selenium	5.1764E-07	AERMOD-m	7.39761E-06	354191	5572230	24	24	7.39761E-06	10	Health	Guideline	0.0%
7782-50-5	Chlorine	0.00014605	AERMOD-m	0.00208718	354191	5572230	24	24	0.00208718	10	Health	Schedule 3	0.0%
10024-97-2	Nitrous Oxide	0.00240331	AERMOD-m	0.034346	354191	5572230	24	24	0.034346	9000	Health	Guideline	0.0%
10102-44-0	Nitrogen oxides	0.04532144	AERMOD-m	1.07637	354059	5571849	1	1	1.07637	400	Health	Schedule 3	0.3%
10102-44-0	Nitrogen oxides	0.04532144	AERMOD-m	0.58165	354191	5572230	24	24	0.58165	200	Health	Schedule 3	0.3%
10102-44-0	Nitrogen oxides (emergency generator)	0.47397001	AERMOD-m	974.74658	354173	5572112	1	0.5	1183.532311	1880	Health	NA	63.0%
13029-08-8	Dichlorobiphenyl	1.368E-10	AERMOD-m	1.95508E-09	354191	5572230	24	24	1.95508E-09	0		0	Neg
15862-07-4	Trichlorobiphenyl	4.8066E-10	AERMOD-m	6.86921E-09	354191	5572230	24	24	6.86921E-09	0		0	Neg
15968-05-5	Tetrachlorobiphenyl	4.6217E-10	AERMOD-m	6.60501E-09	354191	5572230	24	24	6.60501E-09	0		0	Neg
18259-05-7	Pentachlorobiphenyl	2.2184E-10	AERMOD-m	3.1704E-09	354191	5572230	24	24	3.1704E-09	0		0	Neg
18540-29-9	Chromium compounds - Hexavalent	6.4704E-07	AERMOD-m	9.24701E-06	354191	5572230	24	24	9.24701E-06	0.07	Assessment Va	Schedule 3	0.0%
18540-29-9	Chromium compounds - Hexavalent	6.4704E-07	AERMOD-m	7.83445E-07	354219	5572309	8760	8760	7.83445E-07	0.00014	Health	Schedule 3	0.6%
26601-64-9	Hexachlorobiphenyl	1.0168E-10	AERMOD-m	1.4531E-09	354191	5572230	24	24	1.4531E-09	0		0	Neg
27323-18-8	Monochlorobiphenyl	4.0671E-11	AERMOD-m	5.81241E-10	354191	5572230	24	24	5.81241E-10	0		0	Neg
32598-13-3	Tetrachlorobiphenyl	4.6217E-10	AERMOD-m	6.60501E-09	354191	5572230	24	24	6.60501E-09	0		0	Neg
32690-93-0	Tetrachlorobiphenyl	4.6217E-10	AERMOD-m	6.60501E-09	354191	5572230	24	24	6.60501E-09	0		0	Neg
33146-45-1	Dichlorobiphenyl	1.368E-10	AERMOD-m	1.95508E-09	354191	5572230	24	24	1.95508E-09	0		0	Neg
35065-29-3	Heptachlorobiphenyl	1.2201E-11	AERMOD-m	1.74372E-10	354191	5572230	24	24	1.74372E-10	0		0	Neg
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	3.6974E-10	AERMOD-m	5.28401E-09	354191	5572230	24	24	5.28401E-09	0		0	Neg
37680-69-6	Trichlorobiphenyl	4.8066E-10	AERMOD-m	6.86921E-09	354191	5572230	24	24	6.86921E-09	0		0	Neg
37680-73-2	Pentachlorobiphenyl	2.2184E-10	AERMOD-m	3.1704E-09	354191	5572230	24	24	3.1704E-09	0		0	Neg
38444-73-4	Trichlorobiphenyl	4.8066E-10	AERMOD-m	6.86921E-09	354191	5572230	24	24	6.86921E-09	0		0	Neg
39001-02-0	Octachlorodibenzofuran	1.6269E-11	AERMOD-m	2.32496E-10	354191	5572230	24	24	2.32496E-10	0		0	Neg
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	2.9579E-07	AERMOD-m	4.2272E-06	354191	5572230	24	24	4.2272E-06	0		0	Neg
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	2.773E-10	AERMOD-m	3.963E-09	354191	5572230	24	24	3.963E-09	0		0	Neg
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran (TEQ)	1.3865E-10	AERMOD-m	1.9815E-09	354191	5572230	24	24	1.9815E-09	0		0	Neg
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.4369E-11	AERMOD-m	6.34081E-10	354191	5572230	24	24	6.34081E-10	0		0	Neg
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	5.1764E-11	AERMOD-m	7.39761E-10	354191	5572230	24	24	7.39761E-10	0		0	Neg
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	5.1764E-11	AERMOD-m	7.39761E-10	354191	5572230	24	24	7.39761E-10	0		0	Neg
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.9579E-07	AERMOD-m	4.2272E-06	354191	5572230	24	24	4.2272E-06	0		0	Neg
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	5.1764E-11	AERMOD-m	7.39761E-10	354191	5572230	24	24	7.39761E-10	0		0	Neg
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	5.1764E-11	AERMOD-m	7.39761E-10	354191	5572230	24	24	7.39761E-10	0		0	Neg
PM	Total particulate matter	2.31278379	AERMOD-PM	60.16636	354183.8	5572223	24	24	60.16636	120	Particulate	Schedule 3	50.1%

## 1.0 Introduction and Site Description

This Emission Summary and Dispersion Modelling (“ESDM”) report was prepared in accordance with s.26 of Ontario Regulation 419/05 (“O.Reg. 419”). In addition, guidance in the ministry publication “Procedure for Preparing an Emission Summary and Dispersion Modelling Report” dated March 2009 (“ESDM Procedure Document”) PIBS 3614e03 was followed, as appropriate.

For ease of review and to promote clarity, this ESDM report is structured to correspond to each of the items listed in the ESDM Report Checklist.

This section provides a description of the Site as required by sub-paragraph 1 of s.26 (1) of O.Reg. 419.

### 1.1 Purpose and Scope of the ESDM Report

This ESDM report was prepared in support of an application for Renewable Energy Approval and Environmental Compliance Approval, which will collectively constitute approval for all air emissions at the Site. The ESDM was prepared in accordance with s.26 of O.Reg. 419.

Sagatay Cogeneration LP, with its General Partner, Sagatay Cogeneration Ltd., and Whitesand First Nation (Whitesand) as agent, will operate a biomass fuelled electrical power and heat 3.6 MW cogeneration plant and a solid wood fuel pellet plant located in an unorganized territory of the Thunder Bay District near Whitesand First Nation and Armstrong, Ontario. The unorganized territory is administered by the Armstrong Local Service Board and is located on the traditional territory of Whitesand First Nation.

The Site is located in an area previously used as an industrial site.

The location of the Site is presented in **Figure E1**. The location of the discharges from each of the sources is presented in **Figure E2**. The location of each source is labelled with the Source ID.

### 1.2 Description of Processes and NAICS Code

Whitesand will produce electricity and residential and/or industrial grade wood fuel pellets at this Site. The main processes will be electrical power generation and solid wood fuel pellet production. Many of the activities are performed continuously at the Site but some may be intermittent. Some intermittent activities will occur during the day time shift only.



The North American Industry Classification System (NAICS) code that applies to the Site is 32199 – All Other Wood Product Manufacturing. Other NAICS codes that apply to the Site are 221119 – Other Electrical Power Generation and 221122 – Electrical Power Distribution. None of the NAICS codes are listed in Schedule 4 or Schedule 5.

### **1.3 Description of Products and Raw Materials**

Whitesand will manufacture electricity and residential and/or industrial grade wood fuel pellets at this Site.

#### ***Biomass Handling***

The received chipped biomass will be conveyed to the single outside circular arc chip storage pile via a rotating radial belt stacker. The storage pile could be bypassed and the biomass directed to the biomass storage fuel bin at the boiler/turbine plant. The stored chips will be reclaimed by a mobile front end loader into a reclaim metering bin conveyor. The chips will be forwarded on to the pelleting biomass feedstock belt dryer.

The hogged biomass delivered as boiler fuel will go through the biomass hog and screen, which will be located next to the boiler fuel biomass pile in an enclosed building.

#### ***Boiler/Turbine Plant***

The biomass boiler system will start at the enclosed biomass fuel storage bin. It will continue through the heat source furnace, steam boiler system to the hot exhaust flue gas baghouse treatment system. The heat source will also be equipped with a steam boiler system complete with a boiler water supply treatment system and a condensate return system. The boiler will supply the required steam demand to the extraction condensing steam turbine. The remaining steam will exit the steam turbine to the steam surface condenser/hydronic heating glycol heat exchanger and the outside installed evaporative cooling tower. The plant will deliver heat for the pellet plant biomass feedstock drying and site building winter heating utilizing a glycol heating system.

The biomass power plant will be located inside its own heated building.

The standby diesel generator will be located beside the building to enable a controlled shut-down of the steam turbine system and continued operation of the biomass heat source/steam boiler. The emergency pellet boiler site heating system will be located inside the boiler/turbine building as well.

### **Wood Pellet Plant**

The pelleting feedstock reclaimed from the biomass storage pile will be fed onto the dryer feed conveyor. The biomass feedstock belt dryer will use steam from the nearby power plant to heat its required process drying air. The dryer feed conveyor will discharge to the biomass dryer steam heated screen infeed box. The dried biomass feedstock will be conveyed to the outdoor biomass storage silo. The dried biomass will be discharged and fed to the fine hammer mill system equipped with the cyclone/baghouse system. The discharge biomass stream will be conveyed by a bucket elevator up to the pre-conditioner with optional steam and or water conditioning. The conditioned biomass will be dropped into the ripening bin for 30 minutes of retention. The ripening bin will discharge into two conditioners followed by the two pellet mills. The parallel lines of two pellet mills will discharge by chutes down to the counter-flow pellet cooler and the screener. The screen fines will be conveyed by an air system back to the cyclone/baghouse system located outside the pellet building near the hammer mills. The screened pellets will be collected and conveyed by a bucket elevator up for transfer to the outside located pellet storage bin or could be directly diverted passed the bin on to the pellet packaging system. The finished sealed pellet stacks will be accumulated on a roller conveyor in the building for later or immediate loading by a fork truck for shipping in a truck trailer outside.

The pellet plant will produce 8 tonnes per hour or 60,000 tonnes per year of residential and/or industrial grade fuel pellets which will be bagged for shipping from site.

Product usages and process information are provided in greater detail in **Appendix A**. Refer to **Table E1**, which tabulates the individual sources of emissions at the Site.

### **1.4 Process Flow Diagram**

**Figures 121-12538-01-8010 and 121-12538-01-8011** show the processes that have emissions that exhaust from the Site. Other processes are not described in detail because the emissions, if any, do not exhaust from the Site.

### **1.5 Operating Schedule**

The Site will operate 24 hours a day, seven days a week, all year. Shipping and receiving will occur for 12 hours a day (7 a.m. to 7 p.m.), five days a week, all year. The modelling assumes that the Site and woodyard operates 24 and 12 hours a day respectively, seven days a week, all year.

## 1.6 EBR Posting Text

This report is in support of an application for Renewable Energy Approval and Environmental Compliance Approval for all air emissions from Sagatay Cogeneration LP's Site located near Armstrong, Ontario. Whitesand will produce electricity and residential and/or industrial grade wood fuel pellets at this Site.

The application includes all sources at the Site including:

- one 3.6 MW biomass fuelled boiler system;
- one 7 MMBtu/h emergency pellet boiler;
- one 500 kW standby diesel generator;
- one 150 HP emergency fire pump diesel engine;
- one dust baghouse;
- one pellet cooler cyclone;
- one fine hammermill baghouse;
- one biomass boiler baghouse;
- one pellet mill laboratory;
- one pellet storage silo;
- one dry chip storage silo;
- one indirect heat biomass belt dryer;
- one 2-cell induced draft evaporative cooling tower;
- one biomass hog and screen;
- two truck dumpers;
- two biomass piles;
- three wastewater vents; and,
- unpaved on-site roads.

Emitted contaminants include products of combustion and particulate matter ("PM").

## 2.0 Initial Identification of Sources and Contaminants

This section provides an initial identification of all of the sources and the contaminants emitted from the Site as required by sub-paragraph 2 to 4 of s.26 (1) of O.Reg. 419.

There may be general ventilation from the Site that only discharges uncontaminated air from the workspaces or air from the workspace that may include contaminants that come from commercial office supplies, building maintenance products or supplies and activities; these types of ventilation are considered negligible and may not have been identified as sources at the Site.

It should be noted that general ventilation located in the process area that does not vent process emissions is also considered to be negligible.

### 2.1 Sources and Contaminants Identification Table

**Table E1** tabulates all the emission sources at the Site, for example, EA-01 – Biomass boiler is identified as a source. **Table E1** provides the information required by sub-paragraphs 2 to 4 of s.26 (1) of O.Reg. 419.

The expected contaminants emitted from each source are also identified in **Table E1**; for example, the expected contaminants emitted from EA-01 – Biomass boiler are identified as combustion products. Each of the identified sources has been assigned a Source ID, for example Biomass boiler source has been identified as #8.

The location of each discharge point is presented in **Figure E2**. The discharge point is labelled with its Source ID.



### 3.0 Assessment of the Significance of Contaminants and Sources

This section provides an explanation for each source and contaminant identified in **Table E1**, as required by sub-paragraph 5 of s.26 (1) of O.Reg. 419.

In accordance with s.8 of O.Reg. 419, emission rate calculations, and dispersion modelling does not have to be performed for emissions from negligible sources or for the emission of negligible contaminants from significant sources.

#### 3.1 Identification of Negligible Contaminants and Sources

Of the processes listed on **Table E1**, some of the processes have been identified as negligible. Each negligible process is identified in the table, for example, EA15 – Truck dumper (60\_1) has been labelled as negligible. The remaining processes are considered significant. For example, EA-01 - Biomass boiler (8) is considered a significant process. These significant processes are included in the dispersion modelling for the Site.

Of the sources listed on **Table E1**, several emission points have been identified as negligible. Each negligible emission point is identified in the table, for example, Pellet plant lab exhaust (37) has been labelled as negligible. The remaining exhaust points are considered significant. For example, Biomass boiler (8) is considered a significant source. These sources will be included in the dispersion modelling for the Site. The emissions from many exhaust points are covered under the processes listed above. If this is the case, then the “Rate/Rational” column will indicate the process that exhausts through this point.

Of the contaminants listed on **Table E1**, several of the contaminants have been identified as negligible. Each negligible contaminant is identified in the table, for example, p-Tolualdehyde (104-87-0) has been labelled as negligible. The remaining contaminants are not listed in Table E1 but are shown on Table E4.

#### 3.2 Rationale for Assessment

For each Process in **Table E1** that has been identified as being negligible there is an accompanying documented rationale. For example the rationale for EA15 – Truck dumper (60\_1) is “Contained space; less than 5% of total property-wide emissions.” The technical information required to substantiate the argument that each of the identified sources is negligible is presented in **Appendix B**.

For each Source in **Table E1** that has been identified as being negligible there is an accompanying documented rationale. For example the rationale for Pellet plant lab

exhaust (37) is “Table B-3: Fume hoods for laboratories.” The technical information required to substantiate the argument that each of the identified sources is negligible is presented in **Appendix B**.

The only contaminants that are listed as negligible are identified on **Table E4** as “Neg” when their POI concentration is less than the negligible limit from Table B-2A of the ESDM Procedure Document.

## 4.0 Operating Conditions, Emissions Estimating and Data Quality Emissions

This section provides a description of the operating conditions used in the calculation of the emission estimates and an assessment of the data quality of the emission estimates for each significant contaminant from the Site as required by sub-paragraphs 6 and 7 of s.26 (1) of O.Reg. 419. In accordance with s.8 of O.Reg. 419, emission rate calculations and dispersion modelling does not have to be performed for emissions from negligible sources or for the emission of negligible contaminants from negligible sources.

### 4.1 Description of Operating Conditions

As noted in Section 1.2, the NAICS code that applies to this facility is 221119 Other Electrical Power Generation.

Therefore, s.20 of O.Reg. 419 currently applies to the Site and the modeled impact to POI criteria can be assessed using AERMOD. As a result, all of the POI criteria have been assessed against their Schedule 3, or other, criteria as appropriate.

s.10 of O.Reg. 419 states “A scenario that assumes operating conditions for the Facility that would result, for the relevant contaminant, in the highest concentration of the contaminant at a point of impingement that the Facility is capable of.” The operating condition described in this ESDM Report meets this requirement.

The averaging time for the operating condition is 24 hours. The operating condition used for this Site that results in the maximum concentration at a POI is the scenario where all significant sources are operating simultaneously at their individual maximum rates of production. The individual maximum rates of production for each significant source of emissions correspond to the maximum emission rate during any 24 hour period. The individual maximum rates of production for each significant source of emissions are explicitly described in **Appendix A**. Several contaminants (e.g., nitrogen oxides, benzo(a)pyrene) have been assessed on a one hour or an annual basis.

Backup equipment (diesel generator, pellet boiler, fire diesel pump engine) was modelled separately as they will not be running simultaneously with all other onsite sources.

The assessment of all operating conditions included transient, start-up, shut-down and continuous operation modes. Continuous operation is expected to provide the largest POI concentration estimate so that method is used as the basis of calculations in this application.

## 4.2 Explanation of the Method Used to Calculate Emission Rates

The maximum emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with requirements of the ESDM Procedure Document.

The emission rate for each significant contaminant emitted from a significant source was estimated and the methodology for the calculation is documented in **Table E2**. For example, the emission of Nitrogen Oxides was calculated using an emission factor (EF) technique. The information for **Table E2** can be found in either **Table E2-1** (sorted by Source ID) or **Table E2-2** (sorted by contaminant).

## 4.3 Sample Calculations

The technical rationale, including sample calculations, required to substantiate the emission rates presented in **Table E2** is documented in **Appendix A**.

## 4.4 Assessment of Data Quality

This section provides a description of the assessment of the data quality of the emission estimates for each significant contaminant from the Site, as required by sub-paragraph 7iii of s.26 (1) of O.Reg. 419.

The assessment of data quality of the emission rate estimates for each significant contaminant emitted from significant sources was performed in accordance with the requirements of sub-paragraph 7iii of s.26 (1) of O.Reg. 419. For example, the EF technique used to calculate the emissions from source #8 is based on the USEPA NO<sub>x</sub> emission factor published in AP-42. The data quality of that emission factor is "A" which is equivalent to the MOE data Quality of "Above-Average."

Therefore, the emission rate estimate is not likely to be an underestimate of the actual emission rate and use of these emission rates will result in a calculated concentration at a POI greater than the actual concentrations. This source was documented as having a Data Quality of "Above-Average", which is generally acceptable according to requirements of the ESDM Procedure Document.

For each contaminant, the emission rate was estimated and the data quality of the estimate is documented in **Table E2**. The assessment of data quality for each type of source listed in **Table E2** is documented in **Appendix A**.

## 5.0 Source Summary Table and Site Plan

This section provides the table required by sub-paragraph 8 and the site plan required by sub-paragraph 9 of S.26 (1) O.Reg. 419.

### 5.1 Source Summary Table

The emission rate estimates for each source of significant contaminants are documented in **Table E2** in accordance with the requirements of sub-paragraph 8 of s.26 (1) of O.Reg. 419.

For each source of significant contaminants the following parameters are referenced:

- contaminant name;
- Chemical Abstract Society ("CAS") reference number;
- source ID;
- source description;
- stack parameters (flow rate, exhaust temperature, diameter, height above grade, height above roof);
- location referenced to a Cartesian coordinate system presented on **Figure E2**;
- averaging period;
- emission estimating technique;
- estimation of data quality; and,
- percentage of overall emission.

### 5.2 Site Plan

The locations of the emission sources listed in **Table E2** are presented in **Figure E2**. The location of each of the sources is specified with the Source ID. The location of the property line is indicated on **Figure E2**, with the end points of each section of the property line clearly referenced to a Cartesian coordinate system.

The location of each source is referenced to this Cartesian coordinate system under a column in **Table E2**.

## 6.0 Dispersion Modelling

This section provides a description of how the dispersion modelling was conducted at the Site to calculate the maximum concentration at a POI, as required by sub-paragraphs 10 to 13 of s.26 of O.Reg. 419.

Dispersion modelling was completed in accordance with the MOE's "Air Dispersion Modelling Guideline for Ontario" PIBS 516502e ("The ADMGO"). A general description of the input data used in the dispersion model is provided below and summarized in **Table E3**.

The Site is subject to s.20 of O.Reg. 419/05. Therefore, the discharge of the Site has to meet the standards in Schedule 3 of O.Reg. 419/05 using one of the approved dispersion models listed in s.6 of O.Reg. 419/05. AERMOD has been used to demonstrate compliance.

Since the Schedule 3 standards of O.Reg. 419/05 apply, the modelled impact of contaminant emissions are assessed as 10-minute, one-hour, 24-hour, and annual maximum POI concentrations. The appropriate model to assess the maximum POI impact is the USEPA AERMOD model. The following dispersion model and pre-processors were used in the assessment:

- AERMOD dispersion model (v. AERMOD\_MPI\_Lakes\_11353);
- AERMAP surface pre-processor (v. AERMAP\_EPA\_11103); and,
- BPIP building downwash pre-processor (v. 0474).

The Meteorological Regional Data set as published by the MOE for the Northern Region (Int. Falls, Forest) was used. AERMET was not used as a result.

There is no child care facility, senior's residence, health care facility, long-term care facility, or educational facility located at the Site and no other tenant at the Site. As such, same structure contamination was not considered.

### 6.1 Meteorology and Land Use Data

The project is located on Crown Land on which a portion of it has been withdrawn under Section 35 of the Mining Act for prospecting, staking out, sale or lease rights, to develop a cogeneration processing facility. The land was previously used as an industrial site for a forestry operation under a Land Use Permit which was forfeited to the Crown. Whitesand First Nation currently holds a Land Use Permit for the Site. The Site is shown in **Figure E1**.

