



Environmental

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Construction Quality
Verification

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Locations

Peterborough
Kingston
Barrie
Oshawa

Laboratory

Peterborough



April 17, 2023

Ministry of the Environment, Conservation, and Parks
135 St. Clair Ave. West
Toronto, Ontario
M4V 1P5

Attn: Edward Soo, P.Eng.
Senior Review Engineer

Re: Petawawa Wastewater Treatment Facility REA Application for Air Cover Letter
Cambium Reference: 11757-003

Dear Mr. Soo,

Cambium Inc. (Cambium) has revised the air assessment regarding the Petawawa Net Zero Facility's Renewable Energy Approval (REA) Application (Ref. 4578-CHKJU2). We have outlined in this letter any modifications made to the Emission Dispersion and Modelling Report (ESDM) dated July 22, 2022, that was prepared in support of the REA Application.

MODIFICATIONS TO THE FACILITY'S OPERATIONS AND EQUIPMENT

The flare has been relocated from the north of the property to its centre just northwest of the digesters. The diameter of the flare was increased from 0.11 m to 0.5 m and its height above grade reduced from 5.5 m to 5.0 m.

The Facility's two 369 kW boilers will provide process heat as required to supplement the CHP units in addition to comfort heating. The boilers will utilize natural gas except when the CHP is not in operation, during which they will fire some of the biogas that would typically be utilized by the CHPs. The boiler exhausts are located approximately 20 m south of the CHP units.

ESDM MODIFICATIONS

The changes to our assessment are supported through the updated calculations and ESDM Summary Tables enclosed in this letter. These details are outlined below.



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1. For consistency with the current application, the emissions and modelling reflect only the Phase 0 configuration that does not include the biogas upgrade system and a reduced biogas production rate. Both the regular operating scenario (i.e., biogas to CHP, boilers firing natural gas, and flare operating on pilot gas) and maintenance scenario (i.e., all biogas flared and boilers firing biogas) has been enclosed.
2. The location of the flare was moved, and its release height and diameter changed.
3. Emission sources BL01 and BL02 were added to the model to represent emissions from the boilers. It was assumed that the worst-case operating scenario occurs when the boilers are firing natural gas while all the biogas produced is fired in the CHP units and flare.

ADDITIONAL SUPPORTING REPORTS

The Odour Study Report dated July 22, 2022, remains accurate as the modifications do not change the management or understanding of the identified significant sources of odour at the Facility.





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CLOSING

If you have any questions or require clarification of any aspect of this submission, please do not hesitate to contact the undersigned at (705) 772-2016.

Best regards,

Cambium Inc.

Sadie Bachynski, P.Eng.
Senior Project Manager

*Encl. Cambium Qualifications and Limitations
ESDM Emission Calculation Sheets
Emission Summary Tables*

*Copies: Michael Lucente, Anaergia
Aaron Law, OCWA*

*P:\11700 to 11799\11757-003 JDM Designworks - Air & Noise - Petawawa STP\Deliverables\REPORT - AIR\April 2023\2023-04-13- LTR-Petawawa REA ESDM
Summary Changes.docx*





April 17, 2023

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Calculation 1 - Gas Emissions

Gas flow properties

Gas Type	Flow Rate ¹ (Nm ³ /h)	Flow Rate ¹ (m ³ /h)	Temperature ¹ (K)	Pressure ¹ (kPa)	Flow Rate ² (mol-gas/hr)	Carbon Content ³ (mol-C/mol-gas)	Silica Content ⁴ (mol-Si/mol-gas)
Natural Gas	1.42	2.25	298.15	69.6	6.32E+01	1.039	0.0
Biogas - Phase 1 Total	113	13,132	313.15	1.00	5.04E+03	0.651	7.88E-06
Biogas - Phase 1 CHP	113	13,132			5.04E+03		
Biogas - Phase 2 CHP	112	13,011			5.00E+03		
Biogas - Phase 2 Total	368	42,751			1.64E+04		
Biogas - Phase 2 Gas Upgrade	256	23.54	298.15	1,203	1.14E+04		
Biogas - Phase 2 Gas Venting	88	8.06			3.91E+03		

Methane Removal Efficiency of Upgrade System: 95.0%

Gas composition data¹

Substance Name	CAS	Molecular Weight (g/mol)	Carbon Content (mol-C/mol-substance)	Silica Content (mol-Si/mol-substance)	Max Natural Gas Concentration (v-substance/v-gas)	Max Biogas Concentration (v-substance/v-gas)	Max Upgraded Concentration ⁵ (v-substance/v-gas)
Methane	74-82-8	16.04	1.00	0.00	9.47E-01	6.50E-01	7.36E-02
Carbon dioxide	124-38-9	44.01	1.00	0.00	3.00E-03	4.00E-01	9.06E-01
Hydrogen sulfide	7783-06-4	34.1	0.00	0.00	4.30E-06	3.50E-03	7.93E-03
Carbon monoxide	630-08-0	28.01	1.00	0.00	0.00	1.00E-03	2.27E-03
Ammonia	7664-41-7	17.03	0.00	0.00	0.00	4.35E-03	9.86E-03
Hexamethyldisiloxane	107-46-0	162.38	6.00	2.00	0.00	1.30E-08	2.95E-08
Hexamethylcyclotrisiloxane	541-05-9	222.46	6.00	3.00	0.00	3.00E-07	6.80E-07
Octamethyltrisiloxane	107-51-7	236.53	8.00	3.00	0.00	1.30E-08	2.95E-08
Octamethylcyclotetrasiloxane	556-67-2	296.62	8.00	4.00	0.00	2.50E-07	5.66E-07
Decamethyltetrasiloxane	141-62-8	310.69	10.00	4.00	0.00	1.30E-08	2.95E-08
Decamethylcyclopentasiloxane	541-02-6	370.77	10.00	5.00	0.00	1.16E-06	2.63E-06
Dodecamethylpentasiloxane	141-63-9	384.84	12.00	5.00	0.00	1.30E-08	2.95E-08
Propane	74-98-6	44.1	3.00	0.00	2.00E-03	0.00	0.00E+00
Propene	115-07-1	42.08	3.00	0.00	0.00	1.73E-06	3.92E-06
Ethane	74-84-0	30.07	2.00	0.00	4.20E-02	0.00	0.00E+00
Cyclohexane	110-82-7	84.16	6.00	0.00	0.00	6.50E-09	1.47E-08
2,2,4-Trimethylpentane	540-84-1	114.23	8.00	0.00	0.00	6.50E-09	1.47E-08
Hexane	110-54-3	86.18	6.00	0.00	0.00	3.00E-08	6.80E-08
Heptane	142-82-5	100.21	4.00	0.00	0.00	1.50E-07	3.40E-07
Butane	106-97-8	58.12	4.00	0.00	4.00E-04	0.00	0.00E+00
2-Butanone	78-93-3	72.11	4.00	0.00	0.00	3.50E-08	7.93E-08
4-Methyl-2-pentanone	108-10-1	100.16	6.00	0.00	0.00	6.50E-09	1.47E-08
Benzene	71-43-2	78.11	6.00	0.00	0.00	2.00E-08	4.53E-08
Toluene	108-88-3	92.14	7.00	0.00	0.00	1.50E-06	3.40E-06
Ethylbenzene	100-41-4	106.17	8.00	0.00	0.00	2.00E-08	4.53E-08
Xylenes	1330-20-7	106.16	8.00	0.00	0.00	2.65E-08	6.00E-08
Tetrahydrofuran	109-99-9	72.11	4.00	0.00	0.00	1.00E-07	2.27E-07
Molecular Weight (g/mol):					16.70	28.25	41.57

Notes:

- ¹ Target gas properties and composition prior to combustion as provided by client
- ² Calculated as per the ideal gas law. The vented gas molar flow rate was calculated as the total upgrade gas less 95% of the methane content. This assumption results in the greatest emission of other biogas contaminants as the upgrade system can achieve up to 99.5% removal.
- ³ Stoichiometric conversion per gas composition less carbon contained in carbon dioxide, which was assumed to not undergo chemical transformation.
- ⁴ Stoichiometric conversion per gas composition
- ⁵ Calculated from the biogas concentration less 95% molar weight of methane. The selectivity of the upgrade system will vary by contaminant, however it was assumed all other substances remained in the vented gas as a worst-case.



Calculation 1 - Gas Emissions

Phase 1 - Scenario 1: Regular operations approximately 95% of year.

Substance Name	CAS	Flare		CHP	
		Pre-Flare Rate ¹ (g/s)	Emission Rate ² (g/s)	Pre-CHP Rate ¹ (g/s)	Emission Rate ² (g/s)
Methane	74-82-8	2.67E-01	5.33E-03	1.46E+01	2.92E-01
Carbon dioxide ²	124-38-9	2.32E-03	2.32E-03	2.47E+01	2.47E+01
Hydrogen sulfide ³	7783-06-4	2.57E-06	5.15E-08	1.67E-01	3.34E-03
Carbon monoxide	630-08-0	0.00E+00	0.00E+00	3.92E-02	7.85E-04
Ammonia	7664-41-7	0.00E+00	0.00E+00	1.04E-01	2.08E-03
Hexamethyldisiloxane	107-46-0	0.00E+00	0.00E+00	2.96E-06	5.91E-08
Hexamethylcyclotrisiloxane	541-05-9	0.00E+00	0.00E+00	9.35E-05	1.87E-06
Octamethyltrisiloxane	107-51-7	0.00E+00	0.00E+00	4.31E-06	8.62E-08
Octamethylcyclotetrasiloxane	556-67-2	0.00E+00	0.00E+00	1.04E-04	2.08E-06
Decamethyltetrasiloxane	141-62-8	0.00E+00	0.00E+00	5.66E-06	1.13E-07
Decamethylcyclopentasiloxane	541-02-6	0.00E+00	0.00E+00	6.03E-04	1.21E-05
Dodecamethylpentasiloxane	141-63-9	0.00E+00	0.00E+00	7.01E-06	1.40E-07
Propane	74-98-6	1.55E-03	3.10E-05	0.00E+00	0.00E+00
Propene	115-07-1	0.00E+00	0.00E+00	1.02E-04	2.04E-06
Ethane	74-84-0	2.22E-02	4.43E-04	0.00E+00	0.00E+00
Cyclohexane	110-82-7	0.00E+00	0.00E+00	7.66E-07	1.53E-08
2,2,4-Trimethylpentane	540-84-1	0.00E+00	0.00E+00	1.04E-06	2.08E-08
Hexane	110-54-3	0.00E+00	0.00E+00	3.62E-06	7.24E-08
Heptane	142-82-5	0.00E+00	0.00E+00	2.11E-05	4.21E-07
Butane	106-97-8	4.08E-04	8.16E-06	0.00E+00	0.00E+00
2-Butanone	78-93-3	0.00E+00	0.00E+00	3.54E-06	7.07E-08
4-Methyl-2-pentanone	108-10-1	0.00E+00	0.00E+00	9.12E-07	1.82E-08
Benzene	71-43-2	0.00E+00	0.00E+00	2.19E-06	4.38E-08
Toluene	108-88-3	0.00E+00	0.00E+00	1.94E-04	3.87E-06
Ethylbenzene	100-41-4	0.00E+00	0.00E+00	2.97E-06	5.95E-08
Xylenes	1330-20-7	0.00E+00	0.00E+00	3.94E-06	7.88E-08
Tetrahydrofuran	109-99-9	0.00E+00	0.00E+00	1.01E-05	2.02E-07

Conversion products

Substance Name	CAS	Flare			CHP		
		Emission Factor Units	Emission Factor	Emission Rate ⁴ (g/s)	Emission Factor Units	Emission Factor	Emission Rate ⁴ (g/s)
Total particulate matter ⁵	N/A (tsp)	g/m ³	1.77E-01	6.96E-05	lb/MMBtu	6.60E-03	3.39E-03
Nitrogen oxides ⁶	10102-44-0	g-NO ₂ /mol-NH ₃	45.09	0.00E+00	lb/MMBtu	3.20E-01	1.64E-01
Sulphur dioxide ^{3,7}	7446-09-05	g-SO ₂ /mol-H ₂ S	62.79	2.71E-08	g-SO ₂ /mol-H ₂ S	62.79	1.76E-03
Carbon dioxide ⁷	124-38-9	g-CO ₂ /mol-C	43.13	7.861E-01	g-CO ₂ /mol-C	43.13	3.93E+01
Carbon monoxide ⁸	630-08-0	g-CO/mol-C	0.56	1.021E-02	g-CO/mol-C	0.56	5.11E-01
Silica dioxide ⁷	7631-86-9	g-SiO ₂ /mol-Si	58.88	0.00E+00	g-SiO ₂ /mol-Si	58.88	6.50E-04