The MOE has created, and periodically updates, AERMOD-ready regional meteorological datasets for use with dispersion modelling using AERMOD. Depending upon the local land use of the Site, the dataset used can be urban, crops, or forest. As the Site is situated within the geographical coverage of MOE Thunder Bay District Office and based on the land-use characteristics around the site, the “Forest” dataset (last updated using version 06341 (INTFALFR.SFC and INTFALFR.PFL)) was used. The surface data is the Upper Air Data from the Int. Falls, MN. The meteorological data covers the dates from January 1, 1996 to December 31, 2000. The hourly data includes many factors which affect the dispersion of air contaminants including wind speed, wind direction, temperature, ceiling height, and atmospheric stability.

Sub-paragraph 10 of s.26 (1) of O.Reg. 419/05 requires a description of the local land use conditions if meteorological data described in paragraph 2 of s.13 (1) of O.Reg. 419/05 was used. In this assessment, MOE’s regional meteorological dataset described in paragraph 1 of s.13 (1) of O.Reg. 419/05 was used.

## 6.2 Coordinate System

The Universal Transverse Mercator (“UTM”) coordinate system, as per Section 5.2.2 of the ADGMO, was used to specify model object sources, buildings, and receptors. All coordinates were defined in the North American Datum of 1983 (“NAD83”).

All source, building, and property line coordinates are shown in **Figure EC-1** (see **Appendix C**).

## 6.3 Terrain

S.16 of O.Reg. 419/05 sets out when terrain must be considered. In this assessment, terrain elevation contour data was downloaded from Natural Resources Canada’s Canadian Digital Elevation Data (CDED) dataset and processed using the AERMOD terrain processor AERMAP. AERMAP determines base terrain elevation using the DEM data for all sources, receptors and buildings, and provides the user with a suitable input file for use with AERMOD. All the onsite sources and buildings were assigned an elevation of 366 m as the site will be leveled off in the areas of the buildings during the construction phase.

## 6.4 Dispersion Modelling Input Summary Table

A description of the way in which the approved dispersion model was performed is included in **Table E3**. This table meets both the requirements of s.26 (1) 11 and Sections 8-17 of O.Reg. 419/05 and follows the format provided in the ESDM Procedure Document.



The Site was modelled as multiple points, with the release height based on the building heights and the location of stacks on those buildings. Roads were modelled as line volume sources. A summary of the AERMOD source input parameters is provided in **Table E2-1** and **E2-2**. The location of all emission points are shown in **Figure E2**. The location of the property-line in relation to the dispersion modelling sources is also presented in **Figure E2**, as well as **Figure EC-1** (see **Appendix C**).

The emission rates used in the dispersion model meet the requirements of s.11 (1) 1 of O.Reg. 419/05, which requires that the emission rate used in the dispersion model is at least as high as the maximum emission rate that the source of contaminant is reasonably capable of for the relevant contaminant. These emission rates are further described in **Appendix A**. A summary of the modelled emission rates for each point source is provided in **Tables E2-1** and **E2-2**.

## 6.5 Building Downwash

The Site buildings were entered into the model using the USEPA Building Profile Input Program (BPIP), and run to evaluate any building cavity downwashing that may be occurring. Cavity downwash can result in air contaminants being forced to ground level prematurely under certain meteorological conditions. The roof height of on-site buildings was modelled using the height of each individual building.

## 6.6 Deposition

AERMOD has the capability to account for wet and dry deposition of substances that would reduce airborne concentrations. The deposition algorithm in the AERMOD model was not used for this assessment and therefore the predicted modelled POI concentrations are considered to be conservative.

## 6.7 Averaging Time and Conversions

The shortest time scale that AERMOD predicts is a 1-hour average value. Schedule 3 standards of O.Reg. 419/05 are being applied to this Site. Many of these standards are based on one hour and 24 hour averaging times, which are averaging times that are easily provided by AERMOD. In cases where a standard has an averaging period of less than one hour (e.g., ten minutes/hours), a conversion to the appropriate averaging period was completed using the MOE recommended conversion factors, as documented in the ADMGO.

## 6.8 Area of Modelling Coverage

Receptors were chosen based on recommendations provided in Section 7.1 of the ADGMO, which is in accordance with s.14 of O.Reg. 419/05. Specifically, a nested receptor grid, centred on the centre of the bounding box that encompasses all the sources at the Site, was placed as follows:

- 20 m spacing within 200 m of the edge of the bounding box;
- 50 m spacing from 200 m to 500 m;
- 100 m spacing from 500 to 1,000 m;
- 200 m spacing from 1,000 to 2,000 m; and,
- 500 m spacing from 2,000 m to 5,000 m.

In addition to using the nested grid, receptors were placed every 10 m along the property boundary. No receptors were placed inside the Site's property line.

## 6.9 Dispersion Modelling Input and Output Files

The information entered into the approved dispersion model is recorded in **Appendix C**. AERMOD dispersion model data of all the contaminants is provided in electronic form on the CD in **Appendix C**. As an illustration, a copy of the contour plot and the model output file for the contaminant PM is also contained in **Appendix C**.

## 7.0 Emissions Summary Table and Conclusions

This section provides the table required by sub-paragraph 14 of s.26 of O.Reg. 419 and provides the interpretation of the results as required by the ESDM Procedure Document.

### 7.1 Emissions Summary Table

A POI concentration for each significant contaminant emitted from the Site was calculated based on the emission rates listed in **Table E2** and the output from the approved dispersion model presented in **Appendix C**. The results are presented in **Table E4**. This table follows the format provided in the ESDM Procedure Document. For each source of significant contaminants the following parameters are referenced:

- contaminant name;
- Chemical Abstract Society (“CAS”) reference number;
- total Site emission rate;
- approved dispersion model used;
- max POI concentration;
- averaging period for the dispersion modelling;
- MOE POI limit;
- indication of the limiting effect;
- schedule in O.Reg. 419/05; and,
- the percentage of standard or indication of the likelihood of an adverse effect.

The POI concentrations listed in **Table E4** are the highest concentrations calculated by the model with meteorological anomalies removed from consideration. The POI concentrations listed in the Emissions Summary Table were compared against the “SUMMARY of STANDARDS and GUIDELINES to support Ontario Regulation 419: Air Pollution – Local Air Quality (including Schedule 6 of O.Reg. 419 on UPPER RISK THRESHOLDS)” dated April 2012, PIBS: 6569e01 and “Jurisdictional Screening *Level (JSL) List, A Screening Tool for Ontario Regulation 419: Air Pollution – Local Air Quality*”, PIBS: 6547e (“List of MOE POI Limits”).

Of the contaminants listed in **Table E4** that have limits in the List of Ministry POI Limits, all the predicted POI concentrations are below the corresponding limits. For example, the 24-hour POI concentration for particulate matter is 60.17 µg/m<sup>3</sup> at 50.1% of the guideline of 120 µg/m<sup>3</sup>.

## 7.2 Assessment of Contaminants with no MOE POI Limits

Sub-paragraph 14 subsection viii of s.26 (1) O.Reg. 419 requires an indication of the likelihood, nature, and location of any adverse effect if the contaminant is not listed in any of Schedules 1, 2, and 3 (or the List of Ministry POI Limits).

The contaminants listed in **Table E4** that do not have corresponding criteria limits in the List of MOE POI Limits are considered to be "*Contaminants with No Ministry POI Limits.*" All "*Contaminants with No Ministry POI Limits*" were deemed as negligible for the purpose of this report using an Emission Threshold. No further assessment has been completed for these contaminants.

## 7.3 Conclusions

This ESDM Report was prepared in accordance with s.26 of O.Reg. 419. In addition, guidance in the ESDM Procedure Document was followed as appropriate.

The Site is subject to s.20 of O.Reg. 419/05. Therefore, the discharge of the Site has to meet the standards in Schedule 3 of O.Reg. 419/05 using one of the approved dispersion models listed in s.6 of O.Reg. 419/05. AERMOD has been used to demonstrate compliance.

The emission rate estimates for each source of significant contaminants are documented in **Table E2**. All the emission rates listed in **Table E2** correspond to the operating scenario where all sources are operating simultaneously at their individual maximum rates of production. Therefore these emission rate estimates listed in **Table E2**, are not likely to be an underestimate of the actual emission rates.

Backup equipment was modelled separately as they will not be running simultaneously with all other onsite sources.

A POI concentration for each contaminant emitted from the Site was calculated based on the calculated emission rates and the output from the model; the results are presented in **Table E4**.

The POI concentrations listed in **Table E4** were compared against criteria listed in the publication "*Summary of O.Reg. 419 Standards, Points of Impingement Guidelines and Ambient Air Quality Criteria (AAQC)*" dated February 2008 and "*Jurisdictional Screening Level (JSL) List, A Screening Tool for Ontario Regulation 419: Air Pollution – Local Air Quality*", 6547e.pdf (List of Ministry POI Limits).

Of the contaminants listed in **Table E4** that have limits in the List of Ministry POI Limits, all the predicted POI concentrations are below the corresponding limits. For example, the 24-hour POI concentration for particulate matter is 60.17 µg/m<sup>3</sup> at 50.1% of the guideline of 120 µg/m<sup>3</sup>.

This ESDM Report demonstrates that the Site can operate in compliance with O.Reg. 419/05.

#### **7.4 Limitations and Use of Report**

Neegan Burnside Ltd. (Neegan Burnside) has completed this report in accordance with generally accepted standards and practices. The conclusions and recommendations in this report are professional opinions based upon our understanding of anticipated Site conditions at the time of this assessment. To the best of our knowledge, the information contained in our report is accurate however Neegan Burnside does not guarantee the accuracy and reliability of the information provided by other persons or agencies. Neegan Burnside is not responsible for environmental concerns that are not visible or otherwise disclosed to us.

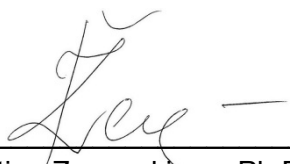
This report was prepared for the exclusive use of Whitesand First Nation and the Ministry of the Environment and Climate Change. Any use or reliance on or decisions based on this report by a third party, are the responsibility of such third parties. Neegan Burnside accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

Respectfully submitted,

**Neegan Burnside Ltd.**

**Written by:**

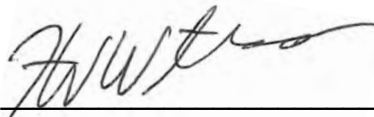
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Kristina Zeromskiene, Ph.D.  
Air Emissions and Noise Scientist  
Neegan Burnside Ltd.

Date October, 2014

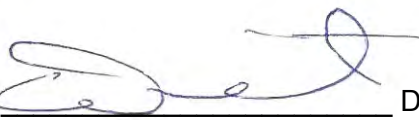
Emission Summary and Dispersion Modelling Report  
October 2014

**Reviewed by:**

Signature  Date October, 2014  
Harvey Watson, P.Eng.  
Technical Group Leader, Air and Noise  
Neegan Burnside Ltd.

Signature  Date October, 2014  
Chris Shilton, P.Eng., LEED®AP  
Project Manager  
Neegan Burnside Ltd.

**Approved By:**

Signature  Date October, 2014  
Craig Toset  
Project Manager  
Whitesand First Nation

# Tables





Table E1:  
Sources and Contaminants Identification Table  
(Rev2)

Source Information			Expected Contaminants	Significant		Costing Assignment			
Process ID	Unit Name	Stack IDs	Contaminants	Yes or No?	Rate / Rationale	Contaminant Cost Code	Contaminant Cost Group	Noise Cost Code	Noise Cost Group
EA-01	Biomass boiler (8)	8	PM, Nox, VOC, trace elements	Yes	3.605 E01 g/s	12	a		
EA-02	Pellet boiler (24)	24	PM, Nox, VOC, trace elements	No	standby	12	a		
EA-03	Stand by diesel generator (30)	30	NOx, PM	No	standby	1	a		
EA-04	Fire pump diesel engine (31)	31	NOx, PM	No	standby	1	a		
EA-05	Baghouse - Dust collection (38)	38	PM	Yes	1.172 E-02 g/s	5	a		
EA-06	Baghouse - Cooler (39)	39	PM	Yes	1.172 E-02 g/s	5	a		
EA-07	Baghouse - Hammer mill (40)	40	PM	Yes	2.495 E-02 g/s	5	a		
EA-08	Biomass hog and screen (70)	70	PM	Yes	9.438 E-02 g/s	12	b		
EA-09	Dry biomass storage silo (57)	57	PM	Yes	1.080 E-03 g/s	11	a		
EA-10	Biomass dryer (58)	58_1, 58_2, 58_3, 58_4	PM, VOC, formaldehyde	Yes	8.667 E-01 g/s	12	c		
EA-11	Aspen/Birch storage pile (61)	61	PM	Yes	6.410 E-02 g/s	11	b		
EA-13	Biomass fuel storage pile (63)	63	PM	Yes	3.122 E-02 g/s	11	b		
EA-14	Road dust	100_1, 100_2, 100_3, 100_4, 100_5, 100_6, 100_7, 100_8, 100_9	PM	Yes	4.075 E-02 g/s	11	c		
EA-15	Sewage vents	101, 102, 103	Ammonia	No	Below emission threshold limit	None			

Source ID	Source Description	General Location	Contaminants	Yes or No?	Rate / Rationale	Contaminant Cost Code	Contaminant Cost Group	Noise Cost Code	Noise Cost Group
1	Boiler Blow Down	Boiler/turbine plant		No	No Contaminants				
2	RO system Blow Down	Boiler/turbine plant		No	No Contaminants				
3	Filter Back Wash	Boiler/turbine plant		No	No Process				
4	Soft Regen	Boiler/turbine plant		No	No Process				
5	Washup and Floor Drains	Boiler/turbine plant		No	No Process				
6	Ash transfer shed washup	Boiler/turbine plant		No	No Process				
7	Boiler Building Washrooms/showers	Boiler/turbine plant		No	No Process				
8	Boiler Flue Gas Stack	Boiler/turbine plant yard	Combustion, Nox, Nox, NOx, NOx	Yes	14,672,213 Btu/h				
9	Boiler Blow Down Vent	Boiler/turbine plant		No	No Contaminants				
10	Gland Steam Vent	Boiler/turbine plant		No	No Contaminants				
11	Boiler De-Aerator Vent	Boiler/turbine plant		No	No Process				
12	Boiler SRV Silencer Outlet 1	Boiler/turbine plant		No	No Contaminants				
13	Boiler SRV Silencer Outlet 2	Boiler/turbine plant		No	No Contaminants				
14	22 psi SRV Silencer Outlet	Boiler/turbine plant		No	No Contaminants				
15	Preheater 1 SRV 1	Boiler/turbine plant		No	No Contaminants				
18	Turbine Surface Condenser Hogging Air Ejector Vent	Boiler/turbine plant		No	No Contaminants				

Table E1:  
Sources and Contaminants Identification Table  
(Rev2)

19	Superheater SRV 1	Boiler/turbine plant		No	No Contaminants				
20	Superheater SRV 2	Boiler/turbine plant		No	No Contaminants				
21	Turbine Outlet SRV 1	Boiler/turbine plant		No	No Contaminants				
22	Turbine Outlet SRV 2	Boiler/turbine plant		No	No Contaminants				
23	Soot Blower	Boiler/turbine plant		No	No Contaminants				
24	Pellet Boiler Flue Gas Outlet	Boiler/turbine plant	Combustion, formaldehyde, Nox,	No	7,000,000 Btu/h				
25	Turbine Lube System Vent	Boiler/turbine plant		No	No Process				
26	Turbine Surface Condenser Air Ejector Vent	Boiler/turbine plant		No	B3: VP < 1kPa				
27	Boiler Bathroom Exhaust Fan Outlet	Boiler/turbine plant		No	No Contaminants				
28	Boiler/Turbine Plant Noise	Boiler/turbine plant		No	No Process				
29	Bag House	Boiler/turbine plant		No	Exhaust through Boiler Flue Gas Stack (8)				
30	Stand by Generator (500kW)	Boiler/turbine plant	Combustion, formaldehyde, Nox,	No	1,706,000 Btu/h				
31	Fire Pump Diesel Engine (150hp)	Fire pump building	Combustion, formaldehyde, Nox,	No	376,440 Btu/h				
34	Pellet Plant Washup and Floor Drains	Wood pellet plant		No	No Process				
35	Pellet Plant Washroom, Showers and Locker room	Wood pellet plant		No	No Process				
36	Office HVAC	Wood pellet plant		No	No Contaminants				
37	Pellet Mill Lab Exhaust Fan	Wood pellet plant		No	B3: QA/QC Fume Hood				
38	Pellet Plant – Dust Pick-ups and Screen Fines - Bag House	Wood pellet plant	PM	Yes	See EA-05				
39	Pellet Plant – Pellet Cooler - Cyclone Vent	Wood pellet plant	PM	Yes	See EA-06				
40	Pellet Plant – Fine Hammer Mill - Bag House Vent	Wood pellet plant	PM	Yes	See EA-07				
41	Pellet Plant – Ripening Bin – Vent	Wood pellet plant		No	Contains biomass conditioned with steam or water, no dry material				
42	Pellet Plant – Building Noise	Wood pellet plant		No	No Process				
43	Mechanical Shop Exhaust Fan	Wood pellet plant		No	No Contaminants				
44	Electrical Shop Exhaust Fan	Wood pellet plant		No	No Contaminants				
45	Control Room Exhaust Fan	Wood pellet plant		No	No Contaminants				
49	Garage Washup and Floor Drains	Wood pellet plant		No	No Process				
50	Garage Bathroom	Wood pellet plant		No	No Process				
52	Garage Vehicle Exhaust System	Wood pellet plant		No	Vehicle				
53	Pellet Storage Silo Vent	Wood pellet plant		No	Finished product, larger than 6mm				
56	Biomass Boiler Ash	Boiler/turbine plant		No	No emissions, will be stored in a bunker or bin				
57	Dry Chip Storage Silo Vent	Wood pellet plant	PM	Yes	See EA-09				
60_1	Truck Dumper #1	Yard		No	Less than 5% overall emissions, contained space				
60_2	Truck Dumper #2	Yard		No	Less than 5% overall emissions, contained space				
61	Biomass Pile- Aspen/Birch	Yard	PM	Yes	See EA-11				
63	Biomass Pile-Fuel	Yard	PM	Yes	See EA-13				
65	Mobile Equipment - Forklift - Pellet Shipping Forklift	Yard		No	Mobile Equipment				
67	Mobile Equipment – Front End Loader – Biomass Reclaim	Yard		No	Mobile Equipment				
68	Mobile Equipment – Front End Loader – Chip Reclaim	Yard		No	Mobile Equipment				
69	Mobile Equipment – Front End Loader – Biomass Fuel Reclaim	Yard		No	Mobile Equipment				
70	Biomass Fuel Screen and Hog	Yard		Yes	See EA-08				
71	Imported Biomass Transfer Conveyor	Yard		No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
73	Raw Fuel Infeed	Yard		No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
75	Fuel Transfer conveyor 1	Yard		No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
76	Fuel Transfer conveyor to stacker	Yard		No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
77	Fuel Stacker	Biomass fuel storage		No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
78	Fuel Reclaim	Next to Biomass fuel storage		No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
79	Fuel Re-claim Transfer	Yard		No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
80	Fuel Transfer 2	Yard		No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				

Table E1:  
Sources and Contaminants Identification Table  
(Rev2)

81	Disc Screen	In front of boiler/turbine plant	No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
83	Fuel Transfer Conveyor	Yard	No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
84	Fuel Infeed Conveyor	Yard	No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
85	Chip Transfer Conveyor 1	Yard	No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
86	Chip Transfer Conveyor 2	Yard	No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
87	Chip Transfer Conveyor 3	Yard	No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
89	Chip Stacker Aspen/Birch	Aspen/Birch storage pile	No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
91	Chip Reclaim Aspen/Birch	Next to Aspen/Birch storage pile	No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
92	Reclaim Conveyor 1	Yard	No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
93	Reclaim Conveyor 2	Yard	No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
94	Reclaim Conveyor 3	Yard	No	Humid biomass, and 0% emissions as per 'BCMOE Pellets'				
95	Dried Chip Storage Feed Conveyors	Wood pellet plant yard	No	Chips larger than 6mm, and 0% emissions as per 'BCMOE Pellets'				
96	Dried Chip Storage Discharge Conveyors	Wood pellet plant yard	No	Chips larger than 6mm, and 0% emissions as per 'BCMOE Pellets'				
97	Baghouse Fines Conveyors	Wood pellet plant	No	0% emissions as per 'BCMOE Pellets'				
98	Dried Pellet Storage Feed Conveyors	Wood pellet plant yard	No	No emissions, chips are in the bags				
99	Dried Pellet Storage Discharge Conveyors	Wood pellet plant yard	No	No emissions, chips are in the bags				
100_1	Road dust	PM	Yes	See EA-14				
100_2	Road dust	PM	Yes	See EA-14				
100_3	Road dust	PM	Yes	See EA-14				
100_4	Road dust	PM	Yes	See EA-14				
100_5	Road dust	PM	Yes	See EA-14				
100_6	Road dust	PM	Yes	See EA-14				
100_7	Road dust	PM	Yes	See EA-14				
100_8	Road dust	PM	Yes	See EA-14				
100_9	Road dust	PM	Yes	See EA-14				
58_1	Chip Dryer	Wood pellet plant yard	Yes	See EA-10				
58_2	Chip Dryer	Wood pellet plant yard	Yes	See EA-10				
58_3	Chip Dryer	Wood pellet plant yard	Yes	See EA-10				
58_4	Chip Dryer	Wood pellet plant yard	Yes	See EA-10				
59_1	Cooling Tower	Boiler/turbine plant yard	Yes					
59_2	Cooling Tower	Boiler/turbine plant yard	Yes					
101	Sewage Vent #1	Ammonia	No	Emissions below threshold value				
102	Sewage Vent #2	Ammonia	No	Emissions below threshold value				
103	Sewage Vent #3	Ammonia	No	Emissions below threshold value				

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Armstrong Station, Ontario

Table E2-1:  
Source Summary Table - Stack ID  
(Rev2)