Notes:

- ¹ Calculated as the gas molar flowrate multiplied by the concentration of the substance and the corresponding molecular weight (conversion of 3600 s/hr applied).
- ² Assumed removal efficiency of 98% for both the flare and CHP. Existing carbon dioxide in the gas was assumed to exit unconverted.
- ³ Assumed removal efficiency of 99.4% for biogas H₂S removal system.
- ⁴ Conversion of 3600 s/hr applied.
- ⁵ Average flare soot concentration obtained from AP-42 CH 13.5 (conversion of 1000 µg·m³/g·L applied). Total particulate matter emission factor for stationary gas turbines from AP-42 CH 3.1 (Conversion of 453.59 g/lb and 35.31 scf/m³ applied. Assumed average heating value of 1020 btu/scf).
- ⁶ Flare temperature assumed low such that oxidation of nitrogen gas is insignificant. Therefore, nitrogen oxides from oxidation of fuel gas was the only emission calculated from the flare. 98% of ammonia was assumed to be converted into nitrogen dioxide while flaring. Nitrogen oxide emission factor for stationary gas turbines from AP-42 CH 3.1 (Conversion of 453.59 g/lb and 35.31 scf/m³ applied. Assumed average heating value of 1020 btu/scf).
- ⁷ Assumed oxidation conversion of 98% of applicable substances in fuel gas.
- ⁸ As a worst-case 2% of carbon in the fuel gas was assumed to remain as carbon monoxide. Note, carbon dioxide calculation assumes all carbon converted to carbon dioxide as desired.



Calculation 1 - Gas Emissions

Phase 1 - Scenario 2: Maintenance requiring all gas to be flared approximately 5% of year.

Substance Name	CAS	Flare	
		Pre-Flare Rate ¹ (g/s)	Emission Rate ² (g/s)
Methane	74-82-8	1.49E+01	2.97E-01
Carbon dioxide ²	124-38-9	2.47E+01	2.47E+01
Hydrogen sulfide	7783-06-4	1.67E-01	3.34E-03
Carbon monoxide	630-08-0	3.92E-02	7.85E-04
Ammonia	7664-41-7	1.04E-01	2.08E-03
Hexamethyldisiloxane	107-46-0	2.96E-06	5.91E-08
Hexamethylcyclotrisiloxane	541-05-9	9.35E-05	1.87E-06
Octamethyltrisiloxane	107-51-7	4.31E-06	8.62E-08
Octamethylcyclotetrasiloxane	556-67-2	1.04E-04	2.08E-06
Decamethyltetrasiloxane	141-62-8	5.66E-06	1.13E-07
Decamethylcyclopentasiloxane	541-02-6	6.03E-04	1.21E-05
Dodecamethylpentasiloxane	141-63-9	7.01E-06	1.40E-07
Propane	74-98-6	1.55E-03	3.10E-05
Propene	115-07-1	1.02E-04	2.04E-06
Ethane	74-84-0	2.22E-02	4.43E-04
Cyclohexane	110-82-7	7.66E-07	1.53E-08
2,2,4-Trimethylpentane	540-84-1	1.04E-06	2.08E-08
Hexane	110-54-3	3.62E-06	7.24E-08
Heptane	142-82-5	2.11E-05	4.21E-07
Butane	106-97-8	4.08E-04	8.16E-06
2-Butanone	78-93-3	3.54E-06	7.07E-08
4-Methyl-2-pentanone	108-10-1	9.12E-07	1.82E-08
Benzene	71-43-2	2.19E-06	4.38E-08
Toluene	108-88-3	1.94E-04	3.87E-06
Ethylbenzene	100-41-4	2.97E-06	5.95E-08
Xylenes	1330-20-7	3.94E-06	7.88E-08
Tetrahydrofuran	109-99-9	1.01E-05	2.02E-07

Conversion products

Substance Name	CAS	Flare		
		Emission Factor Units	Emission Factor	Emission Rate ³ (g/s)
Total particulate matter ⁴	N/A (tsp)	g/m ³	0.177	5.63E-03
Nitrogen oxides ⁵	10102-44-0	g-NO ₂ /mol-NH ₃	45.09	2.75E-01
Sulphur dioxide ⁶	7446-09-5	g-SO ₂ /mol-H ₂ S	62.79	3.08E-01
Carbon dioxide ⁶	124-38-9	g-CO ₂ /mol-C	43.13	4.01E+01
Carbon monoxide ⁷	630-08-0	g-CO/mol-C	0.56	5.21E-01
Silica dioxide ⁶	7631-86-9	g-SiO ₂ /mol-Si	58.88	6.50E-04

Notes:

- Calculated as the gas molar flowrate multiplied by the concentration of the substance and the corresponding molecular weight (conversion of 3600 s/hr applied). The flared gas includes natural gas plus all biogas.
- Assumed flare removal efficiency of 98%. Existing carbon dioxide in the gas was assumed to exit unconverted.
- Conversion of 3600 s/hr applied. The flared gas includes natural gas plus all biogas
- Average flare soot concentration obtained from AP-42 CH 13.5 (conversion of 1000 µg·m³·g·L applied).
- Flare temperature assumed low such that oxidation of nitrogen gas is insignificant. Therefore, nitrogen oxides from oxidation of fuel gas was the only emission calculated from the flare. 98% of ammonia was assumed to be converted into nitrogen dioxide while flaring.
- Assumed oxidation conversion of 98% of applicable substances in fuel gas.
- As a worst-case 2% of carbon in the fuel gas was assumed to remain as carbon monoxide. Note, carbon dioxide calculation assumes all carbon converted to carbon dioxide as desired.



Calculation 2 - Boiler Emissions

Max Input Heat Rating 369 kW
 35.0 Nm³/h⁽¹⁾

Max emission rate from natural gas firing boiler¹

Source	Contaminant	CAS #	Emission Factor (lb/10 ⁶ scf)	Emission Factor (g/kWh)	Emission Rate (g/s)
BL01 & BL02	Nitrogen Oxides	10102-44-0	280	4.25E-01	4.35E-02
	Particulate Matter	N/A (tsp)	7.6	1.15E-02	1.18E-03
	Sulfur dioxide	7446-09-5	0.60	9.10E-04	9.33E-05

Notes:

¹ Emission factors for Uncontrolled Large Wall-Fired Boilers >100 mmBtu/h from USEPA AP 42 section 1.4 - Natural Gas Combustion (July, 1998). Conversion of 1020 mmBtu/10⁶scf, 293.07 kWh/mmBtu, 35.31 scf/Nm³, and 3600 s/h applied.

Estimation of exhaust flowrate²

Description	Variable	Value	Units
Fuel Factor (dry)	F _d	8710	dscf/MMBtu
Assumed Oxygen Concentration (dry)	%O ₂	3.0	%v
Heat Input Rate	H _{in}	1.259	MMBtu/h
Estimated Dry Stack Gas Flowrate	Q	213	dscfm
Assumed Moisture Content	%w	60.0	%v
Estimated Actual Stack Gas Flowrate	Q	356	ascfm
		0.168	m ³ /s

$$Q = F_d * \frac{20.9}{(20.9 - \%O_2)} * \frac{H_{in}}{60}$$

² Fuel factor for natural gas from Table 19-2 and equation for dried exhaust flowrate from Eq.19-1 of USEPA Method 19 (March, 2017)



Calculation 3 - Odour Emissions

Phase 2 - Scenario 2: Maintenance requiring all gas to be flared approximately 5% of year.

Source	Source ID	Material	Quantity (tonnes/day)	Emission Factor ¹ (OU/tonne)	Emission Rate (OU/s)
Flare	FL01	Hydrogen sulfide	2.89E-04	1.00E+11	7.94E+02
		Sulfur dioxide	2.66E-02	1.49E+09	
Clarifiers	PT01	Primary sludge	4.34E+01	1.02E+04	5.13E+00
Sequence Batch Reactors	ST01	Primary sludge	4.34E+01	1.02E+04	5.13E+00
Dewatering Building	DB01	Primary sludge	9.52E+01	1.02E+04	1.12E+01
Thickening Building	TB01	Thickened waste activated sludge	1.20E+02	1.02E+04	2.38E+01
		Septage	7.67E+01	1.09E+04	

Notes:

¹ Flare odour emissions were assumed to be dominated by hydrogen sulfide and sulfur dioxide. The odour emission factor for hydrogen sulfide and sulfur dioxide was developed assuming an odour threshold concentration of 0.01 and 0.67 ppm respectively. Emission factors for sludge and septage taken from Odour emission factors: Fundamental tools for air quality management (2014) assuming a material density of 1.0 g/mL.



Flare pseudo parameters

Parameter	Description	Value	Units
Stack properties			
H _s	Stack height above ground	5.0	m
D _{noz}	Flare nozzle diameter	0.50	m
n	Flare molar flow rate	1.65E+04	mol/h
T _{gas1}	Flare gas temperature prior to combustion	298.2	K
T _{gas2}	Flare gas temperature after combustion (as per MECF assumption)	1273	K
P _{gas1}	Flare gas pressure prior to combustion	101.325	kPa
T _{air}	Ambient air temperature	298.2	K
ρ _{air}	Density of air at ambient temperature and pressure	1.183	kg/m ³
cp _{air}	specific heat of dry air constant at T _{air}	1004	J/kg·K
Calculated properties			
Q	Flare volumetric flow rate	1.12E-01	m ³ /s
V _{noz}	Flare actual gas exit velocity (including lift gas) at flare nozzle before combustion	0.57	m/s
Q _t	Heat available from combustion. Sensible and radiative heat available estimated based on the properties of the flared gas stream including the pilot fuel and combustible lift gas	2.40E+06	J/s
f	height loss from radiation	30.0%	%
Q _n	Net heat released	1.68E+06	J/s
ρ _{gas}	Flare gas density prior to combustion	1.149	kg/m ³
F _m	momentum flux	0.020	m ⁴ /s ²
F _b	buoyancy flux	14.816	m ⁴ /s ³
Effective stack properties			
H _{eff}	Effective stack height including flame height	7.17	m
V _{eff}	Effective stack velocity (at flame tip). Assumed 1.5 m/s minimum	1.50	m/s
D _{eff}	Effective stack diameter (at flame tip)	2.29	m

Substance	Molecular Weight (g/mol)	Max Concentration (v-substance/v-gas)	Lower Heating Value (J/g-mol)
Methane	16.04	65.4%	8.02E+05
Non-combustables	50.89	34.6%	0.00E+00
Total	28.11	100.0%	5.24E+05

Molecular Weight (g/mol)	Radiative heat loss values (f)
≤ 20	25%
21 - 35	30%
36 - 50	35%
51 - 65	40%
66 - 80	45%
81 - 95	50%
>95	55%

Notes:

Calculated as per guidance in Flare Modelling Technical Bulletin (MOECC, 2020).
 Flare properties for Phase 2 - Scenario 2 (all gas to be flared).



Table 1: Sources and Contaminants Identification Table

Source Information			Expected Contaminants	Included in Modelling?	
Source ID	Source Description	General Location	Contaminant	Significant (Yes/No)	Rational
HVAC	Emissions due to all HVAC equipment at the facility	Facility-wide	Products of NG Combustion	No	As per Table B-3 of The ESDM Procedure Document, natural gas fired boilers, water heaters, space-heaters and make-up air units when the total facility-wide heat input usage for this equipment is less than 20 million kJ/hr can be considered insignificant.
BV	General ventilation including: open spaces, washrooms, offices, etc.	Facility-wide	N/A	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from The ESDM Procedure Document.
Dust	Fugitive dust from roadways, traffic, and storage piles	Facility-wide	Suspended particulate matter (< 44 µm diameter)	No	The Facility is not listed in Table 7-2 or 7-3 of Section 7.4 of The ESDM Procedure Document. Additionally, the nature and quantity of dust generated from these sources were not deemed likely to pose a significant health risk if present.
FL01	Emergency flare	Centre of site	Mixed Odour	Yes	Not Applicable
FL01	Emergency flare	Centre of site	Methane	Yes	Not Applicable
FL01	Emergency flare	Centre of site	Carbon dioxide	Yes	Not Applicable
FL01	Emergency flare	Centre of site	Hydrogen sulphide	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Carbon monoxide	Yes	Not Applicable
FL01	Emergency flare	Centre of site	Ammonia	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Hexamethyldisiloxane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Hexamethylcyclotrisiloxane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Octamethyltrisiloxane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Octamethylcyclotetrasiloxane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)