Project No.: 030895

Source Summary Table by Stack ID

Source ID	Description	Volumetric Emission Rate (m³/s)	Emission Temperature (K)	Stack Dimensions (dia. or X by Y) (m)	Emission Height above Grade (m)	Height above or below Building Roof (m)	Stack Location X	Stack Location Y	CAS	Contaminant Name	Averaging Period (h)	Estimation Method	Accuracy	Emission Rate (g/s)	Percent of total Emission (%)
8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	0-03-3	Pentachlorodibenzo-p-furans	24	EF	Above-Average	7.765E-11	100.00%
									50-00-0	Formaldehyde	24	EF	Above-Average	0.0008134	19.62%
									50-32-8	Benzo(a)pyrene - all sources	24	EF	Above-Average	4.807E-07	100.00%
									51-28-5	2,4-Dinitrophenol	24	EF	Above-Average	3.328E-08	100.00%
									53-70-3	Dibenzo(a,h)anthracene	24	EF	Above-Average	1.682E-09	100.00%
									56-23-5	Carbon tetrachloride	24	EF	Above-Average	8.319E-06	100.00%
									56-55-3	Benzo(a)anthracene	24	EF	Above-Average	1.202E-08	100.00%
									65-85-0	Benzoic Acid	24	EF	Above-Average	8.689E-09	100.00%
									66-25-1	Hexanaldehyde	24	EF	Above-Average	1.294E-06	100.00%
									67-64-1	Acetone	24	EF	Above-Average	3.513E-05	100.00%
									67-66-3	Chloroform	24	EF	Above-Average	5.176E-06	100.00%
									71-43-2	Benzene	24	EF	Above-Average	0.0007765	100.00%
									71-55-6	1,1,1-Trichloroethane	24	EF	Above-Average	5.731E-06	100.00%
									74-82-8	Methane	24	EF	Above-Average	0.0038823	100.00%
									74-83-9	Bromomethane	24	EF	Above-Average	2.773E-06	100.00%
									74-87-3	Methyl Chloride	24	EF	Above-Average	4.252E-06	100.00%
									75-01-4	Vinyl chloride	24	EF	Above-Average	3.328E-06	100.00%
									75-07-0	Acetaldehyde	24	EF	Above-Average	0.0001534	100.00%
									75-09-2	Dichloromethane	24	EF	Above-Average	5.361E-05	100.00%
									75-69-4	CFC-11	24	EF	Above-Average	7.58E-06	100.00%
									78-84-2	Isobutyraldehyde	24	EF	Above-Average	2.218E-06	100.00%
									78-87-5	1,2-Dichloropropane	24	EF	Above-Average	6.101E-06	100.00%
									78-93-3	Methyl ethyl ketone	24	EF	Above-Average	9.983E-07	100.00%
									79-01-6	Trichloroethylene	24	EF	Above-Average	5.546E-06	100.00%
									83-32-9	PAH - Acenaphthene	24	EF	Above-Average	1.682E-07	100.00%
									85-01-8	Phenanthrene	24	EF	Above-Average	1.294E-06	100.00%
									86-73-7	PAH - Fluorene	24	EF	Above-Average	6.286E-07	100.00%
									86-74-8	Dibenzopyrrole	24	EF	Above-Average	3.328E-07	100.00%
									87-86-5	Pentachlorophenol	24	EF	Above-Average	9.428E-09	100.00%
									88-06-2	2,4,6-trichlorophenol	24	EF	Above-Average	4.067E-09	100.00%
									88-75-5	2-Nitrophenol	24	EF	Above-Average	4.437E-08	100.00%
									91-20-3	Naphthalene	24	EF	Above-Average	1.793E-05	100.00%
									91-57-6	p-Methyl Naphthalene	24	EF	Above-Average	2.958E-08	100.00%
									91-58-7	2-Chloronaphthalene	24	EF	Above-Average	4.437E-10	100.00%
									95-47-6	o-Xylene	24	EF	Above-Average	4.622E-06	100.00%
									95-57-8	2-Chlorophenol	24	EF	Above-Average	4.437E-09	100.00%
									98-86-2	Acetophenone	1	EF	Above-Average	5.916E-10	100.00%
									100-02-7	p-Nitrophenol	24	EF	Above-Average	2.034E-08	100.00%
									100-41-4	Ethylbenzene	24	EF	Above-Average	5.731E-06	100.00%
									100-42-5	Styrene	24	EF	Above-Average	0.0003513	100.00%
									100-52-7	Benzaldehyde	24	EF	Above-Average	1.571E-07	100.00%
									104-87-0	p-Tolualdehyde	24	EF	Above-Average	2.034E-06	100.00%
									107-02-8	Acrolein	24	EF	Above-Average	0.0007395	100.00%
									107-06-2	1,2-Dichloroethane / Ethylene dichloride	24	EF	Above-Average	5.361E-06	100.00%
									108-88-3	Toluene	24	EF	Above-Average	0.0001701	100.00%
									108-90-7	Chlorobenzene	1	EF	Above-Average	6.101E-06	100.00%
									108-95-2	Phenol	24	EF	Above-Average	9.428E-06	100.00%
									117-81-7	Bis(2-ethylhexyl) phthalate	24	EF	Above-Average	8.689E-09	100.00%
									120-12-7	Anthracene	24	EF	Above-Average	5.546E-07	100.00%

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Table E2-1:  
Source Summary Table - Stack ID  
(Rev2)

Project No.: 030895

Source ID	Description	Volumetric Emission Rate (m³/s)	Emission Temperature (K)	Stack Dimensions (dia. or X by Y) (m)	Emission Height above Grade (m)	Height above or below Building Roof (m)	Stack Location X	Stack Location Y	CAS	Contaminant Name	Averaging Period (h)	Estimation Method	Accuracy	Emission Rate (g/s)	Percent of total Emission (%)
									123-38-6	Propionaldehyde	0.1667	EF	Above-Average	1.128E-05	100.00%
									123-73-9	Crotonaldehyde	24	EF	Above-Average	1.83E-06	100.00%
									124-38-9	Carbon Dioxide	24	EF	Above-Average	36.049626	100.00%
									127-18-4	Tetrachloroethylene	24	EF	Above-Average	7.025E-06	100.00%
									129-00-0	Pyrene	24	EF	Above-Average	6.84E-07	100.00%
									191-24-2	Benzo(g,h,i)perylene	24	EF	Above-Average	1.719E-08	100.00%
									192-97-2	Benzo(e)pyrene	24	EF	Above-Average	4.807E-10	100.00%
									193-39-5	Indeno(1,2,3-c,d)pyrene	24	EF	Above-Average	1.608E-08	100.00%
									198-55-0	Perylene	24	EF	Above-Average	9.613E-11	100.00%
									205-99-2	Benzo(b)fluoranthene	24	EF	Above-Average	1.849E-08	100.00%
									206-44-0	Fluoranthene	24	EF	Above-Average	2.958E-07	100.00%
									207-08-9	Benzo(k)fluoranthene	24	EF	Above-Average	6.655E-09	100.00%
									208-96-8	Acenaphthylene	24	EF	Above-Average	9.243E-07	100.00%
									218-01-9	Benzo(a)phenanthrene	24	EF	Above-Average	7.025E-09	100.00%
									529-20-4	o-Tolualdehyde	24	EF	Above-Average	1.331E-06	100.00%
									540-49-8	1,2-Dibromoethene	24	EF	Above-Average	1.017E-05	100.00%
									630-08-0	Carbon monoxide	0.5	EF	Above-Average	0.1109219	100.00%
									1746-01-6	2,3,7,8-tetrachlorodibenzo-para-dioxin	24	EF	Above-Average	8.689E-11	100.00%
									2050-67-1	Dichlorobiphenyl	24	EF	Above-Average	1.368E-10	100.00%
									2051-24-3	Decachlorobiphenyl	24	EF	Above-Average	4.991E-11	100.00%
									2974-90-5	Dichlorobiphenyl	24	EF	Above-Average	1.368E-10	100.00%
									3268-87-9	Octachlorodibenzo-p-dioxin	24	EF	Above-Average	1.22E-08	100.00%
									7439-89-6	Iron	24	EF	Above-Average	0.000183	100.00%
									7439-92-1	Lead	24	EF	Above-Average	8.874E-06	100.00%
									7439-96-5	Manganese	24	EF	Above-Average	0.0002958	100.00%
									7439-97-6	Mercury	24	EF	Above-Average	6.47E-07	100.00%
									7439-98-7	Molybdenum	24	EF	Above-Average	3.882E-07	100.00%
									7440-02-0	Nickel	24	EF	Above-Average	6.101E-06	100.00%
									7440-09-7	Potassium	24	EF	Above-Average	0.0072099	100.00%
									7440-22-4	Silver	24	EF	Above-Average	0.0003143	100.00%
									7440-23-5	Sodium	24	EF	Above-Average	6.655E-05	100.00%
									7440-24-6	Strontium	24	EF	Above-Average	1.849E-06	100.00%
									7440-31-5	Tin	24	EF	Above-Average	4.252E-06	100.00%
									7440-32-6	Titanium	24	EF	Above-Average	3.697E-06	100.00%
									7440-36-0	Antimony	24	EF	Above-Average	1.46E-06	100.00%
									7440-38-2	Arsenic	24	EF	Above-Average	4.067E-06	100.00%
									7440-39-3	Barium - total water soluble	24	EF	Above-Average	3.143E-05	100.00%
									7440-41-7	Beryllium (And its compounds)	24	EF	Above-Average	2.034E-07	100.00%
									7440-43-9	Cadmium	24	EF	Above-Average	7.58E-07	100.00%
									7440-47-3	Chromium (metallic, II, III)	24	EF	Above-Average	3.882E-06	100.00%
									7440-48-4	Cobalt	24	EF	Above-Average	1.202E-06	100.00%
									7440-50-8	Copper	24	EF	Above-Average	9.059E-06	100.00%
									7440-62-2	Vanadium	24	EF	Above-Average	1.812E-07	100.00%
									7440-65-5	Yttrium	24	EF	Above-Average	5.546E-08	100.00%
									7440-66-6	Zinc	24	EF	Above-Average	7.765E-05	100.00%
									7647-01-0	Hydrochloric acid	24	EF	Above-Average	0.0035125	100.00%
									7723-14-0	Phosphorus, white	24	EF	Above-Average	4.991E-06	100.00%
									7782-49-2	Selenium	24	EF	Above-Average	5.176E-07	100.00%
									7782-50-5	Chlorine	24	EF	Above-Average	0.000146	100.00%
									10024-97-2	Nitrous Oxide	24	EF	Above-Average	0.0024033	100.00%

Table E2-1:  
Source Summary Table - Stack ID  
(Rev2)

Source ID	Description	Volumetric Emission Rate (m³/s)	Emission Temperature (K)	Stack Dimensions (dia. or X by Y) (m)	Emission Height above Grade (m)	Height above or below Building Roof (m)	Stack Location X	Stack Location Y	CAS	Contaminant Name	Averaging Period (h)	Estimation Method	Accuracy	Emission Rate (g/s)	Percent of total Emission (%)
24	Pellet Boiler Flue Gas Outlet	0.13875255	433.15	0.254	7.62	0	354205.561	5572154.82	10102-44-0	Nitrogen oxides	24	EF	Above-Average	0.0406714	89.74%
									13029-08-8	Dichlorobiphenyl	24	EF	Above-Average	1.368E-10	100.00%
									15862-07-4	Trichlorobiphenyl	24	EF	Above-Average	4.807E-10	100.00%
									15968-05-5	Tetrachlorobiphenyl	24	EF	Above-Average	4.622E-10	100.00%
									18259-05-7	Pentachlorobiphenyl	24	EF	Above-Average	2.218E-10	100.00%
									18540-29-9	Chromium compounds - Hexavalent	24	EF	Above-Average	6.47E-07	100.00%
									26601-64-9	Hexachlorobiphenyl	24	EF	Above-Average	1.017E-10	100.00%
									27323-18-8	Monochlorobiphenyl	24	EF	Above-Average	4.067E-11	100.00%
									32598-13-3	Tetrachlorobiphenyl	24	EF	Above-Average	4.622E-10	100.00%
									32690-93-0	Tetrachlorobiphenyl	24	EF	Above-Average	4.622E-10	100.00%
									33146-45-1	Dichlorobiphenyl	24	EF	Above-Average	1.368E-10	100.00%
									35065-29-3	Heptachlorobiphenyl	24	EF	Above-Average	1.22E-11	100.00%
									35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-di	24	EF	Above-Average	3.697E-10	100.00%
									37680-69-6	Trichlorobiphenyl	24	EF	Above-Average	4.807E-10	100.00%
									37680-73-2	Pentachlorobiphenyl	24	EF	Above-Average	2.218E-10	100.00%
									38444-73-4	Trichlorobiphenyl	24	EF	Above-Average	4.807E-10	100.00%
									39001-02-0	Octachlorodibenzofuran	24	EF	Above-Average	1.627E-11	100.00%
									39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-diox	24	EF	Above-Average	2.958E-07	100.00%
									40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	24	EF	Above-Average	2.773E-10	100.00%
									51207-31-9	2,3,7,8-Tetrachlorodibenzofuran (TEQ	24	EF	Above-Average	1.387E-10	100.00%
									55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	24	EF	Above-Average	4.437E-11	100.00%
									57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	24	EF	Above-Average	5.176E-11	100.00%
									60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	24	EF	Above-Average	5.176E-11	100.00%
									67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	24	EF	Above-Average	2.958E-07	100.00%
									70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	24	EF	Above-Average	5.176E-11	100.00%
									72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	24	EF	Above-Average	5.176E-11	100.00%
									PM	Total particulate matter	24	EF	Above-Average	0.31268	13.52%
									0-03-3	Pentachlorodibenzo-p-furans	24	EF	Marginal	0	0.00%
									50-00-0	Formaldehyde	24	EF	Marginal	0	0.00%
									50-32-8	Benzo(a)pyrene - all sources	24	EF	Marginal	0	0.00%
									51-28-5	2,4-Dinitrophenol	24	EF	Marginal	0	0.00%
									53-70-3	Dibenzo(a,h)anthracene	24	EF	Marginal	0	0.00%
									56-23-5	Carbon tetrachloride	24	EF	Marginal	0	0.00%
									56-55-3	Benzo(a)anthracene	24	EF	Marginal	0	0.00%
									65-85-0	Benzoic Acid	24	EF	Marginal	0	0.00%
									66-25-1	Hexanaldehyde	24	EF	Marginal	0	0.00%
									67-64-1	Acetone	24	EF	Marginal	0	0.00%
									67-66-3	Chloroform	24	EF	Marginal	0	0.00%
									71-43-2	Benzene	24	EF	Marginal	0	0.00%
									71-55-6	1,1,1-Trichloroethane	24	EF	Marginal	0	0.00%
									74-82-8	Methane	24	EF	Marginal	0	0.00%
									74-83-9	Bromomethane	24	EF	Marginal	0	0.00%
									74-87-3	Methyl Chloride	24	EF	Marginal	0	0.00%
									75-01-4	Vinyl chloride	24	EF	Marginal	0	0.00%
									75-07-0	Acetaldehyde	24	EF	Marginal	0	0.00%
									75-09-2	Dichloromethane	24	EF	Marginal	0	0.00%
									75-69-4	CFC-11	24	EF	Marginal	0	0.00%
									78-84-2	Isobutyraldehyde	24	EF	Marginal	0	0.00%
									78-87-5	1,2-Dichloropropane	24	EF	Marginal	0	0.00%
									78-93-3	Methyl ethyl ketone	24	EF	Marginal	0	0.00%

Table E2-1:  
Source Summary Table - Stack ID  
(Rev2)

Source ID	Description	Volumetric Emission Rate (m³/s)	Emission Temperature (K)	Stack Dimensions (dia. or X by Y) (m)	Emission Height above Grade (m)	Height above or below Building Roof (m)	Stack Location X	Stack Location Y	CAS	Contaminant Name	Averaging Period (h)	Estimation Method	Accuracy	Emission Rate (g/s)	Percent of total Emission (%)
									79-01-6	Trichloroethylene	24	EF	Marginal	0	0.00%
									83-32-9	PAH - Acenaphthene	24	EF	Marginal	0	0.00%
									85-01-8	Phenanthrene	24	EF	Marginal	0	0.00%
									86-73-7	PAH - Fluorene	24	EF	Marginal	0	0.00%
									86-74-8	Dibenzopyrrole	24	EF	Marginal	0	0.00%
									87-86-5	Pentachlorophenol	24	EF	Marginal	0	0.00%
									88-06-2	2,4,6-trichlorophenol	24	EF	Marginal	0	0.00%
									88-75-5	2-Nitrophenol	24	EF	Marginal	0	0.00%
									91-20-3	Naphthalene	24	EF	Marginal	0	0.00%
									91-57-6	2-Methyl Naphthalene	24	EF	Marginal	0	0.00%
									91-58-7	2-Chloronaphthalene	24	EF	Marginal	0	0.00%
									95-47-6	o-Xylene	24	EF	Marginal	0	0.00%
									95-57-8	2-Chlorophenol	24	EF	Marginal	0	0.00%
									98-86-2	Acetophenone	1	EF	Marginal	0	0.00%
									100-02-7	p-Nitrophenol	24	EF	Marginal	0	0.00%
									100-41-4	Ethylbenzene	24	EF	Marginal	0	0.00%
									100-42-5	Styrene	24	EF	Marginal	0	0.00%
									100-52-7	Benzaldehyde	24	EF	Marginal	0	0.00%
									104-87-0	p-Tolualdehyde	24	EF	Marginal	0	0.00%
									107-02-8	Acrolein	24	EF	Marginal	0	0.00%
									107-06-2	1,2-Dichloroethane / Ethylene dichloride	24	EF	Marginal	0	0.00%
									108-88-3	Toluene	24	EF	Marginal	0	0.00%
									108-90-7	Chlorobenzene	1	EF	Marginal	0	0.00%
									108-95-2	Phenol	24	EF	Marginal	0	0.00%
									117-81-7	Bis(2-ethylhexyl) phthalate	24	EF	Marginal	0	0.00%
									120-12-7	Anthracene	24	EF	Marginal	0	0.00%
									123-38-6	Propionaldehyde	0.1667	EF	Marginal	0	0.00%
									123-73-9	Crotonaldehyde	24	EF	Marginal	0	0.00%
									124-38-9	Carbon Dioxide	24	EF	Marginal	0	0.00%
									127-18-4	Tetrachloroethylene	24	EF	Marginal	0	0.00%
									129-00-0	Pyrene	24	EF	Marginal	0	0.00%
									191-24-2	Benzo(g,h,i)perylene	24	EF	Marginal	0	0.00%
									192-97-2	Benzo(e)pyrene	24	EF	Marginal	0	0.00%
									193-39-5	Indeno(1,2,3-c,d)pyrene	24	EF	Marginal	0	0.00%
									198-55-0	Perylene	24	EF	Marginal	0	0.00%
									205-99-2	Benzo(b)fluoranthene	24	EF	Marginal	0	0.00%
									206-44-0	Fluoranthene	24	EF	Marginal	0	0.00%
									207-08-9	Benzo(k)fluoranthene	24	EF	Marginal	0	0.00%
									208-96-8	Acenaphthylene	24	EF	Marginal	0	0.00%
									218-01-9	Benzo(a)phenanthrene	24	EF	Marginal	0	0.00%
									529-20-4	o-Tolualdehyde	24	EF	Marginal	0	0.00%
									540-49-8	1,2-Dibromoethene	24	EF	Marginal	0	0.00%
									630-08-0	Carbon monoxide	0.5	EF	Marginal	0	0.00%
									1746-01-6	2,3,7,8-tetrachlorodibenzo-para-dioxin	24	EF	Marginal	0	0.00%
									2050-67-1	Dichlorobiphenyl	24	EF	Marginal	0	0.00%
									2051-24-3	Decachlorobiphenyl	24	EF	Marginal	0	0.00%
									2974-90-5	Dichlorobiphenyl	24	EF	Marginal	0	0.00%
									3268-87-9	Octachlorodibenzo-p-dioxin	24	EF	Marginal	0	0.00%
									7439-89-6	Iron	24	EF	Marginal	0	0.00%
									7439-92-1	Lead	24	EF	Marginal	0	0.00%



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Table E2-1:  
Source Summary Table - Stack ID  
(Rev2)

Project No.: 030895

Source ID	Description	Volumetric Emission Rate (m³/s)	Emission Temperature (K)	Stack Dimensions (dia. or X by Y) (m)	Emission Height above Grade (m)	Height above or below Building Roof (m)	Stack Location X	Stack Location Y	CAS	Contaminant Name	Averaging Period (h)	Estimation Method	Accuracy	Emission Rate (g/s)	Percent of total Emission (%)
									7439-96-5	Manganese	24	EF	Marginal	0	0.00%
									7439-97-6	Mercury	24	EF	Marginal	0	0.00%
									7439-98-7	Molybdenum	24	EF	Marginal	0	0.00%
									7440-02-0	Nickel	24	EF	Marginal	0	0.00%
									7440-09-7	Potassium	24	EF	Marginal	0	0.00%
									7440-22-4	Silver	24	EF	Marginal	0	0.00%
									7440-23-5	Sodium	24	EF	Marginal	0	0.00%
									7440-24-6	Strontium	24	EF	Marginal	0	0.00%
									7440-31-5	Tin	24	EF	Marginal	0	0.00%
									7440-32-6	Titanium	24	EF	Marginal	0	0.00%
									7440-36-0	Antimony	24	EF	Marginal	0	0.00%
									7440-38-2	Arsenic	24	EF	Marginal	0	0.00%
									7440-39-3	Barium - total water soluble	24	EF	Marginal	0	0.00%
									7440-41-7	Beryllium (And its compounds)	24	EF	Marginal	0	0.00%
									7440-43-9	Cadmium	24	EF	Marginal	0	0.00%
									7440-47-3	Chromium (metallic, II, III)	24	EF	Marginal	0	0.00%
									7440-48-4	Cobalt	24	EF	Marginal	0	0.00%
									7440-50-8	Copper	24	EF	Marginal	0	0.00%
									7440-62-2	Vanadium	24	EF	Marginal	0	0.00%
									7440-65-5	Yttrium	24	EF	Marginal	0	0.00%
									7440-66-6	Zinc	24	EF	Marginal	0	0.00%
									7647-01-0	Hydrochloric acid	24	EF	Marginal	0	0.00%
									7723-14-0	Phosphorus, white	24	EF	Marginal	0	0.00%
									7782-49-2	Selenium	24	EF	Marginal	0	0.00%
									7782-50-5	Chlorine	24	EF	Marginal	0	0.00%
									10024-97-2	Nitrous Oxide	24	EF	Marginal	0	0.00%
									10102-44-0	Nitrogen oxides	24	EF	Marginal	0	0.00%
									13029-08-8	Dichlorobiphenyl	24	EF	Marginal	0	0.00%
									15862-07-4	Trichlorobiphenyl	24	EF	Marginal	0	0.00%
									15968-05-5	Tetrachlorobiphenyl	24	EF	Marginal	0	0.00%
									18259-05-7	Pentachlorobiphenyl	24	EF	Marginal	0	0.00%
									18540-29-9	Chromium compounds - Hexavalent	24	EF	Marginal	0	0.00%
									26601-64-9	Hexachlorobiphenyl	24	EF	Marginal	0	0.00%
									27323-18-8	Monochlorobiphenyl	24	EF	Marginal	0	0.00%
									32598-13-3	Tetrachlorobiphenyl	24	EF	Marginal	0	0.00%
									32690-93-0	Tetrachlorobiphenyl	24	EF	Marginal	0	0.00%
									33146-45-1	Dichlorobiphenyl	24	EF	Marginal	0	0.00%
									35065-29-3	Heptachlorobiphenyl	24	EF	Marginal	0	0.00%
									35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	24	EF	Marginal	0	0.00%
									37680-69-6	Trichlorobiphenyl	24	EF	Marginal	0	0.00%
									37680-73-2	Pentachlorobiphenyl	24	EF	Marginal	0	0.00%
									38444-73-4	Trichlorobiphenyl	24	EF	Marginal	0	0.00%
									39001-02-0	Octachlorodibenzofuran	24	EF	Marginal	0	0.00%
									39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	24	EF	Marginal	0	0.00%
									40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	24	EF	Marginal	0	0.00%
									51207-31-9	2,3,7,8-Tetrachlorodibenzofuran (TEQ)	24	EF	Marginal	0	0.00%
									55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	24	EF	Marginal	0	0.00%
									57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	24	EF	Marginal	0	0.00%
									60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	24	EF	Marginal	0	0.00%
									67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	24	EF	Marginal	0	0.00%

Table E2-1:  
Source Summary Table - Stack ID  
(Rev2)

Source ID	Description	Volumetric Emission Rate (m³/s)	Emission Temperature (K)	Stack Dimensions (dia. or X by Y) (m)	Emission Height above Grade (m)	Height above or below Building Roof (m)	Stack Location X	Stack Location Y	CAS	Contaminant Name	Averaging Period (h)	Estimation Method	Accuracy	Emission Rate (g/s)	Percent of total Emission (%)
									70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	24	EF	Marginal	0	0.00%
									72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	24	EF	Marginal	0	0.00%
									PM	Total particulate matter	24	EF	Marginal	0	0.00%
30	Stand by Generator (500kW)	0.17602622	393.15	0.1016	8.2296	8.2296	354217.192	5572144.96	10102-44-0	Nitrogen oxides	24	EF	Marginal	0	0.00%
31	Fire Pump Diesel Engine (150hp)	0.03884133	393.15	0.1016	8.2296	8.2296	354387.921	5571951	PM	Total particulate matter	24	EF	Marginal	0	0.00%
									10102-44-0	Nitrogen oxides	24	EF	Marginal	0	0.00%
									PM	Total particulate matter	24	EF	Marginal	0	0.00%
38	Pellet Plant – Dust Pick-ups and Scre	6.92582883	294.261111	1.2192	14.0208	14.0208	354245.334	5572191.11	PM	Total particulate matter	24	EF	Marginal	0.0117178	0.51%
39	Pellet Plant – Pellet Cooler - Cyclone	8.87261206	366.483333	1.2192	14.0208	14.0208	354236.734	5572222.11	PM	Total particulate matter	24	EF	Marginal	0.0117178	0.51%
40	Pellet Plant – Fine Hammer Mill - Bag	5.19142195	294.261111	0.6096	14.0208	14.0208	354253.12	5572200.45	PM	Total particulate matter	24	EF	Marginal	0.0249476	1.08%
57	Dry Chip Storage Silo Vent	0.00943895	294.15	0.1524	23.8252	0.9144	354255.21	5572212.94	PM	Total particulate matter	24	EF	Marginal	0.00108	0.05%
61	Biomass Pile- Aspen/Birch	0.00047195	293.15	40	1	1	354412.619	5572147.58	PM	Total particulate matter	24	EF	Marginal	0.8666667	37.47%
63	Biomass Pile-Fuel	0.00047195	293.15	50	1	1	354310.997	5572053.07	PM	Total particulate matter	24	EF	Marginal	0.0641014	2.77%
70	Biomass Fuel Screen and Hog	4.7194745	294.15	1.37571988	9.7536	-4.064	354352.75	5572024.54	PM	Total particulate matter	24	EF	Marginal	0.0641014	2.77%
100_1	Road dust	0.00047195	293.15	1	1	1	1	1	PM	Total particulate matter	24	EF	Marginal	0.0028096	0.12%
100_2	Road dust	0.00047195	293.15	1	1	1	1	1	PM	Total particulate matter	24	EF	Marginal	0.0014672	0.06%
100_3	Road dust	0.00047195	293.15	1	1	1	1	1	PM	Total particulate matter	24	EF	Marginal	0.0028096	0.12%
100_4	Road dust	0.00047195	293.15	1	1	1	1	1	PM	Total particulate matter	24	EF	Marginal	0.0030905	0.13%
100_5	Road dust	0.00047195	293.15	1	1	1	1	1	PM	Total particulate matter	24	EF	Marginal	0.0112695	0.49%
100_6	Road dust	0.00047195	293.15	1	1	1	1	1	PM	Total particulate matter	24	EF	Marginal	0.0039022	0.17%
100_7	Road dust	0.00047195	293.15	1	1	1	1	1	PM	Total particulate matter	24	EF	Marginal	0.0019355	0.08%
100_8	Road dust	0.00047195	293.15	1	1	1	1	1	PM	Total particulate matter	24	EF	Marginal	0.0031842	0.14%
100_9	Road dust	0.00047195	293.15	1	1	1	1	1	PM	Total particulate matter	24	EF	Marginal	0.0007492	0.03%
58_1	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354259.648	5572190.6	50-00-0	Formaldehyde	24	EF	Marginal	0.0008333	20.10%
58_2	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354254.712	5572185	PM	Total particulate matter	24	EF	Marginal	0.2166667	9.37%
									50-00-0	Formaldehyde	24	EF	Marginal	0.0008333	20.10%
									PM	Total particulate matter	24	EF	Marginal	0.2166667	9.37%
58_3	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354249.731	5572179.35	50-00-0	Formaldehyde	24	EF	Marginal	0.0008333	20.10%
58_4	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354244.704	5572173.81	PM	Total particulate matter	24	EF	Marginal	0.2166667	9.37%
									50-00-0	Formaldehyde	24	EF	Marginal	0.0008333	20.10%
									PM	Total particulate matter	24	EF	Marginal	0.2166667	9.37%
59_1	Cooling Tower	43.8911129	322.038889	3.048	6.7056	6.7056	354187.23	5572135.54	PM	Total particulate matter	24	EF	Average	0.0136275	0.59%
59_2	Cooling Tower	43.8911129	322.038889	3.048	6.7056	6.7056	354189.2	5572133.78	PM	Total particulate matter	24	EF	Average	0.0136275	0.59%

Table E2-2:  
Source Summary Table - Contaminant  
(Rev2)

Source Summary Table by Contaminant

CAS	Contaminant Name	Averaging Period (h)	Source ID	Description	Volumetric Emission Rate (m3/s)	Emission Temperature (K)	Stack Dimension s (dia. or X by Y) (m)	Emission Height above Grade (m)	Height above or below Building Roof (m)	Stack Location X	Stack Location Y	Estimation Method	Accuracy	Emission Rate (g/s)	Percent of total Emission (%)
0-03-3 50-00-0	Pentachlorodibenzo-p-furans Formaldehyde	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	7.765E-11	100.00%
			58_1	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354259.648	5572190.6	EF	Marginal	0.0008333	20.10%
			58_2	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354254.712	5572185	EF	Marginal	0.0008333	20.10%
			58_3	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354249.731	5572179.35	EF	Marginal	0.0008333	20.10%
			58_4	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354244.704	5572173.81	EF	Marginal	0.0008333	20.10%
50-32-8	Benzo(a)pyrene - all sources	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.807E-07	100.00%
51-28-5	2,4-Dinitrophenol	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	3.328E-08	100.00%
53-70-3	Dibenzo(a,h)anthracene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.682E-09	100.00%
56-55-3	Benzo(a)anthracene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.202E-08	100.00%
65-85-0	Benzoic Acid	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	8.689E-09	100.00%
66-25-1	Hexanaldehyde	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.294E-06	100.00%
67-64-1	Acetone	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	3.513E-05	100.00%
67-66-3	Chloroform	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.176E-06	100.00%
71-43-2	Benzene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0007765	100.00%
71-55-6	1,1,1-Trichloroethane	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.731E-06	100.00%
74-82-8	Methane	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0038823	100.00%
74-87-3	Methyl Chloride	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.252E-06	100.00%
75-01-4	Vinyl chloride	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	3.328E-06	100.00%
75-07-0	Acetaldehyde	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0001534	100.00%
75-09-2	Dichloromethane	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.361E-05	100.00%
75-69-4	CFC-11	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	7.58E-06	100.00%
78-84-2	Isobutyraldehyde	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	2.218E-06	100.00%
78-87-5	1,2-Dichloropropane	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	6.101E-06	100.00%
78-93-3	Methyl ethyl ketone	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	9.983E-07	100.00%
79-01-6	Trichloroethylene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.546E-06	100.00%
83-32-9	PAH - Acenaphthene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.682E-07	100.00%
85-01-8	Phenanthrene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.294E-06	100.00%
86-73-7	PAH - Fluorene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	6.286E-07	100.00%
86-74-8	Dibenzopyrrole	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	3.328E-07	100.00%
88-06-2	2,4,6-trichlorophenol	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.067E-09	100.00%
88-75-5	2-Nitrophenol	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.437E-08	100.00%
91-20-3	Naphthalene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.793E-05	100.00%
91-57-6	2-Methyl Naphthalene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	2.958E-08	100.00%
91-58-7	2-Chloronaphthalene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.437E-10	100.00%
95-47-6	o-Xylene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.622E-06	100.00%
95-57-8	2-Chlorophenol	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.437E-09	100.00%
98-86-2	Acetophenone	1	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.916E-10	100.00%
100-02-7	p-Nitrophenol	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	2.034E-08	100.00%
100-41-4	Ethylbenzene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.731E-06	100.00%
100-42-5	Styrene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0003513	100.00%
100-52-7	Benzaldehyde	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.571E-07	100.00%
104-87-0	p-Tolualdehyde	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	2.034E-06	100.00%
107-02-8	Acrolein	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0007395	100.00%
107-06-2	1,2-Dichloroethane / Ethylene dichloride	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.361E-06	100.00%
108-88-3	Toluene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0001701	100.00%
108-90-7	Chlorobenzene	1	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	6.101E-06	100.00%
108-95-2	Phenol	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	9.428E-06	100.00%
117-81-7	Bis(2-ethylhexyl) phthalate	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	8.689E-09	100.00%
120-12-7	Anthracene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.546E-07	100.00%

Table E2-2:  
Source Summary Table - Contaminant  
(Rev2)

CAS	Contaminant Name	Averaging Period (h)	Source ID	Description	Volumetric Emission Rate (m3/s)	Emission Temperature (K)	Stack Dimensions (dia. or X by Y) (m)	Emission Height above Grade (m)	Height above or below Building Roof (m)	Stack Location X	Stack Location Y	Estimation Method	Accuracy	Emission Rate (g/s)	Percent of total Emission (%)
123-38-6	Propionaldehyde	0.1667	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.128E-05	100.00%
123-73-9	Crotonaldehyde	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.83E-06	100.00%
124-38-9	Carbon Dioxide	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	36.049626	100.00%
127-18-4	Tetrachloroethylene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	7.025E-06	100.00%
129-00-0	Pyrene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	6.84E-07	100.00%
191-24-2	Benzo(g,h,i)perylene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.719E-08	100.00%
192-97-2	Benzo(e)pyrene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.807E-10	100.00%
193-39-5	Indeno(1,2,3-c,d)pyrene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.608E-08	100.00%
198-55-0	Perylene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	9.613E-11	100.00%
205-99-2	Benzo(b)fluoranthene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.849E-08	100.00%
206-44-0	Fluoranthene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	2.958E-07	100.00%
207-08-9	Benzo(k)fluoranthene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	6.655E-09	100.00%
208-96-8	Acenaphthylene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	9.243E-07	100.00%
218-01-9	Benzo(a)phenanthrene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	7.025E-09	100.00%
529-20-4	o-Tolualdehyde	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.331E-06	100.00%
540-49-8	1,2-Dibromoethene	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.017E-05	100.00%
630-08-0	Carbon monoxide	0.5	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.1109219	100.00%
1746-01-6	2,3,7,8-tetrachlorodibenzo-para-di	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	8.689E-11	100.00%
2050-67-1	Dichlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.368E-10	100.00%
2051-24-3	Decachlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.991E-11	100.00%
2974-90-5	Dichlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.368E-10	100.00%
3268-87-9	Octachlorodibenzo-p-dioxin	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.22E-08	100.00%
7439-92-1	Lead	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	8.874E-06	100.00%
7439-96-5	Manganese	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0002958	100.00%
7439-97-6	Mercury	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	6.47E-07	100.00%
7439-98-7	Molybdenum	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	3.882E-07	100.00%
7440-02-0	Nickel	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	6.101E-06	100.00%
7440-09-7	Potassium	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0072099	100.00%
7440-22-4	Silver	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0003143	100.00%
7440-23-5	Sodium	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	6.655E-05	100.00%
7440-24-6	Strontium	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.849E-06	100.00%
7440-31-5	Tin	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.252E-06	100.00%
7440-32-6	Titanium	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	3.697E-06	100.00%
7440-36-0	Antimony	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.46E-06	100.00%
7440-38-2	Arsenic	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.067E-06	100.00%
7440-39-3	Barium - total water soluble	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	3.143E-05	100.00%
7440-41-7	Beryllium (And its compounds)	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	2.034E-07	100.00%
7440-43-9	Cadmium	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	7.58E-07	100.00%
7440-47-3	Chromium (metallic, II, III)	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	3.882E-06	100.00%
7440-48-4	Cobalt	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.202E-06	100.00%
7440-50-8	Copper	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	9.059E-06	100.00%
7440-62-2	Vanadium	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.812E-07	100.00%
7440-65-5	Yttrium	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.546E-08	100.00%
7440-66-6	Zinc	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	7.765E-05	100.00%
7647-01-0	Hydrochloric acid	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0035125	100.00%
7723-14-0	Phosphorus, white	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.991E-06	100.00%
7782-49-2	Selenium	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.176E-07	100.00%
7782-50-5	Chlorine	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.000146	100.00%
10024-97-2	Nitrous Oxide	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0024033	100.00%
10102-44-0	Nitrogen oxides	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.0406714	89.74%

Table E2-2:  
Source Summary Table - Contaminant  
(Rev2)

CAS	Contaminant Name	Averaging Period (h)	Source ID	Description	Volumetric Emission Rate (m3/s)	Emission Temperature (K)	Stack Dimensions (dia. or X by Y) (m)	Emission Height above Grade (m)	Height above or below Building Roof (m)	Stack Location X	Stack Location Y	Estimation Method	Accuracy	Emission Rate (g/s)	Percent of total Emission (%)
13029-08-8	Dichlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.368E-10	100.00%
15862-07-4	Trichlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.807E-10	100.00%
15968-05-5	Tetrachlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.622E-10	100.00%
18259-05-7	Pentachlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	2.218E-10	100.00%
18540-29-9	Chromium compounds - Hexavalent	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	6.47E-07	100.00%
26601-64-9	Hexachlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.017E-10	100.00%
27323-18-8	Monochlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.067E-11	100.00%
32598-13-3	Tetrachlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.622E-10	100.00%
32690-93-0	Tetrachlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.622E-10	100.00%
33146-45-1	Dichlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.368E-10	100.00%
35065-29-3	Heptachlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.22E-11	100.00%
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	3.697E-10	100.00%
37680-69-6	Trichlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.807E-10	100.00%
37680-73-2	Pentachlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	2.218E-10	100.00%
38444-73-4	Trichlorobiphenyl	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.807E-10	100.00%
39001-02-0	Octachlorodibenzofuran	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.627E-11	100.00%
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-d	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	2.958E-07	100.00%
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-di	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	2.773E-10	100.00%
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran (	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	1.387E-10	100.00%
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzof	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	4.437E-11	100.00%
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofura	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.176E-11	100.00%
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofura	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.176E-11	100.00%
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzof	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	2.958E-07	100.00%
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofura	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.176E-11	100.00%
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofura	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	5.176E-11	100.00%
PM	Total particulate matter	24	8	Boiler Flue Gas Stack	15.6342032	394.15	1.016	20.0406	20.0406	354205.368	5572113.15	EF	Above-Average	0.31268	13.52%
			38	Pellet Plant – Dust Pick-ups and Scre	6.92582883	294.261111	1.2192	14.0208	14.0208	354245.334	5572191.11	EF	Marginal	0.0117178	0.51%
			39	Pellet Plant – Pellet Cooler - Cyclone	8.87261206	366.483333	1.2192	14.0208	14.0208	354236.734	5572222.11	EF	Marginal	0.0117178	0.51%
			40	Pellet Plant – Fine Hammer Mill - Bag	5.19142195	294.261111	0.6096	14.0208	14.0208	354253.12	5572200.45	EF	Marginal	0.0249476	1.08%
			57	Dry Chip Storage Silo Vent	0.00943895	294.15	0.1524	23.8252	0.9144	354255.21	5572212.94	EF	Marginal	0.00108	0.05%
			61	Biomass Pile- Aspen/Birch	0.00047195	293.15	40	1	1	354412.619	5572147.58	EF	Marginal	0.866667	37.47%
			63	Biomass Pile-Fuel	0.00047195	293.15	50	1	1	354310.997	5572053.07	EF	Marginal	0.0641014	2.77%
			70	Biomass Fuel Screen and Hog	4.7194745	294.15	1.37571988	9.7536	-4.064	354352.75	5572024.54	EF	Marginal	0.0641014	2.77%
			100_1	Road dust	0.00047195	293.15	1	1	1	1	1	EF	Marginal	0.0028096	0.12%
			100_2	Road dust	0.00047195	293.15	1	1	1	1	1	EF	Marginal	0.0014672	0.06%
			100_3	Road dust	0.00047195	293.15	1	1	1	1	1	EF	Marginal	0.0028096	0.12%
			100_4	Road dust	0.00047195	293.15	1	1	1	1	1	EF	Marginal	0.0030905	0.13%
			100_5	Road dust	0.00047195	293.15	1	1	1	1	1	EF	Marginal	0.0112695	0.49%
			100_6	Road dust	0.00047195	293.15	1	1	1	1	1	EF	Marginal	0.0039022	0.17%
			100_7	Road dust	0.00047195	293.15	1	1	1	1	1	EF	Marginal	0.0019355	0.08%
			100_8	Road dust	0.00047195	293.15	1	1	1	1	1	EF	Marginal	0.0031842	0.14%
			100_9	Road dust	0.00047195	293.15	1	1	1	1	1	EF	Marginal	0.0007492	0.03%
			58_1	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354259.648	5572190.6	EF	Marginal	0.216667	9.37%
			58_2	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354254.712	5572185	EF	Marginal	0.216667	9.37%
			58_3	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354249.731	5572179.35	EF	Marginal	0.216667	9.37%
			58_4	Chip Dryer	17.4998114	402.594444	2.1336	7.0104	7.0104	354244.704	5572173.81	EF	Marginal	0.216667	9.37%
			59_1	Cooling Tower	43.8911129	322.038889	3.048	6.7056	6.7056	354187.23	5572135.54	EF	Average	0.0136275	0.59%
			59_2	Cooling Tower	43.8911129	322.038889	3.048	6.7056	6.7056	354189.2	5572133.78	EF	Average	0.0136275	0.59%

Table E3:  
Dispersion Modeling Input Summary Table  
(Rev2)

Relevant Section of the Regulation	Section Title	Description of How the Approved Dispersion Model Was Used
Section 8	Negligible sources	The sources deemed negligible are discussed in the application document in Section 3 and Appendix EB.
Section 9	Same Structure contamination	Not applicable.
Section 10	Operating Conditions	See Section 4 and Appendix EA of the Application
Section 13	Meteorological Conditions	Regional Meteorological data was used for AERMOD.
Section 14	Area of Modelling Coverage	The entire grid specified is used.
Section 15	Stack Height for Certain New Sources of Contaminant	Not applicable
Section 16	Terrain Data	Terrain elevation contour data was used downloaded from Natural Resources Canada's Canadian Digital Elevation Data (CDED) dataset.
Section 17	Averaging Periods	10 min, 0.5 hour, 1 hour, 24 hours, monthly and annual

Table E4:  
Emissions Summary Table  
(Rev2)