Table 1: Sources and Contaminants Identification Table

Source Information			Expected Contaminants	Included in Modelling?	
Source ID	Source Description	General Location	Contaminant	Significant (Yes/No)	Rational
FL01	Emergency flare	Centre of site	Decamethyltetrasiloxane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Decamethylcyclopentasiloxane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Dodecamethylpentasiloxane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Propane	Yes	Not Applicable
FL01	Emergency flare	Centre of site	Propylene	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Ethane	Yes	Not Applicable
FL01	Emergency flare	Centre of site	Cyclohexane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Isooctane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Hexane, n- (n-Hexane and Hexane isomers only)	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Heptane, n-	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Butane	Yes	Not Applicable
FL01	Emergency flare	Centre of site	Methyl ethyl ketone (2-Butanone)	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Methyl isobutyl ketone	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)



Table 1: Sources and Contaminants Identification Table

Source Information			Expected Contaminants	Included in Modelling?	
Source ID	Source Description	General Location	Contaminant	Significant (Yes/No)	Rational
FL01	Emergency flare	Centre of site	Benzene	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Toluene	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Ethyl benzene	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Xylenes	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Tetrahydrofuran	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Suspended particulate matter (< 44 µm diameter)	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Nitrogen oxides	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Sulphur dioxide	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
FL01	Emergency flare	Centre of site	Silicon dioxide	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
EG01	Combined heat and power system	Centre of site	N/A	No	Worst-case scenario modelled as all process gas flared, which occurs during maintenance (i.e. no gas capture).
EG01	Combined heat and power system	Centre of site	Methane	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Carbon dioxide	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Hydrogen sulphide	Yes	Not Applicable



Table 1: Sources and Contaminants Identification Table

Source Information			Expected Contaminants	Included in Modelling?	
Source ID	Source Description	General Location	Contaminant	Significant (Yes/No)	Rational
EG01	Combined heat and power system	Centre of site	Carbon monoxide	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Ammonia	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Hexamethyldisiloxane	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Hexamethylcyclotrisiloxane	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Octamethyltrisiloxane	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Octamethylcyclotetrasiloxane	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Decamethyltetrasiloxane	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Decamethylcyclopentasiloxane	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Dodecamethylpentasiloxane	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Propane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
EG01	Combined heat and power system	Centre of site	Propylene	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Ethane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
EG01	Combined heat and power system	Centre of site	Cyclohexane	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Isooctane	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Hexane, n- (n-Hexane and Hexane isomers only)	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Heptane, n-	Yes	Not Applicable



Table 1: Sources and Contaminants Identification Table

Source Information			Expected Contaminants	Included in Modelling?	
Source ID	Source Description	General Location	Contaminant	Significant (Yes/No)	Rational
EG01	Combined heat and power system	Centre of site	Butane	No	Contaminant Insignificant (less than 5% of the total propertywide emissions) relative to total emissions as outlined in Section 7.2.2 from the ESDM Procedure Document (MECP, 2019)
EG01	Combined heat and power system	Centre of site	Methyl ethyl ketone (2-Butanone)	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Methyl isobutyl ketone	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Benzene	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Toluene	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Ethyl benzene	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Xylenes	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Tetrahydrofuran	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Suspended particulate matter (< 44 µm diameter)	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Nitrogen oxides	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Sulphur dioxide	Yes	Not Applicable
EG01	Combined heat and power system	Centre of site	Silicon dioxide	Yes	Not Applicable
PT01	Clarifiers	North-east of site	Mixed Odour	Yes	Not Applicable
ST01	Sequence Batch Reactors	North of site	Mixed Odour	Yes	Not Applicable
DB01	Dewatering Building	West of site	Mixed Odour	Yes	Not Applicable
TB01	Thickening Building	East of site	Mixed Odour	Yes	Not Applicable
BL01	Process and comfort heating boiler	North of site	Suspended particulate matter (< 44 µm diameter)	Yes	Not Applicable
BL01	Process and comfort heating boiler	North of site	Nitrogen oxides	Yes	Not Applicable
BL01	Process and comfort heating boiler	North of site	Sulphur dioxide	Yes	Not Applicable



Table 1: Sources and Contaminants Identification Table

Source Information			Expected Contaminants	Included in Modelling?	
Source ID	Source Description	General Location	Contaminant	Significant (Yes/No)	Rational
BL02	Process and comfort heating boiler	North of site	Suspended particulate matter (< 44 µm diameter)	Yes	Not Applicable
BL02	Process and comfort heating boiler	North of site	Nitrogen oxides	Yes	Not Applicable
BL02	Process and comfort heating boiler	North of site	Sulphur dioxide	Yes	Not Applicable



Table 2a: Source Summary Table Sorted by Contaminant

Contaminant	CAS Number	Source ID	Type of Source	Source Description	Source Data						Emissions Data					
					Volumetric Flow Rate (m ³ /s)	Temperature (°C)	Inside Diameter (m)	Release Point Above Grade (m)	Release Point Above Structure (m)	Source Coordinates (x,y) (m)	Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Sample Calculation ID	Data Quality	Amount of Overall Emissions (%)
Ammonia	7664-41-7	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	2.08E-03	24 hour	EF & MB	1	Above-Average	100.0%
Benzene	71-43-2	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	4.38E-08	annual	EF & MB	1	Above-Average	100.0%
Butane	106-97-8	FL01	Point Source - Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	8.16E-06	24 hour	EF & MB	1	Above-Average	100.0%
Carbon dioxide	124-38-9	FL01	Point Source - Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	7.88E-01	24 hour	EF & MB	1	Above-Average	1.2%
Carbon dioxide	124-38-9	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	6.40E+01	24 hour	EF & MB	1	Above-Average	98.8%
Carbon monoxide	630-08-0	FL01	Point Source - Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	1.02E-02	30 minute	EF & MB	1	Above-Average	2.0%
Carbon monoxide	630-08-0	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	5.12E-01	30 minute	EF & MB	1	Above-Average	98.0%
Cyclohexane	110-82-7	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	1.53E-08	24 hour	EF & MB	1	Above-Average	100.0%
Decamethylcyclopentasiloxane	541-02-6	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	1.21E-05	24 hour	EF & MB	1	Above-Average	100.0%
Decamethyltetrasiloxane	141-62-8	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	1.13E-07	24 hour	EF & MB	1	Above-Average	100.0%
Dodecamethylpentasiloxane	141-63-9	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	1.40E-07	24 hour	EF & MB	1	Above-Average	100.0%
Ethane	74-84-0	FL01	Point Source - Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	4.43E-04	24 hour	EF & MB	1	Above-Average	100.0%
Ethyl benzene	100-41-4	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	5.95E-08	10 minute	EF & MB	1	Above-Average	100.0%