CAS#	Contaminant	Total Emission Rate (g/s)	Dispersion Model Used	Max POI Value (µg/m³)	Location of		Averaging Period Modelled (h)	Averaging Period of Criterion (h)	Max POI Value Converted to Criterion Period (µg/m³)	Criteria (µg/m³)	Limiting Effect	Regulation Schedule #	Percentage of Criteria or Likelihood of adverse effect (%)
					X (m)	Y (m)							
0-03-3	Pentachlorodibenzo-p-furans	7.7645E-11	AERMOD-m	1.10964E-09	354191	5572230	24	24	1.10964E-09	0		0	Neg
50-00-0	Formaldehyde	0.00414676	AERMOD-m	0.528224	354177	5572216	24	24	0.528224	65	Health	Schedule 3	0.8%
50-32-8	Benzo(a)pyrene - all sources	4.8066E-07	AERMOD-m	6.86921E-06	354191	5572230	24	24	6.86921E-06	0.005	Assessment Va	Schedule 3	0.1%
50-32-8	Benzo(a)pyrene - all sources	4.8066E-07	AERMOD-m	5.81987E-07	354219	5572309	8760	8760	5.81987E-07	0.00001	Health	Schedule 3	5.8%
51-28-5	2,4-Dinitrophenol	3.3277E-08	AERMOD-m	4.7556E-07	354191	5572230	24	24	4.7556E-07	0		0	Neg
53-70-3	Dibenzo(a,h)anthracene	1.6823E-09	AERMOD-m	2.40422E-08	354191	5572230	24	24	2.40422E-08	0		0	Neg
56-23-5	Carbon tetrachloride	8.3191E-06	AERMOD-m	0.00011889	354191	5572230	24	24	0.00011889	2.4	Health	Schedule 3	0.0%
56-55-3	Benzo(a)anthracene	1.2017E-08	AERMOD-m	1.7173E-07	354191	5572230	24	24	1.7173E-07	0		0	Neg
65-85-0	Benzoic Acid	8.6889E-09	AERMOD-m	1.24174E-07	354191	5572230	24	24	1.24174E-07	700	Health	Guideline	0.0%
66-25-1	Hexanaldehyde	1.2941E-06	AERMOD-m	0.000018494	354191	5572230	24	24	0.000018494	2	JSL	JSL	0.0%
67-64-1	Acetone	3.5125E-05	AERMOD-m	0.000501981	354191	5572230	24	24	0.000501981	11880	Health	Schedule 3	0.0%
67-66-3	Chloroform	5.1764E-06	AERMOD-m	7.39761E-05	354191	5572230	24	24	7.39761E-05	1	Health	Schedule 3	0.0%
71-43-2	Benzene	0.00077645	AERMOD-m	0.0110964	354191	5572230	24	24	0.0110964	100	Assessment Va	Schedule 3	0.0%
71-43-2	Benzene	0.00077645	AERMOD-m	0.000940134	354219	5572309	8760	8760	0.000940134	0.45	Health	Schedule 3	0.2%
71-55-6	1,1,1-Trichloroethane	5.731E-06	AERMOD-m	8.19021E-05	354191	5572230	24	24	8.19021E-05	115000	Health	Schedule 3	0.0%
74-82-8	Methane	0.00388227	AERMOD-m	0.055482	354191	5572230	24	24	0.055482	0		0	Neg
74-83-9	Bromomethane	2.773E-06	AERMOD-m	0.00003963	354191	5572230	24	24	0.00003963	1350	Health	Guideline	0.0%
74-87-3	Methyl Chloride	4.252E-06	AERMOD-m	6.07661E-05	354191	5572230	24	24	6.07661E-05	320	Health	Schedule 3	0.0%
75-01-4	Vinyl chloride	3.3277E-06	AERMOD-m	4.75561E-05	354191	5572230	24	24	4.75561E-05	1	Health	Schedule 3	0.0%
75-07-0	Acetaldehyde	0.00015344	AERMOD-m	0.004058	354059	5571849	1	0.5	0.004927203	500	Health	Schedule 3	0.0%
75-07-0	Acetaldehyde	0.00015344	AERMOD-m	0.00219286	354191	5572230	24	24	0.00219286	500	Health	Schedule 3	0.0%
75-09-2	Dichloromethane	5.3612E-05	AERMOD-m	0.000766181	354191	5572230	24	24	0.000766181	220	Health	Schedule 3	0.0%
75-69-4	CFC-11	7.5797E-06	AERMOD-m	0.000108322	354191	5572230	24	24	0.000108322	6000	Health	Guideline	0.0%
78-84-2	Isobutyraldehyde	2.2184E-06	AERMOD-m	0.000031704	354191	5572230	24	24	0.000031704	56	JSL	JSL	0.0%
78-87-5	1,2-Dichloropropane	6.1007E-06	AERMOD-m	8.71861E-05	354191	5572230	24	24	8.71861E-05	2400	Odour	Guideline	0.0%
78-93-3	Methyl ethyl ketone	9.983E-07	AERMOD-m	1.42668E-05	354191	5572230	24	24	1.42668E-05	1000	Health	Schedule 3	0.0%
79-01-6	Trichloroethylene	5.5461E-06	AERMOD-m	7.92601E-05	354191	5572230	24	24	7.92601E-05	12	Health	Schedule 3	0.0%
83-32-9	PAH - Acenaphthene	1.6823E-07	AERMOD-m	2.40422E-06	354191	5572230	24	24	2.40422E-06	0		0	Neg
85-01-8	Phenanthrene	1.2941E-06	AERMOD-m	0.000018494	354191	5572230	24	24	0.000018494	0		0	Neg
86-73-7	PAH - Fluorene	6.2856E-07	AERMOD-m	8.98281E-06	354191	5572230	24	24	8.98281E-06	0		0	Neg
86-74-8	Dibenzopyrrole	3.3277E-07	AERMOD-m	4.7556E-06	354191	5572230	24	24	4.7556E-06	40	JSL	JSL	0.0%
87-86-5	Pentachlorophenol	9.4284E-09	AERMOD-m	1.34742E-07	354191	5572230	24	24	1.34742E-07	20	Health	Guideline	0.0%
88-06-2	2,4,6-trichlorophenol	4.0671E-09	AERMOD-m	5.81241E-08	354191	5572230	24	24	5.81241E-08	1.5	JSL	JSL	0.0%
88-75-5	2-Nitrophenol	4.4369E-08	AERMOD-m	6.34081E-07	354191	5572230	24	24	6.34081E-07	0		0	Neg
91-20-3	Naphthalene	1.7932E-05	AERMOD-m	0.000474246	354059	5571849	1	0.1667	0.00078318	50	Odour	Guideline	0.0%
91-20-3	Naphthalene	1.7932E-05	AERMOD-m	0.000256274	354191	5572230	24	24	0.000256274	22.5	Health	Guideline	0.0%
91-57-6	2-Methyl Naphthalene	2.9579E-08	AERMOD-m	4.2272E-07	354191	5572230	24	24	4.2272E-07	10	JSL	JSL	0.0%
91-58-7	2-Chloronaphthalene	4.4369E-10	AERMOD-m	6.34081E-09	354191	5572230	24	24	6.34081E-09	0		0	Neg
95-47-6	o-Xylene	4.6217E-06	AERMOD-m	6.60501E-05	354191	5572230	24	24	6.60501E-05	100	JSL	JSL	0.0%
95-57-8	2-Chlorophenol	4.4369E-09	AERMOD-m	6.34081E-08	354191	5572230	24	24	6.34081E-08	0.8	JSL	JSL	0.0%
98-86-2	Acetophenone	5.9158E-10	AERMOD-m	1.56452E-08	354059	5571849	1	1	1.56452E-08	1167	Health	Guideline	0.0%
100-02-7	p-Nitrophenol	2.0336E-08	AERMOD-m	2.9062E-07	354191	5572230	24	24	2.9062E-07	4	JSL	JSL	0.0%
100-41-4	Ethylbenzene	5.731E-06	AERMOD-m	8.19021E-05	354191	5572230	24	24	8.19021E-05	1000	Health	Schedule 3	0.0%
100-42-5	Styrene	0.00035125	AERMOD-m	0.00501981	354191	5572230	24	24	0.00501981	400	Health	Schedule 3	0.0%
100-52-7	Benzaldehyde	1.5714E-07	AERMOD-m	2.2457E-06	354191	5572230	24	24	2.2457E-06	2	JSL	JSL	0.0%
104-87-0	p-Tolualdehyde	2.0336E-06	AERMOD-m	0.000029062	354191	5572230	24	24	0.000029062	0		0	Neg
107-02-8	Acrolein	0.00073948	AERMOD-m	0.019557	354059	5571849	1	1	0.019557	4.5	Health	Schedule 3	0.4%
107-02-8	Acrolein	0.00073948	AERMOD-m	0.010568	354191	5572230	24	24	0.010568	0.4	Health	Schedule 3	2.6%
107-06-2	1,2-Dichloroethane / Ethylene dichloride	5.3612E-06	AERMOD-m	7.66181E-05	354191	5572230	24	24	7.66181E-05	2	Health	Schedule 3	0.0%
108-88-3	Toluene	0.00017008	AERMOD-m	0.00243064	354191	5572230	24	24	0.00243064	2000	Odour	Guideline	0.0%
108-90-7	Chlorobenzene	6.1007E-06	AERMOD-m	0.000161342	354059	5571849	1	0.1667	0.00026644	4500	Odour	Guideline	0.0%
108-90-7	Chlorobenzene	6.1007E-06	AERMOD-m	0.000161342	354059	5571849	1	1	0.000161342	3500	Health	Guideline	0.0%



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CAS#	Contaminant	Total Emission Rate (g/s)	Dispersion Model Used	Max POI Value (µg/m³)	Location of		Averaging Period Modelled (h)	Averaging Period of Criterion (h)	Max POI Value Converted to Criterion Period (µg/m³)	Criteria (µg/m³)	Limiting Effect	Regulation Schedule #	Percentage of Criteria or Likelihood of adverse effect (%)
					X (m)	Y (m)							
108-95-2	Phenol	9.4284E-06	AERMOD-m	0.000134742	354191	5572230	24	24	0.000134742	30	Health	Schedule 3	0.0%
117-81-7	Bis(2-ethylhexyl) phthalate	8.6889E-09	AERMOD-m	1.24174E-07	354191	5572230	24	24	1.24174E-07	50	Health	Schedule 3	0.0%
120-12-7	Anthracene	5.5461E-07	AERMOD-m	7.92601E-06	354191	5572230	24	24	7.92601E-06	0.2	JSL	JSL	0.0%
123-38-6	Propionaldehyde	1.1277E-05	AERMOD-m	0.000298237	354059	5571849	1	0.1667	0.000492515	10	Odour	Guideline	0.0%
123-73-9	Crotonaldehyde	1.8302E-06	AERMOD-m	2.61558E-05	354191	5572230	24	24	2.61558E-05	3.4	JSL	JSL	0.0%
124-38-9	Carbon Dioxide	36.0496261	AERMOD-m	515.190613	354191	5572230	24	24	515.190613	21000	JSL	JSL	2.5%
127-18-4	Tetrachloroethylene	7.0251E-06	AERMOD-m	0.000100396	354191	5572230	24	24	0.000100396	360	Health	Schedule 3	0.0%
129-00-0	Pyrene	6.8402E-07	AERMOD-m	9.77541E-06	354191	5572230	24	24	9.77541E-06	0.2	JSL	JSL	0.0%
191-24-2	Benzo(g,h,i)perylene	1.7193E-08	AERMOD-m	2.45706E-07	354191	5572230	24	24	2.45706E-07	1.2	JSL	JSL	0.0%
192-97-2	Benzo(e)pyrene	4.8066E-10	AERMOD-m	6.86921E-09	354191	5572230	24	24	6.86921E-09	0		0	Neg
193-39-5	Indeno(1,2,3-c,d)pyrene	1.6084E-08	AERMOD-m	2.29854E-07	354191	5572230	24	24	2.29854E-07	0		0	Neg
198-55-0	Perylene	9.6132E-11	AERMOD-m	1.37384E-09	354191	5572230	24	24	1.37384E-09	0		0	Neg
205-99-2	Benzo(b)fluoranthene	1.8487E-08	AERMOD-m	2.642E-07	354191	5572230	24	24	2.642E-07	0		0	Neg
206-44-0	Fluoranthene	2.9579E-07	AERMOD-m	4.2272E-06	354191	5572230	24	24	4.2272E-06	140	JSL	JSL	0.0%
207-08-9	Benzo(k)fluoranthene	6.6553E-09	AERMOD-m	9.51121E-08	354191	5572230	24	24	9.51121E-08	0		0	Neg
208-96-8	Acenaphthylene	9.2435E-07	AERMOD-m	0.00001321	354191	5572230	24	24	0.00001321	3.5	JSL	JSL	0.0%
218-01-9	Benzo(a)phenanthrene	7.0251E-09	AERMOD-m	1.00396E-07	354191	5572230	24	24	1.00396E-07	0		0	Neg
529-20-4	o-Tolualdehyde	1.3311E-06	AERMOD-m	1.90224E-05	354191	5572230	24	24	1.90224E-05	0		0	Neg
540-49-8	1,2-Dibromoethene	1.0168E-05	AERMOD-m	0.00014531	354191	5572230	24	24	0.00014531	0		0	Neg
630-08-0	Carbon monoxide	0.11092193	AERMOD-m	2.933482	354059	5571849	1	0.5	3.561818838	6000	Health	Schedule 3	0.1%
1746-01-6	2,3,7,8-tetrachlorodibenzo-para-dioxin	8.6889E-11	AERMOD-m	1.24174E-09	354191	5572230	24	24	1.24174E-09	0.000005	Assessment Va	Schedule 3	0.0%
1746-01-6	2,3,7,8-tetrachlorodibenzo-para-dioxin	8.6889E-11	AERMOD-m	1.05205E-10	354219	5572309	8760	8760	1.05205E-10	1E-07	Health	Schedule 3	0.1%
2050-67-1	Dichlorobiphenyl	1.368E-10	AERMOD-m	1.95508E-09	354191	5572230	24	24	1.95508E-09	0		0	Neg
2051-24-3	Decachlorobiphenyl	4.9915E-11	AERMOD-m	7.13341E-10	354191	5572230	24	24	7.13341E-10	0		0	Neg
2974-90-5	Dichlorobiphenyl	1.368E-10	AERMOD-m	1.95508E-09	354191	5572230	24	24	1.95508E-09	0		0	Neg
3268-87-9	Octachlorodibenzo-p-dioxin	1.2201E-08	AERMOD-m	1.74372E-07	354191	5572230	24	24	1.74372E-07	0		0	Neg
7439-89-6	Iron	0.00018302	AERMOD-m	0.00261558	354191	5572230	24	24	0.00261558	0		0	Neg
7439-92-1	Lead	8.8738E-06	AERMOD-m	0.000126816	354191	5572230	24	24	0.000126816	0.5	Health	Schedule 3	0.0%
7439-92-1	Lead	8.8738E-06	AERMOD-m	2.08806E-05	354199	5572289	720	720	2.08806E-05	0.2	Health	Schedule 3	0.0%
7439-96-5	Manganese	0.00029579	AERMOD-m	0.0042272	354191	5572230	24	24	0.0042272	0.4	Health	Schedule 3	1.1%
7439-97-6	Mercury	6.4704E-07	AERMOD-m	9.24701E-06	354191	5572230	24	24	9.24701E-06	0.5	Health	Schedule 3	0.0%
7439-98-7	Molybdenum	3.8823E-07	AERMOD-m	5.54821E-06	354191	5572230	24	24	5.54821E-06	120	Particulate	Guideline	0.0%
7440-02-0	Nickel	6.1007E-06	AERMOD-m	8.71861E-05	354191	5572230	24	24	8.71861E-05	2	Assessment Va	Schedule 3	0.0%
7440-02-0	Nickel	6.1007E-06	AERMOD-m	7.38677E-06	354219	5572309	8760	8760	7.38677E-06	0.04	Health	Schedule 3	0.0%
7440-09-7	Potassium	0.00720993	AERMOD-m	0.103038	354191	5572230	24	24	0.103038	8	JSL	JSL	1.3%
7440-22-4	Silver	0.00031428	AERMOD-m	0.0044914	354191	5572230	24	24	0.0044914	1	Health	Schedule 3	0.4%
7440-23-5	Sodium	6.6553E-05	AERMOD-m	0.000951121	354191	5572230	24	24	0.000951121	0		0	Neg
7440-24-6	Strontium	1.8487E-06	AERMOD-m	0.00002642	354191	5572230	24	24	0.00002642	120	Particulate	Guideline	0.0%
7440-31-5	Tin	4.252E-06	AERMOD-m	6.07661E-05	354191	5572230	24	24	6.07661E-05	10	Health	Schedule 3	0.0%
7440-32-6	Titanium	3.6974E-06	AERMOD-m	5.28401E-05	354191	5572230	24	24	5.28401E-05	120	Particulate	Schedule 3	0.0%
7440-36-0	Antimony	1.4605E-06	AERMOD-m	2.08718E-05	354191	5572230	24	24	2.08718E-05	25	Health	Schedule 3	0.0%
7440-38-2	Arsenic	4.0671E-06	AERMOD-m	5.81241E-05	354191	5572230	24	24	5.81241E-05	0.3	Health	Guideline	0.0%
7440-39-3	Barium - total water soluble	3.1428E-05	AERMOD-m	0.00044914	354191	5572230	24	24	0.00044914	10	Health	Guideline	0.0%
7440-41-7	Beryllium (And its compounds)	2.0336E-07	AERMOD-m	2.9062E-06	354191	5572230	24	24	2.9062E-06	0.01	Health	Schedule 3	0.0%
7440-43-9	Cadmium	7.5797E-07	AERMOD-m	1.08322E-05	354191	5572230	24	24	1.08322E-05	0.025	Health	Schedule 3	0.0%
7440-47-3	Chromium (metallic, II, III)	3.8823E-06	AERMOD-m	5.54821E-05	354191	5572230	24	24	5.54821E-05	0.5	Health	Schedule 3	0.0%
7440-48-4	Cobalt	1.2017E-06	AERMOD-m	0.000017173	354191	5572230	24	24	0.000017173	0.1	Health	Guideline	0.0%
7440-50-8	Copper	9.0586E-06	AERMOD-m	0.000129458	354191	5572230	24	24	0.000129458	50	Health	Schedule 3	0.0%
7440-62-2	Vanadium	1.8117E-07	AERMOD-m	2.58916E-06	354191	5572230	24	24	2.58916E-06	2	Health	Schedule 3	0.0%
7440-65-5	Yttrium	5.5461E-08	AERMOD-m	7.92601E-07	354191	5572230	24	24	7.92601E-07	2.4	JSL	JSL	0.0%
7440-66-6	Zinc	7.7645E-05	AERMOD-m	0.00110964	354191	5572230	24	24	0.00110964	120	Particulate	Schedule 3	0.0%

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CAS#	Contaminant	Total Emission Rate (g/s)	Dispersion Model Used	Max POI Value (µg/m³)	Location of		Averaging Period Modelled (h)	Averaging Period of Criterion (h)	Max POI Value Converted to Criterion Period (µg/m³)	Criteria (µg/m³)	Limiting Effect	Regulation Schedule #	Percentage of Criteria or Likelihood of adverse effect (%)
					X (m)	Y (m)							
7647-01-0	Hydrochloric acid	0.00351253	AERMOD-m	0.050198	354191	5572230	24	24	0.050198	20	Health	Schedule 3	0.3%
7723-14-0	Phosphorus, white	4.9915E-06	AERMOD-m	7.13341E-05	354191	5572230	24	24	7.13341E-05	0.35	JSL	JSL	0.0%
7782-49-2	Selenium	5.1764E-07	AERMOD-m	7.39761E-06	354191	5572230	24	24	7.39761E-06	10	Health	Guideline	0.0%
7782-50-5	Chlorine	0.00014605	AERMOD-m	0.00208718	354191	5572230	24	24	0.00208718	10	Health	Schedule 3	0.0%
10024-97-2	Nitrous Oxide	0.00240331	AERMOD-m	0.034346	354191	5572230	24	24	0.034346	9000	Health	Guideline	0.0%
10102-44-0	Nitrogen oxides	0.04532144	AERMOD-m	1.07637	354059	5571849	1	1	1.07637	400	Health	Schedule 3	0.3%
10102-44-0	Nitrogen oxides	0.04532144	AERMOD-m	0.58165	354191	5572230	24	24	0.58165	200	Health	Schedule 3	0.3%
10102-44-0	Nitrogen oxides (emergency generator)	0.47397001	AERMOD-m	974.74658	354173	5572112	1	0.5	1183.532311	1880	Health	NA	63.0%
13029-08-8	Dichlorobiphenyl	1.368E-10	AERMOD-m	1.95508E-09	354191	5572230	24	24	1.95508E-09	0		0	Neg
15862-07-4	Trichlorobiphenyl	4.8066E-10	AERMOD-m	6.86921E-09	354191	5572230	24	24	6.86921E-09	0		0	Neg
15968-05-5	Tetrachlorobiphenyl	4.6217E-10	AERMOD-m	6.60501E-09	354191	5572230	24	24	6.60501E-09	0		0	Neg
18259-05-7	Pentachlorobiphenyl	2.2184E-10	AERMOD-m	3.1704E-09	354191	5572230	24	24	3.1704E-09	0		0	Neg
18540-29-9	Chromium compounds - Hexavalent	6.4704E-07	AERMOD-m	9.24701E-06	354191	5572230	24	24	9.24701E-06	0.07	Assessment Va	Schedule 3	0.0%
18540-29-9	Chromium compounds - Hexavalent	6.4704E-07	AERMOD-m	7.83445E-07	354219	5572309	8760	8760	7.83445E-07	0.00014	Health	Schedule 3	0.6%
26601-64-9	Hexachlorobiphenyl	1.0168E-10	AERMOD-m	1.4531E-09	354191	5572230	24	24	1.4531E-09	0		0	Neg
27323-18-8	Monochlorobiphenyl	4.0671E-11	AERMOD-m	5.81241E-10	354191	5572230	24	24	5.81241E-10	0		0	Neg
32598-13-3	Tetrachlorobiphenyl	4.6217E-10	AERMOD-m	6.60501E-09	354191	5572230	24	24	6.60501E-09	0		0	Neg
32690-93-0	Tetrachlorobiphenyl	4.6217E-10	AERMOD-m	6.60501E-09	354191	5572230	24	24	6.60501E-09	0		0	Neg
33146-45-1	Dichlorobiphenyl	1.368E-10	AERMOD-m	1.95508E-09	354191	5572230	24	24	1.95508E-09	0		0	Neg
35065-29-3	Heptachlorobiphenyl	1.2201E-11	AERMOD-m	1.74372E-10	354191	5572230	24	24	1.74372E-10	0		0	Neg
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin	3.6974E-10	AERMOD-m	5.28401E-09	354191	5572230	24	24	5.28401E-09	0		0	Neg
37680-69-6	Trichlorobiphenyl	4.8066E-10	AERMOD-m	6.86921E-09	354191	5572230	24	24	6.86921E-09	0		0	Neg
37680-73-2	Pentachlorobiphenyl	2.2184E-10	AERMOD-m	3.1704E-09	354191	5572230	24	24	3.1704E-09	0		0	Neg
38444-73-4	Trichlorobiphenyl	4.8066E-10	AERMOD-m	6.86921E-09	354191	5572230	24	24	6.86921E-09	0		0	Neg
39001-02-0	Octachlorodibenzofuran	1.6269E-11	AERMOD-m	2.32496E-10	354191	5572230	24	24	2.32496E-10	0		0	Neg
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin	2.9579E-07	AERMOD-m	4.2272E-06	354191	5572230	24	24	4.2272E-06	0		0	Neg
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-p-dioxin	2.773E-10	AERMOD-m	3.963E-09	354191	5572230	24	24	3.963E-09	0		0	Neg
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran (TEQ)	1.3865E-10	AERMOD-m	1.9815E-09	354191	5572230	24	24	1.9815E-09	0		0	Neg
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	4.4369E-11	AERMOD-m	6.34081E-10	354191	5572230	24	24	6.34081E-10	0		0	Neg
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	5.1764E-11	AERMOD-m	7.39761E-10	354191	5572230	24	24	7.39761E-10	0		0	Neg
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	5.1764E-11	AERMOD-m	7.39761E-10	354191	5572230	24	24	7.39761E-10	0		0	Neg
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	2.9579E-07	AERMOD-m	4.2272E-06	354191	5572230	24	24	4.2272E-06	0		0	Neg
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	5.1764E-11	AERMOD-m	7.39761E-10	354191	5572230	24	24	7.39761E-10	0		0	Neg
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	5.1764E-11	AERMOD-m	7.39761E-10	354191	5572230	24	24	7.39761E-10	0		0	Neg
PM	Total particulate matter	2.31278379	AERMOD-PM	60.16636	354183.8	5572223	24	24	60.16636	120	Particulate	Schedule 3	50.1%