Table 2a: Source Summary Table Sorted by Contaminant

Contaminant	CAS Number	Source ID	Type of Source	Source Description	Source Data						Emissions Data					
					Volumetric Flow Rate (m ³ /s)	Temperature (°C)	Inside Diameter (m)	Release Point Above Grade (m)	Release Point Above Structure (m)	Source Coordinates (x,y) (m)	Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Sample Calculation ID	Data Quality	Amount of Overall Emissions (%)
Ethyl benzene	100-41-4	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	5.95E-08	24 hour	EF & MB	1	Above-Average	100.0%
Heptane, n-	142-82-5	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	4.21E-07	24 hour	EF & MB	1	Above-Average	100.0%
Hexamethylcyclotrisiloxane	541-05-9	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	1.87E-06	24 hour	EF & MB	1	Above-Average	100.0%
Hexamethyldisiloxane	107-46-0	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	5.91E-08	24 hour	EF & MB	1	Above-Average	100.0%
Hexane, n- (n-Hexane and Hexane isomers only)	110-54-3	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	7.24E-08	24 hour	EF & MB	1	Above-Average	100.0%
Hydrogen sulphide	7783-06-4	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	3.34E-03	24 hour	EF & MB	1	Above-Average	100.0%
Hydrogen sulphide	7783-06-4	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	3.34E-03	10 minute	EF & MB	1	Above-Average	100.0%
Isooctane	540-84-1	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	2.08E-08	24 hour	EF & MB	1	Above-Average	100.0%
Methane	74-82-8	FL01	Point Source - Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	5.33E-03	24 hour	EF & MB	1	Above-Average	1.8%
Methane	74-82-8	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	2.92E-01	24 hour	EF & MB	1	Above-Average	98.2%
Methyl ethyl ketone (2-Butanone)	78-93-3	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	7.07E-08	24 hour	EF & MB	1	Above-Average	100.0%
Methyl isobutyl ketone	108-10-1	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	1.82E-08	24 hour	EF & MB	1	Above-Average	100.0%
Mixed Odour	NA (odour)	FL01	Point Source - Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	2.58E+03	10 minute	EC	3	Above-Average	98.3%



Table 2a: Source Summary Table Sorted by Contaminant

Contaminant	CAS Number	Source ID	Type of Source	Source Description	Source Data						Emissions Data					
					Volumetric Flow Rate (m ³ /s)	Temperature (°C)	Inside Diameter (m)	Release Point Above Grade (m)	Release Point Above Structure (m)	Source Coordinates (x,y) (m)	Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Sample Calculation ID	Data Quality	Amount of Overall Emissions (%)
Nitrogen oxides	10102-44-0	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	1.64E-01	24 hour	EF & MB	1	Above-Average	98.6%
Nitrogen oxides	10102-44-0	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	1.64E-01	1 hour	EF & MB	1	Above-Average	98.6%
Nitrogen oxides	10102-44-0	BL01	Point Source - Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.18, 5085478.03	1.18E-03	24 hour	EF	2	Marginal	0.7%
Nitrogen oxides	10102-44-0	BL01	Point Source - Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.18, 5085478.03	1.18E-03	1 hour	EF	2	Marginal	0.7%
Nitrogen oxides	10102-44-0	BL02	Point Source - Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.61, 5085474.83	1.18E-03	24 hour	EF	2	Marginal	0.7%
Nitrogen oxides	10102-44-0	BL02	Point Source - Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.61, 5085474.83	1.18E-03	1 hour	EF	2	Marginal	0.7%
Octamethylcyclotetrasiloxane	556-67-2	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	2.08E-06	24 hour	EF & MB	1	Above-Average	100.0%
Octamethyltrisiloxane	107-51-7	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	8.62E-08	24 hour	EF & MB	1	Above-Average	100.0%
Propane	74-98-6	FL01	Point Source - Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	3.10E-05	24 hour	EF & MB	1	Above-Average	100.0%
Propylene	115-07-1	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	2.04E-06	24 hour	EF & MB	1	Above-Average	100.0%
Silicon dioxide	7631-86-9	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	6.50E-04	24 hour	EF & MB	1	Above-Average	100.0%
Sulphur dioxide	7446-09-5	FL01	Point Source - Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	3.08E-01	1 hour	EF & MB	1	Above-Average	99.9%
Sulphur dioxide	7446-09-5	FL01	Point Source - Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	0.30788644	annual	EF & MB	1	Above-Average	99.9%



Table 2a: Source Summary Table Sorted by Contaminant

Contaminant	CAS Number	Source ID	Type of Source	Source Description	Source Data						Emissions Data					
					Volumetric Flow Rate (m ³ /s)	Temperature (°C)	Inside Diameter (m)	Release Point Above Grade (m)	Release Point Above Structure (m)	Source Coordinates (x,y) (m)	Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Sample Calculation ID	Data Quality	Amount of Overall Emissions (%)
Sulphur dioxide	7446-09-5	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	0.00E+00	1 hour	EF & MB	1	Above-Average	0.0%
Sulphur dioxide	7446-09-5	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	0.00E+00	annual	EF & MB	1	Above-Average	0.0%
Sulphur dioxide	7446-09-5	BL01	Point Source - Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.18, 5085478.03	9.33E-05	1 hour	EF	2	Marginal	0.0%
Sulphur dioxide	7446-09-5	BL01	Point Source - Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.18, 5085478.03	9.33E-05	annual	EF	2	Marginal	0.0%
Sulphur dioxide	7446-09-5	BL02	Point Source - Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.61, 5085474.83	9.33E-05	1 hour	EF	2	Marginal	0.0%
Sulphur dioxide	7446-09-5	BL02	Point Source - Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.61, 5085474.83	9.33E-05	annual	EF	2	Marginal	0.0%
Suspended particulate matter (< 44 µm diameter)	NA (tsp)	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	3.39E-03	24 hour	EF & MB	1	Above-Average	3.7%
Suspended particulate matter (< 44 µm diameter)	NA (tsp)	BL01	Point Source - Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.18, 5085478.03	4.35E-02	24 hour	EF	2	Marginal	48.1%
Suspended particulate matter (< 44 µm diameter)	NA (tsp)	BL02	Point Source - Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.61, 5085474.83	4.35E-02	24 hour	EF	2	Marginal	48.1%
Tetrahydrofuran	109-99-9	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	2.02E-07	24 hour	EF & MB	1	Above-Average	100.0%
Toluene	108-88-3	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	3.87E-06	24 hour	EF & MB	1	Above-Average	100.0%
Xylenes	1330-20-7	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	7.88E-08	10 minute	EF & MB	1	Above-Average	100.0%
Xylenes	1330-20-7	EG01	Point Source - Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	7.88E-08	24 hour	EF & MB	1	Above-Average	100.0%



Table 2a: Source Summary Table Sorted by Contaminant

Source Data											Emissions Data						
Contaminant	CAS Number	Source ID	Type of Source	Source Description	Initial Vertical Dimension (m)	Initial Horizontal Dimension (m)	Temperature (°C)	Release Point Above Grade (m)	Release Point Above Structure (m)	Source Coordinates (x,y) (m)	Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Sample Calculation ID	Data Quality	Amount of Overall Emissions (%)	Significant (Yes/No)
Mixed Odour	NA (odour)	PT01	Area Source	Clarifiers	20.00	12.50	N/A	0.0	N/A	325499.80, 5085450.45	5.13E+00	10 minute	EF	3	Marginal	0.2%	Yes
Mixed Odour	NA (odour)	ST01	Area Source	Sequence Batch Reactors	50.00	30.00	N/A	0.0	N/A	325553.47, 5085491.43	5.13E+00	10 minute	EF	3	Marginal	0.2%	Yes
Mixed Odour	NA (odour)	DB01	Volume Source	Dewatering Building	5.18	3.23	N/A	5.6	N/A	325474.29, 5085373.94	1.12E+01	10 minute	EF	3	Marginal	0.4%	Yes
Mixed Odour	NA (odour)	TB01	Volume Source	Thickening Building	3.43	3.23	N/A	3.7	N/A	325547.32, 5085423.95	2.38E+01	10 minute	EF	3	Marginal	0.9%	Yes



Table 2b: Source Summary Table Sorted by Source

Source Data									Emissions Data							
Source ID	Type of Source	Source Description	Volumetric Flow Rate (m ³ /s)	Temperature (°C)	Inside Diameter (m)	Release Point Above Grade (m)	Release Point Above Structure (m)	Source Coordinates (x,y) (m)	Contaminant	CAS Number	Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Sample Calculation ID	Data Quality	Amount of Overall Emissions (%)
FL01	Point Source Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	Mixed Odour	NA (odour)	2.58E+03	10 minute	EC	3	Above-Average	98.3%
FL01	Point Source Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	Methane	74-82-8	5.33E-03	24 hour	EF & MB	1	Above-Average	1.8%
FL01	Point Source Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	Carbon dioxide	124-38-9	7.88E-01	24 hour	EF & MB	1	Above-Average	1.2%
FL01	Point Source Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	Carbon monoxide	630-08-0	1.02E-02	30 minute	EF & MB	1	Above-Average	2.0%
FL01	Point Source Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	Propane	74-98-6	3.10E-05	24 hour	EF & MB	1	Above-Average	100.0%
FL01	Point Source Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	Ethane	74-84-0	4.43E-04	24 hour	EF & MB	1	Above-Average	100.0%
FL01	Point Source Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	Butane	106-97-8	8.16E-06	24 hour	EF & MB	1	Above-Average	100.0%
FL01	Point Source Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	Sulphur dioxide	7446-09-5	3.08E-01	1 hour	EF & MB	1	Above-Average	99.9%
FL01	Point Source Vertical Stack (uncapped)	Emergency flare	6.18E+00	<1000	2.29	7.2	N/A	325484.29, 5085437.78	Sulphur dioxide	7446-09-5	3.08E-01	annual	EF & MB	1	Above-Average	99.9%



Table 2b: Source Summary Table Sorted by Source

Source Data									Emissions Data							
Source ID	Type of Source	Source Description	Volumetric Flow Rate (m3/s)	Temperature (°C)	Inside Diameter (m)	Release Point Above Grade (m)	Release Point Above Structure (m)	Source Coordinates (x,y) (m)	Contaminant	CAS Number	Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Sample Calculation ID	Data Quality	Amount of Overall Emissions (%)
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Methane	74-82-8	2.92E-01	24 hour	EF & MB	1	Above-Average	98.2%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Carbon dioxide	124-38-9	6.40E+01	24 hour	EF & MB	1	Above-Average	98.8%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Hydrogen sulphide	7783-06-4	3.34E-03	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Hydrogen sulphide	7783-06-4	3.34E-03	10 minute	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Carbon monoxide	630-08-0	5.12E-01	30 minute	EF & MB	1	Above-Average	98.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Ammonia	7664-41-7	2.08E-03	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Hexamethyldisiloxane	107-46-0	5.91E-08	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Hexamethylcyclotrisiloxane	541-05-9	1.87E-06	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Octamethyltrisiloxane	107-51-7	8.62E-08	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Octamethylcyclotetrasiloxane	556-67-2	2.08E-06	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Decamethyltetrasiloxane	141-62-8	1.13E-07	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Decamethylcyclopentasiloxane	541-02-6	1.21E-05	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Dodecamethylpentasiloxane	141-63-9	1.40E-07	24 hour	EF & MB	1	Above-Average	100.0%



Table 2b: Source Summary Table Sorted by Source

Source Data									Emissions Data							
Source ID	Type of Source	Source Description	Volumetric Flow Rate (m3/s)	Temperature (°C)	Inside Diameter (m)	Release Point Above Grade (m)	Release Point Above Structure (m)	Source Coordinates (x,y) (m)	Contaminant	CAS Number	Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Sample Calculation ID	Data Quality	Amount of Overall Emissions (%)
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Propylene	115-07-1	2.04E-06	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Cyclohexane	110-82-7	1.53E-08	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Isooctane	540-84-1	2.08E-08	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Hexane, n- (n-Hexane and Hexane isomers only)	110-54-3	7.24E-08	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Heptane, n-	142-82-5	4.21E-07	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Methyl ethyl ketone (2-Butanone)	78-93-3	7.07E-08	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Methyl isobutyl ketone	108-10-1	1.82E-08	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Benzene	71-43-2	4.38E-08	annual	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Toluene	108-88-3	3.87E-06	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Ethyl benzene	100-41-4	5.95E-08	10 minute	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Ethyl benzene	100-41-4	5.95E-08	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Xylenes	1330-20-7	7.88E-08	10 minute	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Xylenes	1330-20-7	7.88E-08	24 hour	EF & MB	1	Above-Average	100.0%