Figures





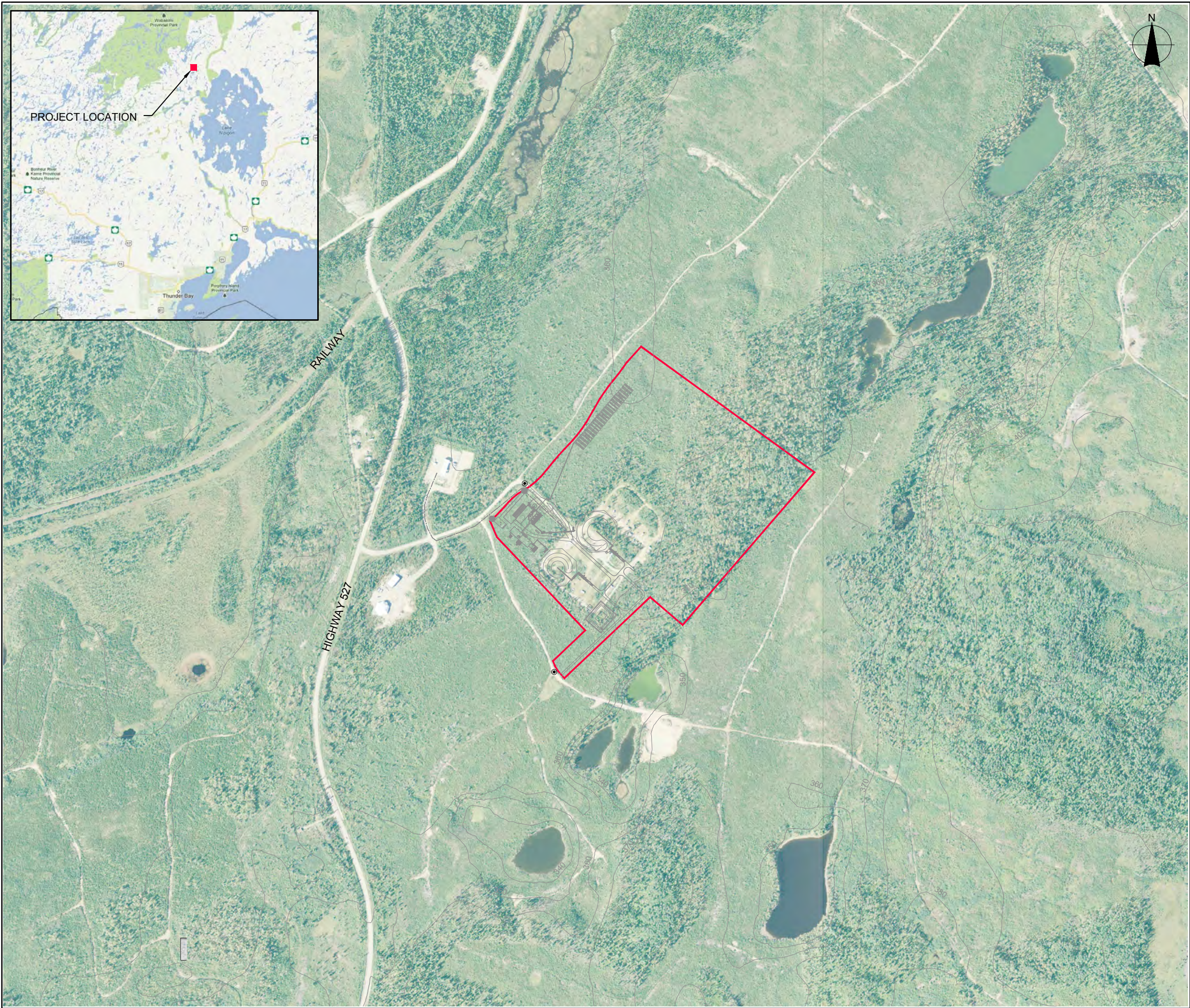


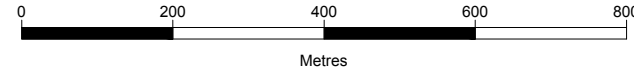
FIGURE E1

WHITESAND FIRST NATION  
COGENERATION & PELLET MILL PROJECT  
*ESDM REPORT*

SITE LOCATION PLAN

- LEGEND**
- PROJECT LOCATION
  - EXISTING ELECTRICITY DISTRIBUTION LINE
  - CONNECTION POINT
  - EXISTING 10m CONTOURS INTERVAL (m asl)
  - GEO REFERENCE

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1:10,000  
August 2014  
Project Number: 300030895  
Prepared by: C. Sheppard  
Projection: UTM Zone 16  
Datum: NAD83  
Verified by: C. Shilton

NEEGAN BURNSIDE



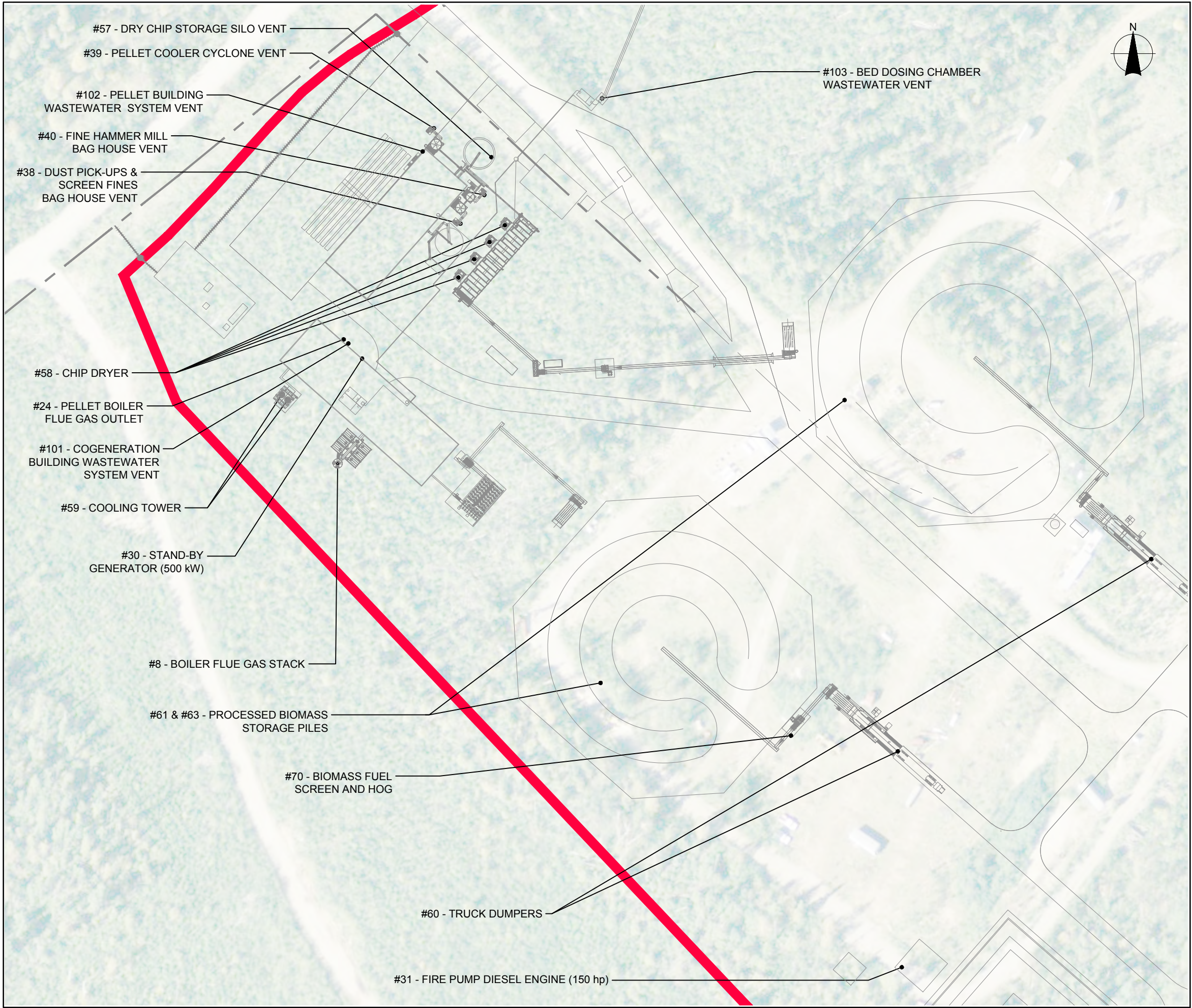


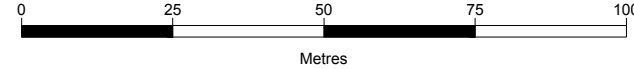
FIGURE E2

WHITESAND FIRST NATION  
COGENERATION & PELLET MILL PROJECT  
*ESDM REPORT*

ROOF PLAN &  
EMISSION POINTS

- LEGEND**
- PROJECT LOCATION
  - EXISTING ELECTRICITY DISTRIBUTION LINE
  - CONNECTION POINT

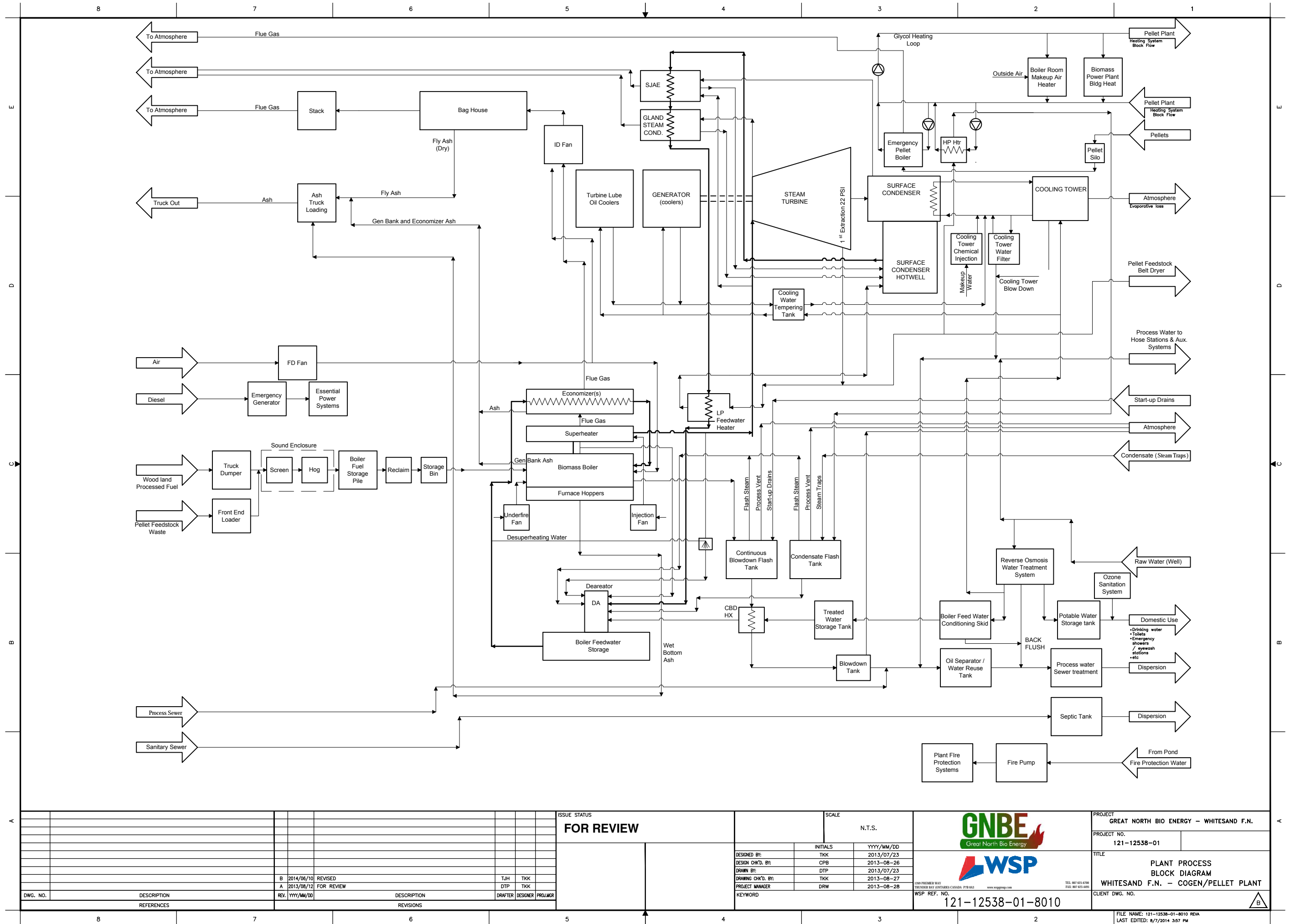
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1:1,250  
August 2014  
Project Number: 300030895  
Prepared by: C. Sheppard  
Projection: UTM Zone 16  
Datum: NAD83  
Verified by: C. Shilton

NEEGAN BURNSIDE







COMMENTS:

**SOURCES:**



RECEPTORS:

2101

OUTPUT TYPE:
--------------

## Concentration

MAX:

COMPANY NAME:

**R.J. Burnside &  
Associates Limited**

MODELER:

KA

DATE:

8/12/2014

SCALE: 1:8,422

0 0.2 km

PROJECT NO.:

**030895**



# Supporting Calculations



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## 1.0 Usage Rates

Please see **Table E1** for maximum usage rates and list of combustion equipment corresponding to the operating conditions that would result in the maximum emission rate in accordance with s.10 and s.11 of O.Reg. 419/05.

## 2.0 Combustion Equipment:

There will be four pieces of combustion equipment on site:

- 3.6 MW biomass fuelled boiler;
- 7 MMBtu/h emergency pellet boiler;
- 500 KW standby diesel generator; and,
- 150 HP emergency fire pump diesel engine.

**Methodology:** USEPA Emission Factor ("EF")

AP-42<sup>2</sup> lists 31 contaminants as products of diesel combustion and 121 contaminants as products of wood combustion. The contaminant emission rates used for diesel combustion are Nitrogen Oxides ("NO<sub>x</sub>"), Total Suspended Particulate Matter ("TSP") and any factor for a contaminant that is released in another process. The remaining unused factors will predict POI concentrations below their corresponding criteria since the NO<sub>x</sub> emission factor provides the highest % of criteria per unit of combustion. All emission factors were used for wood combustion.

$$R [g/s] = \frac{X * FiringRate [Btu/h] * [1000 g/kg]}{[3600 s/h] * [10^6] * [2.2046226 lb/kg]}$$

Where,  
R is the emission rate in g/s.  
X is the AP42<sup>3</sup> emission factor for the appropriate contaminant.

The emission factors used in this application for diesel combustion are:

CAS#	Contaminant Name	X= (in lb /MMBtu)	Emission Factor Rating	Data Quality
10102-44-0	NO <sub>x</sub>	4.41	D	Marginal
	PM10	0.31	D	Marginal

The list of diesel-fired equipment can be found in **Table EA-B**.

<sup>2</sup> "Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources" Table 1.4-1 from the Air CHIEF CD-ROM Version 12, June 2005.

<sup>3</sup> "Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources" Table 1.4-1 from the Air CHIEF CD-ROM Version 12, June 2005.

**Data Quality: Marginal**

Data quality for this calculation is best characterized by the following paragraph from s.8.3.4 of the ESDM Procedure Document titled “Marginal” or “Uncertain Data Quality” Emission Estimating Techniques states:

*Emission Factors: Emission rate estimates that are developed from tests on only a small number of facilities where there is evidence of variability within the source category population (e.g., US EPA, AP-42, emission factor quality rating of D or E) and/or the emission factor rating is uncertain are considered to have uncertain data quality.*

The list of wood-fired equipment can be found in **Table EA-B**.

**Sample Calculation: Standby diesel generator**

For NO<sub>x</sub>:

From the Table above, for NO<sub>x</sub>, X= 4.41 lb/MMBtu (Emission Factor Rating “D”). The input firing rate is 1,706,000 Btu/h.

$$\begin{aligned} R \text{ (g/s)} &= \frac{4.41 \text{ lb}}{10^6 \text{ Btu}} * \frac{1,706,000 \text{ Btu}}{\text{h}} * \frac{\text{kg}}{2.2046226 \text{ lb}} * \frac{1000 \text{ g}}{\text{kg}} * \frac{1 \text{ h}}{3600 \text{ s}} \\ &= 0.95 \text{ g/s} \end{aligned}$$

Emergency equipment will not run for more than 12 hours; therefore emission rate was divided by 2 and no variable emission scenario used in the modelling.

$$R \text{ (g/s)} = 0.95 \text{ g/s} / 2 = 0.474 \text{ g/s}$$

Operating Condition, Individual maximum Rates of Production:

The emission rate calculations for these sources are based on the maximum input firing rate of the gas-fired unit at each point.

### **3.0 Equipment Emissions**

#### **3.1 General Information**

##### **3.1.1 Balance of Assumptions**

In order to represent the worst case emission scenario for the Site a number of conservative assumptions were used in the assessment as listed below. All of the assumptions used throughout the Application are listed together so that it can be seen that the balance of assumptions is generally conservative.

- All the equipment is assumed to be operating 24 hours a day, 7 days a week all year.
- Particulate matter from unpaved onsite roads is included in the assessment. Dust mitigation of 95% is assumed. No adjustment for the rainfall or other precipitation is used. There will be a Best Management Plan implemented for onsite roads.
- Both biomass storage piles are considered in the modeling. A conservative assumption of up to 10 transfer points was used in emission rate calculation for each pile. Both piles were assumed to be 20 m in diameter as per model restriction. Since only part of the pile will be disturbed during each day, the disturbed surface area will be smaller than the surface area of the entire pile so the restriction of the source to 20 m in diameter is reasonable. No adjustment for the rainfall or other precipitation is used. There will be a Best Management Plan implemented for the onsite storage piles.
- The emission factor for dry product is used despite the fact that the biomass is not completely dry. This choice was made because the emission factor for the wet biomass could be an underestimate.
- Backup diesel generator and emergency diesel fire pump engine are included in the assessment. The same contaminants are emitted from both equipment with higher emissions coming from backup diesel generator; therefore emissions from diesel generator were used in the assessment. Modelling files for emergency diesel fire pump are also included on CD.
- Emergency pellet boiler is used as a backup for the main biomass boiler; therefore both boilers will never run at the same time. Emissions from the main biomass boiler were used in the assessment since both boilers will emit the same contaminants and higher emissions result from the main biomass boiler. Modelling files for an emergency pellet boiler are also included on CD. It was assumed to be operating 12 hours a day, 7 days a week, all year.
- Pellet plant mill lab exhaust is considered negligible as it will be used for quality control only.
- The ripening bin is considered insignificant, as the content of the bin will be conditioned with steam or water and is not expected to generate any particulate matter.

- Garage vehicle exhaust is negligible, as per **Table B-3** (ESDM Procedure Document Section 7.2.1).
- Dry chips conveyors and storage silo will handle finished product, which is larger than 6 mm; therefore emissions are considered negligible.
- Biomass boiler ash is considered negligible, because it will be stored in a bunker or bin.
- Truck dumpers are considered negligible, as they will be contained and minimal fugitive emissions are expected.
- All mobile equipment will be moving on the paved areas or inside the buildings only, therefore is considered negligible.
- All the outdoor biomass conveyors and stackers are considered negligible as they will handle humid biomass that is less prone to generate dust as per The BC Ministry of the Environment documentation “Emissions and Air Pollution Controls for the Biomass Pellet Manufacturing Industry” (included on CD).
- The dried pellet storage conveyors are assumed to have no emissions as produced chips will be in the bags; therefore are not included in the assessment.

### 3.1.2 Table EA-99: Site Emissions Summary

**Table EA-99** lists all the emissions from all the sources at the Site. It also adjusts the emissions calculated on the EA-xx series of tables for the cases described below.

The value shown on **Table EA-99** is the maximum emission rate calculated on the corresponding calculation sheet for that contaminant.

**Table EA-99** shows a “1” in the column for “Volatility” when a product is a liquid or a gas. This column shows a “0” when the contaminant is a solid.

**Table EA-99** shows a “1” in the column for “Negligible Indicator” when a contaminant is considered negligible. The reasons for being considered negligible are indicated on **Table 1** and discussed in **Appendix B**.

## 3.2 Biomass Handling Building Exhaust

Particulate emissions from the biomass handling building exhaust was calculated based on the 20 mg/m<sup>3</sup> emission factor provided in **Tables C-1** and **C-2** of the MOE Guide.

**Methodology:** Emission Factor (“EF”)

$$R [g/s] = \frac{X * FlowRate [m^3 / s]}{[1000mg / g]}$$

Where,

R is the emission rate in g/s.

X is the particulate emission factor based on the MOE Guideline.

ECA Supporting Calculations  
October 2014

### Data Quality: Above-Average

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.2 of the ESDM Procedure Document titled “Above-Average Data Quality” Emission Estimating Techniques states:

*Emission Factors: Emission rate estimates that are developed from tests on a moderate to large number of sources where the source category population is sufficiently specific to minimize variability (e.g., US EPA, AP-42, emission factor quality rating of A or B) are anticipated to provide above-average quality of emission rate estimates.*

### Sample Calculation:

Biomass hog and screen baghouse:

$$R \text{ (g/s)} = 20\text{mg/m}^3 * 4.719\text{m} * \left[ \frac{1000\text{mg}}{1\text{g}} \right]$$

$$= 0.094 \text{ g/s}$$

## 3.3 Baghouses

Particulate emissions from the baghouses were calculated using manufacturer’s data.

**Methodology:** Engineering Calculation (“EC”)

$$R \text{ [g/s]} = \frac{X \text{ [lb/hr]} * [453.59 \text{ g/lb}] * [1\text{hr}]}{[3600\text{s}]}$$

Where,

R is the emission rate in g/s.

X is the particulate emission factor based on manufacturer’s data.

### Data Quality: Above-Average

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.2 of the ESDM Procedure Document titled “Above-Average Data Quality” Emission Estimating Techniques states:

*Engineering Calculations/Judgement: Emission rate estimates derived from fundamental scientific and engineering principles; and/or relevant empirical data can be considered above-average quality estimates if it is clear (e.g., the approach is recommended through MOE documentation)*

*that the estimating technique will result in relatively conservative predictions.*

### Sample Calculation:

Fine hammer mill dust baghouse:

$$\begin{aligned} R \text{ (g/s)} &= \frac{0.198 \text{ lb/hr} * 453.59 \text{ g/lb} * 1 \text{ hr}}{3600 \text{ s}} \\ &= 0.025 \text{ g/s} \end{aligned}$$

## 3.4 Dried Biomass Storage Silo

Particulate emissions from the dried biomass storage silo were calculated based on a maximum grain loading of 0.05 grains per dry standard cubic foot and a maximum air flow rate of 20 ft.<sup>3</sup>/min.

### Methodology: Emission Factor ("EF")

The emission from the silo is estimated as 20 cfm times 0.05 grain/ft<sup>3</sup>.

### Data Quality: Above-Average

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.2 of the ESDM Procedure Document titled "Above-Average Data Quality" Emission Estimating Techniques states:

*Emission Factors: Emission rate estimates that are developed from tests on a moderate to large number of sources where the source category population is sufficiently specific to minimize variability (e.g., US EPA, AP-42, emission factor quality rating of A or B) are anticipated to provide above-average quality of emission rate estimates.*

### Sample Calculation:

$$\begin{aligned} R \text{ (g/s)} &= 20 \text{ cfm} * 0.05 \text{ gr / scf} * \left[ \frac{1 \text{ lb}}{7,000 \text{ gr}} \right] * \left[ \frac{453.6 \text{ g}}{1 \text{ lb}} \right] * \left[ \frac{1 \text{ min}}{60 \text{ s}} \right] \\ &= 0.00108 \text{ g/s} \end{aligned}$$



### 3.5 Cooling Tower

Particulate emissions from the cooling tower were calculated based on AP-42 recommendations and manufacture provided drift rate of 0.01%.

**Methodology:** Engineering Calculation ("EC")

$$R [g/s] = Throughput[gal / min] * \left[ \frac{3.785L}{1gal} \right] * \left[ \frac{1min}{60s} \right] * \\ * WaterConc.[mg / L] * \left[ \frac{1g}{1000mg} \right] * DriftRate[\%]$$

Where,

R is the emission rate in g/s.

X is the AP42<sup>4</sup> emission factor for the appropriate contaminant.

**Data Quality:** Above-Average

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.2 of the ESDM Procedure Document titled "Above-Average Data Quality" Emission Estimating Techniques states:

*Engineering Calculations/Judgement: Emission rate estimates derived from fundamental scientific and engineering principles; and/or relevant empirical data can be considered above-average quality estimates if it is clear (e.g., the approach is recommended through MOE documentation) that the estimating technique will result in relatively conservative predictions.*

**Sample Calculation:**

$$R (g/s) = 1,800gal / min * \left[ \frac{3.785L}{1gal} \right] * \left[ \frac{1min}{60s} \right] * 1,200mg / L * \left[ \frac{1g}{1000mg} \right] * 0.01[\%] \\ = 0.0136 g/s$$

### 3.6 Road Dust

Particulate emissions from the onsite roads were calculated based on AP-42 methodology for unpaved roads.

<sup>4</sup> "Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume 1: Stationary Point and Area Sources" Table 1.4-1 from the Air CHIEF CD-ROM Version 12, June 2005.

**Methodology: USEPA Emission Factor ("EF")**

$$X [lb/VMT] = k * \left[ \frac{SiltContent(\%)}{12} \right]^a * \left[ \frac{VehicleWeight(tons)}{3} \right]^b$$

Where,

X is the emission factor in lb/VMT based on AP-42 constants;

VMT – vehicle mile travelled;

Constants k = 4.9 (lb/VMT), a = 0.7, b = 0.45;

$$R [g/s] = X[lb/VMT] * \left[ \frac{281.9g/VKT}{1lb/VMT} \right] * Dist[km] * [1 - 0.95] * \\ * \left[ \frac{1day}{24hour} \right] * \left[ \frac{1hour}{3600s} \right]$$

Where,

R is the emission rate in g/s;

Dist – total distance travelled on this road segment in 1 day;

Dust mitigation = 0.95%.

**Data Quality: Above-Average**

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.2 of the ESDM Procedure Document titled "Above-Average Data Quality" Emission Estimating Techniques states:

*Emission Factors: Emission rate estimates that are developed from tests on a moderate to large number of sources where the source category population is sufficiently specific to minimize variability (e.g., US EPA, AP-42, emission factor quality rating of A or B) are anticipated to provide above-average quality of emission rate estimates.*

**Sample Calculation: Road segment #1**

$$R (g/s) = 4.9[lb/VMT] * \left[ \frac{8.4(\%)}{12} \right]^{0.7} * \left[ \frac{(45tons)}{3} \right]^{0.45} * \left[ \frac{281.9g/VKT}{1lb/VMT} \right] * \\ * 1.75[km] * [1 - 0.95] * \left[ \frac{1day}{24hour} \right] * \left[ \frac{1hour}{3600s} \right] \\ = 0.0037 g/s$$

### 3.7 Biomass Storage Piles

Particulate emissions from the biomass storage piles were based on emission factor provided in US EPA Memorandum on Particulate Matter Potential to Emit Emission Factors for Activities at Sawmills, Excluding Boilers, Located in Pacific Northwest Indian Country (included on CD).

An emission factor for “drop” of “dry” material from one surface to another, including drop onto a pile was used for the storage piles.

**Methodology:** USEPA Emission Factor (“EF”)

$$R [g / s] = X [lb / bdt] * MatHandl [bdt / day] * \#ofTransferPoints$$

Where,

R is the emission rate in g/s;

X is the emission factor in pounds per dry bone ton of material;

MatHandl is the weight of the wood chips moved from the pile per day in tons;

#ofTransferPoints is the number of points where biomass is moved/dropped.

**Data Quality:** Marginal

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.4 of the ESDM Procedure Document titled “Marginal” or “Uncertain Data Quality” Emission Estimating Techniques states:

*Emission Factors: Emission rate estimates that are developed from tests on only a small number of facilities where there is evidence of variability within the source category population (e.g., US EPA, AP-42, emission factor quality rating of D or E) and/or the emission factor rating is uncertain are considered to have uncertain data quality.*

**Sample Calculation: Chip storage pile**

$$R (g/s) = 0.0015 [lb / bdt] * 9,250 [tonnes] / 22 [days] * 10 * (100\% - 45\% (WaterContent)) * \frac{1.1ton}{1tonne} * \left[ \frac{453.6g}{lb} \right] * \left[ \frac{1day}{12hr} \right] * \left[ \frac{1hr}{3600s} \right]$$

$$= 0.0401 g/s$$

### 3.8 Biomass Belt Dryer

Particulate emissions from the biomass belt dryer were calculated per stack using emission rate provided by the manufacturer.

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October 2014

**Methodology:** Manufacturer Emission Factors (“EF”)

$$R [g / s] = X[mg / m^3] * FlowRate[m^3 / s] * \left[ \frac{1g}{1000mg} \right]$$

Where,

R is the emission rate in g/s;

X is the emission rate in mg/m<sup>3</sup>.

The emission factors used in this application for the dryer are:

**Data Quality:** Above-Average

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.2 of the ESDM Procedure Document titled “Above-Average Data Quality” Emission Estimating Techniques states:

*Emission Factors: Emission rate estimates that are developed from tests on a moderate to large number of sources where the source category population is sufficiently specific to minimize variability (e.g., US EPA, AP-42, emission factor quality rating of A or B) are anticipated to provide above-average quality of emission rate estimates.*

**Sample Calculation:**

$$\begin{aligned} R (g/s) &= 5[mg / m^3] * 17.5[m^3 / s] * \left[ \frac{1g}{1,000mg} \right] \\ &= 0.0875 g/s \end{aligned}$$

**Methodology:** USEPA Emission Factors (“EF”)

AP-42 lists four contaminants for conveyor dryer as a source. The contaminant emission rates used for the dryer are VOC as propane and formaldehyde.

Acrolein emissions from biomass belt dryer were not considered as it is not included as one of the contaminants emitted from the conveyor indirect-heated dryers in AP-42. It should be noted that the dryers using different technology do have emission factors for acrolein. This indicates that conveyor indirect-heated dryers are not considered as significant sources of acrolein.

The MOE produced a Technical Standard for acrolein for the Forest Products Sector and this technology was not flagged as a significant source of acrolein either.

$$R [g/s] = X[lb/ODT] * DryingRate[tonnes/h] * \left[ \frac{1\text{ton}}{2000\text{lb}} \right] * \left[ \frac{1\text{h}}{3600\text{s}} \right]$$

Where,

R is the emission rate in g/s;

X is the emission factor in lb per oven-dried ton of wood material out of dryer.

The emission factors used in this application for the dryer are:

CAS#	Contaminant Name	X= (in lb /ODT)	Emission Factor Rating	Data Quality
	VOC as propane	0.51	E	Marginal
50-00-0	Formaldehyde	0.0024	E	Marginal

ODT – oven-dried ton of wood material out of dryer

**Data Quality:** Marginal

Data quality for this calculation is best characterized by the following paragraph from Section 8.3.4 of the ESDM Procedure Document titled “Marginal” or “Uncertain Data Quality” Emission Estimating Techniques states:

*Emission Factors: Emission rate estimates that are developed from tests on only a small number of facilities where there is evidence of variability within the source category population (e.g., US EPA, AP-42, emission factor quality rating of D or E) and/or the emission factor rating is uncertain are considered to have uncertain data quality.*

**Sample Calculation:** VOC as propane

$$R (g/s) = 0.51[lb/ODT] * 10[tonnes/h] * \left[ \frac{1\text{ton}}{2,000\text{lb}} \right] * \left[ \frac{1,000,000\text{g}}{1\text{tonne}} \right] * \left[ \frac{1\text{h}}{3600\text{s}} \right]$$

$$= 0.708 \text{ g/s}$$

or  $0.708/4 = 0.177 \text{ g/s}$  per dryer exhaust

Table EA-B:  
Biomass Burners  
(Rev2)

Contaminant	Source ID			8	24
	Firing Rate (Input Rate) (BTU/h)			14,672,213	7,000,000
	Firing Rate (Input Rate) (kJ/h)			15,476,308	7,383,628
	CAS	Emission factor (lb/MMBtu)	Rating	Emission rate g/s	Emission rate g/s
PM	PM	20 mg/m3	D	3.13E-01	
PM	PM	0.56	C		2.47E-02
Nox	10102-44-0	0.22	A	4.07E-02	9.70E-03
SO2	7446-09-5	0.025	A	4.62E-03	1.10E-03
CO	630-08-0	0.6	A	1.11E-01	2.65E-02
Acenaphthene	83-32-9	9.10E-07	B	1.68E-07	4.01E-08
Acenaphthylene	208-96-8	5.00E-06	A	9.24E-07	2.21E-07
Acetaldehyde	75-07-0	8.30E-04	A	1.53E-04	3.66E-05
Acetone	67-64-1	1.90E-04	D	3.51E-05	8.38E-06
Acetophenone	98-86-2	3.20E-09	D	5.92E-10	1.41E-10
Acrolein	107-02-8	4.00E-03	C	7.39E-04	1.76E-04
Anthracene	120-12-7	3.00E-06	A	5.55E-07	1.32E-07
Benzaldehyde	100-52-7	8.50E-07	D	1.57E-07	3.75E-08
Benzene	71-43-2	4.20E-03	A	7.76E-04	1.85E-04
Benzo(a)anthracene	56-55-3	6.50E-08	B	1.20E-08	2.87E-09
Benzo(a)pyrene	50-32-8	2.60E-06	A	4.81E-07	1.15E-07
Benzo(b)fluoranthene	205-99-2	1.00E-07	B	1.85E-08	4.41E-09
Benzo(e)pyrene	192-97-2	2.60E-09	D	4.81E-10	1.15E-10
Benzo(g,h,i)perylene	191-24-2	9.30E-08	B	1.72E-08	4.10E-09
Benzo(j,k)fluoranthene	206-44-0	1.60E-07	D	2.96E-08	7.06E-09
Benzo(k)fluoranthene	207-08-9	3.60E-08	B	6.66E-09	1.59E-09
Benzoic acid	65-85-0	4.70E-08	D	8.69E-09	2.07E-09
bis(2-Ethylhexyl)phthalate	117-81-7	4.70E-08	D	8.69E-09	2.07E-09
Bromomethane	74-83-9	1.50E-05	D	2.77E-06	6.62E-07
2-Butanone (MEK)	78-93-3	5.40E-06	D	9.98E-07	2.38E-07
Carbazole	86-74-8	1.80E-06	D	3.33E-07	7.94E-08
Carbon tetrachloride	56-23-5	4.50E-05	D	8.32E-06	1.98E-06
Chlorine	7782-50-5	7.90E-04	D	1.46E-04	3.48E-05
Chlorobenzene	108-90-7	3.30E-05	D	6.10E-06	1.46E-06
Chloroform	67-66-3	2.80E-05	D	5.18E-06	1.23E-06
Chloromethane	74-87-3	2.30E-05	D	4.25E-06	1.01E-06
2-Chloronaphthalene	91-58-7	2.40E-09	D	4.44E-10	1.06E-10
2-Chlorophenol	95-57-8	2.40E-08	C	4.44E-09	1.06E-09
Chrysene	218-01-9	3.80E-08	B	7.03E-09	1.68E-09
Crotonaldehyde	123-73-9	9.90E-06	D	1.83E-06	4.37E-07
Decachlorobiphenyl	2051-24-3	2.70E-10	D	4.99E-11	1.19E-11
Dibenzo(a,h)anthracene	53-70-3	9.10E-09	B	1.68E-09	4.01E-10
1,2-Dibromoethene	540-49-8	5.50E-05	D	1.02E-05	2.43E-06
Dichlorobiphenyl	13029-08-8	7.40E-10	C	1.37E-10	3.26E-11
1,2-Dichloroethane	107-06-2	2.90E-05	D	5.36E-06	1.28E-06
Dichloromethane	75-09-2	2.90E-04	D	5.36E-05	1.28E-05
1,2-Dichloropropane	78-87-5	3.30E-05	D	6.10E-06	1.46E-06
2,4-Dinitrophenol	51-28-5	1.80E-07	C	3.33E-08	7.94E-09
Ethylbenzene	100-41-4	3.10E-05	D	5.73E-06	1.37E-06
Fluoranthene	206-44-0	1.60E-06	B	2.96E-07	7.06E-08
Fluorene	86-73-7	3.40E-06	A	6.29E-07	1.50E-07
Formaldehyde	50-00-0	4.40E-03	A	8.13E-04	1.94E-04
Heptachlorobiphenyl	35065-29-3	6.60E-11	D	1.22E-11	2.91E-12
Hexachlorobiphenyl	26601-64-9	5.50E-10	D	1.02E-10	2.43E-11
Hexanal	66-25-1	7.00E-06	D	1.29E-06	3.09E-07
Heptachlorodibenzo-p-dioxins	35822-46-9	2.00E-09	C	3.70E-10	8.82E-11
Heptachlorodibenzo-p-furans	55673-89-7	2.40E-10	C	4.44E-11	1.06E-11
Hexachlorodibenzo-p-dioxins	39227-28-6	1.60E-06	C	2.96E-07	7.06E-08
Hexachlorodibenzo-p-furans	70648-26-9	2.80E-10	C	5.18E-11	1.23E-11
Hydrogen chloride	7647-01-0	1.90E-02	C	3.51E-03	8.38E-04
Indeno(1,2,3,c,d)pyrene	193-39-5	8.70E-08	B	1.61E-08	3.84E-09
Isobutyraldehyde	78-84-2	1.20E-05	D	2.22E-06	5.29E-07
Methane	74-82-8	2.10E-02	C	3.88E-03	9.26E-04
2-Methylnaphthalene	91-57-6	1.60E-07	D	2.96E-08	7.06E-09
Monochlorobiphenyl	27323-18-8	2.20E-10	D	4.07E-11	9.70E-12
Naphthalene	91-20-3	9.70E-05	A	1.79E-05	4.28E-06
2-Nitrophenol	88-75-5	2.40E-07	C	4.44E-08	1.06E-08
4-Nitrophenol	100-02-7	1.10E-07	C	2.03E-08	4.85E-09
Octachlorodibenzo-p-dioxins	3268-87-9	6.60E-08	B	1.22E-08	2.91E-09
Octachlorodibenzo-p-furans	39001-02-0	8.80E-11	C	1.63E-11	3.88E-12
Pentachlorodibenzo-p-dioxins	40321-76-4	1.50E-09	B	2.77E-10	6.62E-11
Pentachlorodibenzo-p-furans	0-03-3	4.20E-10	C	7.76E-11	1.85E-11
Pentachlorobiphenyl	18259-05-7	1.20E-09	D	2.22E-10	5.29E-11
Pentachlorophenol	87-86-5	5.10E-08	C	9.43E-09	2.25E-09
Perylene	198-55-0	5.20E-10	D	9.61E-11	2.29E-11
Phenanthrene	85-01-8	7.00E-06	B	1.29E-06	3.09E-07

Table EA-B:  
Biomass Burners  
(Rev2)

Contaminant	Source ID			8	24
	Firing Rate (Input Rate) (BTU/h)			14,672,213	7,000,000
	Firing Rate (Input Rate) (kJ/h)			15,476,308	7,383,628
	CAS	Emission factor (lb/MMBtu)	Rating	Emission rate g/s	Emission rate g/s
Phenol	108-95-2	5.10E-05	C	9.43E-06	2.25E-06
Propanal	123-38-6	3.20E-06	D	5.92E-07	1.41E-07
Propionaldehyde	123-38-6	6.10E-05	D	1.13E-05	2.69E-06
Pyrene	129-00-0	3.70E-06	A	6.84E-07	1.63E-07
Styrene	100-42-5	1.90E-03	D	3.51E-04	8.38E-05
2,3,7,8-Tetrachlorodibenzo-p-dioxins	1746-01-6	8.60E-12	C	1.59E-12	3.79E-13
Tetrachlorodibenzo-p-dioxins	1746-01-6	4.70E-10	C	8.69E-11	2.07E-11
2,3,7,8-Tetrachlorodibenzo-p-furans	51207-31-9	9.00E-11	C	1.66E-11	3.97E-12
Tetrachlorodibenzo-p-furans	51207-31-9	7.50E-10	C	1.39E-10	3.31E-11
Tetrachlorobiphenyl	32598-13-3	2.50E-09	D	4.62E-10	1.10E-10
Tetrachloroethene	127-18-4	3.80E-05	D	7.03E-06	1.68E-06
o-Tolualdehyde	529-20-4	7.20E-06	D	1.33E-06	3.18E-07
p-Tolualdehyde	104-87-0	1.10E-05	D	2.03E-06	4.85E-07
Toluene	108-88-3	9.20E-04	C	1.70E-04	4.06E-05
Trichlorobiphenyl	37680-69-6	2.60E-09	C	4.81E-10	1.15E-10
1,1,1-Trichloroethane	71-55-6	3.10E-05	D	5.73E-06	1.37E-06
Trichloroethene	79-01-6	3.00E-05	D	5.55E-06	1.32E-06
Trichlorofluoromethane	75-69-4	4.10E-05	D	7.58E-06	1.81E-06
2,4,6-Trichlorophenol	88-06-2	2.20E-08	C	4.07E-09	9.70E-10
Vinyl Chloride	75-01-4	1.80E-05	D	3.33E-06	7.94E-07
o-Xylene	95-47-6	2.50E-05	D	4.62E-06	1.10E-06
Total organic compounds (TOC)	#N/A	0.039	D	7.21E-03	1.72E-03
Volatile organic compounds (VOC)	#N/A	0.017	D	3.14E-03	7.50E-04
Nitrous Oxide (N2O)	10024-97-2	0.013	D	2.40E-03	5.73E-04
Carbon Dioxide (CO2)	124-38-9	195	A	3.60E+01	8.60E+00
Antimony	7440-36-0	7.90E-06	C	1.46E-06	3.48E-07
Arsenic	7440-38-2	2.20E-05	A	4.07E-06	9.70E-07
Barium	7440-39-3	1.70E-04	C	3.14E-05	7.50E-06
Beryllium	7440-41-7	1.10E-06	B	2.03E-07	4.85E-08
Cadmium	7440-43-9	4.10E-06	A	7.58E-07	1.81E-07
Chromium, total	7440-47-3	2.10E-05	A	3.88E-06	9.26E-07
Chromium, hexavalent	18540-29-9	3.50E-06	C	6.47E-07	1.54E-07
Cobalt	7440-48-4	6.50E-06	C	1.20E-06	2.87E-07
Copper	7440-50-8	4.90E-05	A	9.06E-06	2.16E-06
Iron	7439-89-6	9.90E-04	C	1.83E-04	4.37E-05
Lead	7439-92-1	4.80E-05	A	8.87E-06	2.12E-06
Manganese	7439-96-5	1.60E-03	A	2.96E-04	7.06E-05
Mercury	7439-97-6	3.50E-06	A	6.47E-07	1.54E-07
Molybdenum	7439-98-7	2.10E-06	D	3.88E-07	9.26E-08
Nickel	7440-02-0	3.30E-05	A	6.10E-06	1.46E-06
Phosphorus	7723-14-0	2.70E-05	D	4.99E-06	1.19E-06
Potassium	7440-09-7	3.90E-02	D	7.21E-03	1.72E-03
Selenium	7782-49-2	2.80E-06	A	5.18E-07	1.23E-07
Silver	7440-22-4	1.70E-03	D	3.14E-04	7.50E-05
Sodium	7440-23-5	3.60E-04	D	6.66E-05	1.59E-05
Strontium	7440-24-6	1.00E-05	D	1.85E-06	4.41E-07
Tin	7440-31-5	2.30E-05	D	4.25E-06	1.01E-06
Titanium	7440-32-6	2.00E-05	D	3.70E-06	8.82E-07
Vanadium	7440-62-2	9.80E-07	D	1.81E-07	4.32E-08
Yttrium	7440-65-5	3.00E-07	D	5.55E-08	1.32E-08
Zinc	7440-66-6	4.20E-04	A	7.76E-05	1.85E-05

Table EA-B:  
Diesel Burners  
(Rev2)

Source ID	Firing Rate (Input Rate)	Firing Rate (Input Rate)	NO <sub>x</sub>	Particulate Matter (Total)
	(BTU/h)	(kJ/h)	(g/s)	(g/s)
	[FR]		=[V*F]	=[V*F]
	Factor (lb/MMBtu) [X]:		4.41	0.31
	Factor (lb/hr) [F]=(X)*(5)/(2):		5.55651E-07	3.90593E-08
		CAS #:	10102-44-0	PM
	Emission Factor Rating (A-E):		D	D
30	1,706,000	1,799,496	0.474	0.035143559
31	376,440	397,070	0.105	0.007754655
Total E-Rate	2,082,440	2,196,566	0.5786	0.04290



Whitesand  
Armstrong Station, Ontario

Table EA-C:  
Cooling Towers  
(Rev2)

Project No.: 030895

Source ID	Description	Throughput (USGal/min)	Throughput (L/s)	PM10 Water Concentration (mg/L)	Drift Rate (L lost/L throughput)	Emission Rate (g/s)
59_1	Cooling Tower	1800	113.562354	1200	0.01%	0.01362748
59_2	Cooling Tower	1800	113.562354	1200	0.01%	0.01362748

# Supporting Information for Assessment of Negligibility



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Sources were screened for negligibility using the following screening protocols listed in the ESDM Procedure Document.

The results of the screening are discussed in greater detail in the following text.

## 1.0 Fugitive Dust Emissions

Fugitive emissions can potentially be generated from the truck dumpers; however it will be contained and fugitive emissions will be minimal. All biomass handling will occur inside the biomass handling building. Another potential fugitive emission source would be conveyors. All outdoor conveyors will transport humid wood which is much less susceptible to fugitive emissions than dried wood which is handled indoors. Fugitive emissions are potentially generated from shipping and delivery of raw and finished products. Fugitive emissions from all other sources described in this section are either negligible or no method of estimation is available.

## 2.0 Sources Listed in O. Reg 524/98 or on Table B-3

Sources listed on **Table B-3** (ESDM Procedure Document Section 7.2.1):

**Table B-3** of the ESDM Procedure Document lists sources that can be considered to be insignificant. Source or product that was considered negligible for any of the reasons listed is indicated with the appropriate designation in **Table E1**.

7. Any equipment, apparatus, mechanism or thing that is used for the ventilation of indoor air out of,
  - i. a space that is used for a purpose other than laboratory analysis, the production, processing, repair, maintenance or storage of goods or materials, or the processing, storage, transfer or disposal of waste,

In **Table EA-1**, Sources falling into this category have the text “No Process” in the column for “Rate/Rationale”.

- ii. a space that is used for laboratory analysis, the production, processing, repair, maintenance or storage of goods or materials, or the processing, storage, transfer or disposal of waste, if the equipment, apparatus, mechanism or thing does not discharge any contaminant produced by those activities, other than heat or noise, out of the space,

In **Table EA-1**, Sources falling into this category have the text “No Contaminants” in the column for “Rate/Rationale”. Some sources in this category are deemed to have no

emissions because the nearby activities that cause emissions are assigned to a different nearby emission point.

8.1 Any equipment, apparatus, mechanism or thing that is used for the ventilation of emissions from a motor vehicle or locomotive that is used to transport things into, out of or within a warehouse or enclosed storage area [except coffee roasting operations 1.(3)].

In **Table EA-1**, Sources falling into this category have the text “Vehicle” in the column for “Rate/Rationale”.

13. Any mobile equipment that is used for,

- i. snow-making,
- ii. the cleaning of ducts, carpets or upholstery,
- iii. the removal of asbestos, or
- iv. the crushing or screening of aggregate, if the mobile equipment is located below grade in a pit or quarry that is operated in accordance with a licence or permit issued under the Aggregate Resources Act.

20. Any equipment, apparatus, mechanism or thing that is used solely to mitigate the effects of an emergency declared to exist under the Emergency Plans Act.

- Standby power generators firing liquid or gaseous fuels that are used for standby power only with periodic testing as per the Regulation.
- Fume hoods for laboratories that are used for quality control and quality assurance purposes at industrial facilities.

In **Table EA-1**, Sources falling into this category have the text “B3: QA/QC Fume Hood” in the column for “Rate/Rationale”.

- Low temperature handling of compounds with a vapour pressure less than 1 kilopascal.

In **Table EA-1**, Sources falling into this category have the text “B3: VP < kPa” and “B3: standby” in the column for “Rate/Rationale”.

### 3.0 Sources that are Insignificant Relative to Total Emissions

Sources that are insignificant relative to total emissions (ESDM Procedure Document Section 7.2.2)

As per Section 7.2.2 of the ESDM Procedure Document, it may not be necessary to consider a source of contaminant that discharges a negligible amount of the relevant

contaminant, having regard to the total amount of the contaminant that is discharged by all the sources of that contaminant to the nature of the contaminant.

Sources that, in combination, represent less than 5% of total property-wide emissions of a contaminant can, in many cases, be considered insignificant sources.

There are some exceptions to this general concept such as the situation where a relatively small amount of emissions from a source, that is emitting near a POI and/or where atmospheric dispersion is poor, can contribute the majority of the maximum POI concentration. As a result, the MOE may require, on a case-by-case basis, the inclusion of sources that would typically be considered insignificant relative to property-wide emissions of the contaminant or as a result of concerns with the nature of the contaminant.

Particulate generated by an ash dump truck was considered negligible, because it represents less than 5% of total property-wide particulate emissions. An ash dump truck drives less than 2% of the distance driven by all other trucks onsite per day. It is a dumper truck; therefore it has fewer wheels and generates less dust than all other trucks. It is correct to state that an ash dumper truck represents less than 5% of total particulate generated by truck traffic. Considering truck traffic is only a fraction of the overall particulate matter generated on site, particulate generated by an ash dump truck clearly represents less than 5% of total property-wide particulate emissions.

#### **4.0 Generalized Guidance to identifying Insignificant or Significant Sources and Contaminants**

Generalized guidance to identifying Insignificant or Significant Sources and Contaminants (ESDM Procedure Document Section 7.3):

The ministry has provided additional guidance to the Generalized Guidance in Chapter 7.3 of ESDM Procedure Document through the O.Reg. 419/05 Q&A process regarding Semi-Qualitative Assessments (Q8-7 Round 2 March 10, 2006).

In general, using this guidance, a source may be considered negligible if the emissions from one source of contaminants are similar (same contaminants and same relative proportions of contaminants) to another source of contaminants **and** one of the sources would have much higher emissions rates than the other **and** the nature of their emissions is similar (resultant dispersion impact from either source are the same) then the smaller source can be classified as insignificant provided the resultant POI impact of all the contaminants does not result in non-compliance **or** that the margin of compliance

is so slight that if the smaller source or sources were included the aggregate POI impact of all the contaminants would result in non-compliance.

Using this guidance it is possible to conclude that sources of contaminants are negligible by comparing the difference in usage rates between sources at a Site. If the usage rate of materials in the process are much less than the usage rates in other significant sources at the same Site then the lesser source may be considered negligible.

This mechanism was not used to designate any source as negligible.

## 5.0 Identifying Significant Contaminants Using an Emission Threshold

Identifying significant contaminants using an emission threshold (ESDM Procedure Document Section 7.1.2):

Using the Threshold Calculator provided in Chapter 7.1.2 of the ESDM Procedure Document the Emission Thresholds can be calculated.

Emissions from wastewater vents were deemed to be negligible using emission threshold calculation.

### Sample Calculation: Ammonia

There are three wastewater vents on the property. The closet vent to the property line is at 56 m. To be conservative the rural dispersion factor corresponding to the distance of 40 m was used<sup>5</sup>.

Ammonia is the main contaminant of concern from wastewater and was used to assess negligibility based on the emission threshold. MOE POI limit for ammonia is 100 µg/m<sup>3</sup> for 24 h averaging period. The dispersion factor for 24 h will be:

$$\begin{aligned} DispersionFactor_{24hr} &= DispersionFactor_{1hr}(1h/24h)^{0.28} = 8100 * (1/24)^{0.28} \\ &= 3,327 \mu g / m^3 \text{ per } g / s \text{ emission} \end{aligned}$$

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<sup>5</sup> Guideline A-10, Table B-1 Guidance for Screening-Out with Dispersion Factors.

$$\begin{aligned}\text{Emission Threshold (g/s)} &= \frac{0.5 * \text{MOE POI Limit}(\mu\text{g} / \text{m}^3)}{\text{Dispersion Factor}(\mu\text{g} / \text{m}^3 \text{ per g} / \text{s emission})} = \\ &= \frac{0.5 * 100(\mu\text{g} / \text{m}^3)}{3,327(\mu\text{g} / \text{m}^3 \text{ per g} / \text{s emission})} = 0.015 \text{ g/s}\end{aligned}$$

To be conservative, the flow rates from process and sanitary vents were added together, since both vents are located next to each other. An emission factor of 2.28 kg/1,000 m<sup>3</sup> influent was used as per NPRI Guidance Manual for the Wastewater Sector - Table D-2 - Plant-Wide, Air-Emission Factors for Municipal Wastewater Treatment Plants.

$$\begin{aligned}\text{EmissionRate(g/s)} &= \text{EmissionFactor} * \text{FlowRate} \\ &= 2.28(\text{kg}/1,000\text{m}^3 \text{influent}) * (92,000\text{L}/\text{day} + 8,100\text{L}/\text{day}) * \frac{1}{1,000\text{m}^3} \\ &\quad * \frac{1\text{m}^3}{1,000\text{L}} * \frac{1,000\text{g}}{1\text{kg}} * \frac{1\text{hr}}{3600\text{s}} * \frac{1\text{day}}{24\text{hr}} = 0.003\text{g/s}\end{aligned}$$

Calculated emission rate of 0.003 g/s is below 0.015 g/s threshold limit for ammonia; therefore it was deemed to be negligible.

Any other contaminants that may be emitted from these sources are expected to be a smaller fraction of their respective criteria than ammonia so ammonia would reach its limit before any other contaminant; therefore, the entire wastewater treatment process was assumed to be negligible and no further assessment was done.

Contaminants deemed negligible using this mechanism are marked as "Neg" in **Table E2**.

## 6.0 De-minimis Calculations

De-minimis calculations (ESDM Procedure Document Appendix B):

Appendix B of the Procedure Document, entitled *Supporting Information for the Assessment of the Significance of Contaminants and Sources* provides some direction on identifying insignificant emissions of a contaminant.

Specifically, Step 2 of **Table B-2A** entitled *Contaminants Not Listed in the MOE Document "Summary of Point of Impingement Guidelines, and Ambient Air Quality Criteria (AAQCs)" that Can Be Deemed Insignificant in a Specific Situation* indicates that if a substance is not listed in **Table B-2B** entitled *List of Contaminants Excluded from de minimus level* it can be considered insignificant if its predicted impact is below 0.1 µg/m<sup>3</sup>.



Using the de-minimus procedure included in Appendix B of the ESDM Procedure Document contaminants can be shown to be negligible.

Contaminants considered negligible because their POI concentration is less than the threshold concentration are shown on **Table E4** and are indicated by “Neg” in the column titled “Percentage of Criteria or Likelihood of Adverse Effect.”

Products for which the MSDS indicates “Non-Hazardous” have been marked as “No contaminants of concern” and considered to be negligible.

This mechanism was not used to designate any source as negligible.

## 7.0 Operating Conditions

Operating conditions (ESDM Procedure Document Section 8.1):

As per Section 8.1 of the ESDM Procedure Document, operating conditions provide key information to the development of emission rate estimates (i.e., operating conditions provide production data that translates an emission factor into an emission rate estimate).

Subsection 10(1) of O.Reg. 419/05 states:

*“1. A scenario that assumes operating conditions for the facility that would result, for the relevant contaminant, in the highest concentration of the contaminant at a point of impingement that the facility is capable of.”*

If a product is only found in a spill kit, it is rarely used and only for an emergency so any normal emission can be considered negligible.

In **Table EA-1**, Sources falling into this category have the text “Spill Kit” in the column for “Rate/Rationale”.

This mechanism was not used to designate any source as negligible.

# Dispersion Modelling Printouts



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<b>1.0</b>	<b>Nitrogen Oxides.....</b>	<b>C1</b>
<b>2.0</b>	<b>Particulate Matter .....</b>	<b>C1</b>
<b>3.0</b>	<b>Multi Contaminant Run .....</b>	<b>C1</b>

The emission rates organized by emission point are found in **Table E2-1**. The emission rates organized by contaminant are found in **Table E2-2**. Selected pages from the simulation output file for nitrogen oxides are shown at the end of this Appendix.

## 1.0 Nitrogen Oxides

The nitrogen oxides simulations are found in “030895 Whitesand ECA NOx.zip”, “030895 Whitesand ECA NOx30.zip” and “030895 Whitesand ECA NOx31.zip” backup files. The simulations are for biomass boiler, standby diesel generator and fire pump diesel engine respectively and all emission points are simulated as point sources. The NO<sub>x</sub> emissions are predicted from the maximum firing rate of each burner on Site. The first highest predicted values are reported in **Table E4**.

## 2.0 Particulate Matter

The particulate matter simulation is found in the “030895 Whitesand ECA PM.zip” backup. This simulation uses the entire site except pellet boiler, standby diesel generator and fire pump diesel engine. All emission points are simulated as point sources and roads are simulated as line volume sources. The PM emissions are predicted from the maximum firing rate of the biomass boiler. The baghouse emissions are predicted using the standard baghouse emission factors as discussed in **Appendix A**. Other particulate sources include biomass storage piles, belt dryer, storage silo, biomass handling building exhaust.

## 3.0 Multi Contaminant Run

The other contaminant simulations were done using Lakes’ “Multi-Chemical Run...” option and are found in the “030895 Whitesand ECA Multichem.zip” backup. This simulation uses the entire site except pellet boiler, standby diesel generator, fire pump diesel engine and particulate (separate simulation) and all emission points are simulated as point sources. The various emissions are predicted from the baghouse emission factors. The first highest predicted values are reported in **Table E4**. “030895 Whitesand ECA Multichem\_24.zip” backup file includes simulation for emergency pellet boiler.

```

**
*****
**
** AERMOD Input Produced by:
** AERMOD View Ver. 8.5.0
** Lakes Environmental Software Inc.
** Date: 8/11/2014
** File: C:\AERMOD\Whitesand\8 Whitesand_PM lastKZ\Whitesand_PM.ADI
**
*****
**
**
*****
** AERMOD Control Pathway
*****
**
**
CO STARTING
  TITLEONE Whitesand - PM
  MODELOPT CONC BETA
  AVERTIME 24
  POLLUTID TSP
  RUNORNOT RUN
  ERRORFIL Whitesand_PM.err
CO FINISHED
**
*****
** AERMOD Source Pathway
*****
**
**
SO STARTING
** Source Location **
** Source ID - Type - X Coord. - Y Coord. **
LOCATION 8 POINT 354205.368 5572113.148 366.000
** DESCRSRC Boiler Flue Gas Stack
LOCATION 24 POINT 354205.561 5572154.823 366.000
** DESCRSRC Pellet Boiler Flue Gas Outlet
LOCATION 30 POINT 354217.192 5572144.959 366.000
** DESCRSRC Stand by Generator (500kW)
LOCATION 31 POINT 354387.921 5571950.996 366.000
** DESCRSRC Fire Pump Diesel Engine (150hp)
LOCATION 38 POINT 354245.334 5572191.106 366.000
** DESCRSRC Pellet Plant - Dust Pick-ups and Screen Fines - Bag House
Vent
LOCATION 39 POINT 354236.742 5572222.110 366.000
** DESCRSRC Pellet Plant - Pellet Cooler - Cyclone Vent
LOCATION 40 POINT 354253.120 5572200.449 366.000
** DESCRSRC Pellet Plant - Fine Hammer Mill - Bag House Vent
LOCATION 57 POINTCAP 354255.210 5572212.938 366.000
** DESCRSRC Dry Chip Storage Silo Vent
LOCATION 61 POINTCAP 354412.619 5572147.580 366.000
** DESCRSRC Biomass Pile- Aspen/Birch
LOCATION 63 POINTCAP 354310.997 5572053.072 366.000

```

```

*** AERMOD - VERSION 12060 ***    *** Whitesand - PM
***      08/11/14
***
***      10:34:17

```

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\*\*MODELOPTs: NonDEFAULT CONC  
ELEV

BETA

```

*** THE MAXIMUM 200 24-HR AVERAGE
CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***
INCLUDING SOURCE(S):      8
24      , 30      , 31      , 38      ,
      39      , 40      , 57      , 61      ,
63      , 58_1      , 58_2      , 58_3      ,
      58_4      , 59_1      , 59_2      , L0000678
L0000679      , L0000680      , L0000699      , L0000700
      L0000703      , L0000704      , L0000705      , L0000706
L0000707      , L0000708      , L0000715      , . . .

```

```

** CONC OF TSP      IN
**
MICROGRAMS/M**3

```

RANK	CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE	RANK
CONC	(YYMMDDHH) AT	RECEPTOR (XR,YR) OF TYPE		
1.	60.16636	(98082224) AT ( 354183.82, 5572222.76)	DC	41.
52.13153	(98101424) AT ( 354183.82, 5572222.76)	DC		
2.	59.78304	(98022624) AT ( 354176.94, 5572215.74)	DC	42.
52.08912	(99051424) AT ( 354183.82, 5572222.76)	DC		
3.	59.33884	(98102924) AT ( 354176.94, 5572215.74)	DC	43.
51.98776	(99083024) AT ( 354190.71, 5572229.78)	DC		
4.	58.83725	(00071124) AT ( 354183.82, 5572222.76)	DC	44.
51.98426	(97032424) AT ( 354183.82, 5572222.76)	DC		
5.	58.54380	(97052224) AT ( 354183.82, 5572222.76)	DC	45.
51.98322	(99050324) AT ( 354190.71, 5572229.78)	DC		
6.	58.51524	(00081924) AT ( 354183.82, 5572222.76)	DC	46.
51.96239	(98012224) AT ( 354183.82, 5572222.76)	DC		
7.	58.34562	(98022624) AT ( 354170.05, 5572208.72)	DC	47.
51.95332c	(99121324) AT ( 354190.71, 5572229.78)	DC		
8.	58.21602	(98081824) AT ( 354183.82, 5572222.76)	DC	48.
51.82685	(96102024) AT ( 354183.82, 5572222.76)	DC		
9.	57.85950	(98081824) AT ( 354190.71, 5572229.78)	DC	49.
51.80794	(00022524) AT ( 354176.94, 5572215.74)	DC		
10.	56.98299	(98012024) AT ( 354254.48, 5572025.81)	DC	50.
51.63599	(98101124) AT ( 354176.94, 5572215.74)	DC		
11.	56.73728	(99050524) AT ( 354170.05, 5572208.72)	DC	51.
51.41609	(00110524) AT ( 354190.71, 5572229.78)	DC		
12.	56.42690	(00081924) AT ( 354190.71, 5572229.78)	DC	52.
51.40093	(96121124) AT ( 354183.82, 5572222.76)	DC		



COMMENTS:

**SOURCES:**



RECEPTORS:

2101

OUTPUT TYPE:
--------------

## Concentration

MAX:

COMPANY NAME:

**R.J. Burnside &  
Associates Limited**

MODELER:

KA

DATE:

8/12/2014

SCALE: 1:8,422

0  0.2 km

PROJECT NO.:

**030895**







Neegan Burnside Ltd.