Table 2b: Source Summary Table Sorted by Source

Source Data									Emissions Data							
Source ID	Type of Source	Source Description	Volumetric Flow Rate (m3/s)	Temperature (°C)	Inside Diameter (m)	Release Point Above Grade (m)	Release Point Above Structure (m)	Source Coordinates (x,y) (m)	Contaminant	CAS Number	Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Sample Calculation ID	Data Quality	Amount of Overall Emissions (%)
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Tetrahydrofuran	109-99-9	2.02E-07	24 hour	EF & MB	1	Above-Average	100.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Suspended particulate matter (< 44 µm diameter)	NA (tsp)	3.39E-03	24 hour	EF & MB	1	Above-Average	3.7%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Nitrogen oxides	10102-44-0	1.64E-01	24 hour	EF & MB	1	Above-Average	98.6%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Nitrogen oxides	10102-44-0	1.64E-01	1 hour	EF & MB	1	Above-Average	98.6%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Sulphur dioxide	7446-09-5	0.00E+00	1 hour	EF & MB	1	Above-Average	0.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Sulphur dioxide	7446-09-5	0.00E+00	annual	EF & MB	1	Above-Average	0.0%
EG01	Point Source Vertical Stack (uncapped)	Combined heat and power system	2.28E-01	180	0.15	6.5	N/A	325514.77, 5085491.52	Silicon dioxide	7631-86-9	6.50E-04	24 hour	EF & MB	1	Above-Average	100.0%
BL01	Point Source Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.18, 5085478.03	Suspended particulate matter (< 44 µm diameter)	NA (tsp)	4.35E-02	24 hour	EF	2	Marginal	48.1%
BL01	Point Source Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.18, 5085478.03	Nitrogen oxides	10102-44-0	1.18E-03	24 hour	EF	2	Marginal	0.7%
BL01	Point Source Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.18, 5085478.03	Nitrogen oxides	10102-44-0	1.18E-03	1 hour	EF	2	Marginal	0.7%
BL01	Point Source Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.18, 5085478.03	Sulphur dioxide	7446-09-5	9.33E-05	1 hour	EF	2	Marginal	0.0%
BL01	Point Source Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.18, 5085478.03	Sulphur dioxide	7446-09-5	9.33E-05	annual	EF	2	Marginal	0.0%
BL02	Point Source Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.61, 5085474.83	Suspended particulate matter (< 44 µm diameter)	NA (tsp)	4.35E-02	24 hour	EF	2	Marginal	48.1%



Table 2b: Source Summary Table Sorted by Source

Source Data									Emissions Data							
Source ID	Type of Source	Source Description	Volumetric Flow Rate (m ³ /s)	Temperature (°C)	Inside Diameter (m)	Release Point Above Grade (m)	Release Point Above Structure (m)	Source Coordinates (x,y) (m)	Contaminant	CAS Number	Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Sample Calculation ID	Data Quality	Amount of Overall Emissions (%)
BL02	Point Source Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.61, 5085474.83	Nitrogen oxides	10102-44-0	1.18E-03	24 hour	EF	2	Marginal	0.7%
BL02	Point Source Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.61, 5085474.83	Nitrogen oxides	10102-44-0	1.18E-03	1 hour	EF	2	Marginal	0.7%
BL02	Point Source Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.61, 5085474.83	Sulphur dioxide	7446-09-5	9.33E-05	1 hour	EF	2	Marginal	0.0%
BL02	Point Source Vertical Stack (capped)	Process and comfort heating boiler	1.68E-01	180	0.25	6.0	1	325513.61, 5085474.83	Sulphur dioxide	7446-09-5	9.33E-05	annual	EF	2	Marginal	0.0%



Table 2b: Source Summary Table Sorted by Source

Source Data									Emissions Data								
Source ID	Type of Source	Source Description	Initial Vertical Dimension (m)	Initial Horizontal Dimension (m)	Temperature (°C)	Release Point Above Grade (m)	Release Point Above Structure (m)	Source Coordinates (x,y) (m)	Contaminant	CAS Number	Emission Rate (g/s)	Averaging Period	Emission Estimating Technique	Sample Calculation ID	Data Quality	Amount of Overall Emissions (%)	Significant (Yes/No)
PT01	Area Source	Clarifiers	20.00	12.50	N/A	0.0	N/A	325499.80, 5085450.45	Mixed Odour	NA (odour)	5.13E+00	10 minute	EF	3	Marginal	0.2%	Yes
ST01	Area Source	Sequence Batch Reactors	50.00	30.00	N/A	0.0	N/A	325553.47, 5085491.43	Mixed Odour	NA (odour)	5.13E+00	10 minute	EF	3	Marginal	0.2%	Yes
DB01	Volume Source	Dewatering Building	5.18	3.23	N/A	5.6	N/A	325474.29, 5085373.94	Mixed Odour	NA (odour)	1.12E+01	10 minute	EF	3	Marginal	0.4%	Yes
TB01	Volume Source	Thickening Building	3.43	3.23	N/A	3.7	N/A	325547.32, 5085423.95	Mixed Odour	NA (odour)	2.38E+01	10 minute	EF	3	Marginal	0.9%	Yes



Table 3: Dispersion Modelling Input Summary Table

Relevant Section of the Regulation	Section Title	Description of How the Approved Dispersion Model was Used
Section 6	Approved Air Dispersion (include Model Versions)	Site Specific meteorological data by MECP v19191 AERMET v19191 (incl. in Met Data) BPIP v04274 AERMAP v18081 AERMOD v19191
Section 8	Negligible Sources	If any sources are deemed negligible they are discussed in Section 3 and Appendix B of the ESDM Report. Any negligible sources identified using the guidance provided in section 7 of The ESDM Procedure Document were not included in modelling as per section 8 of O. Reg. 419/05
Section 9	Same Structure Contamination	Same Structure Contamination has not been assessed as the Facility is not in a multi-tenant building.
Section 10	Operating Conditions	All equipment was assumed to be operating at the maximum production rates at the same time during their applicable hours of operation. See section 4.1 and Appendix A of the ESDM report.
Section 11	Source of Contaminant Emission Rates	See section 4.2 and Appendix A of the ESDM Report for more information.
Section 12	Combined Effect of Assumptions for Operating Conditions and Emission Rates	See section 4.1 and Appendix A of the ESDM Report for more information.
Section 13	Meteorological Conditions (include AERMET Version)	The preprocessed meteorological data (AERMET v19191) provided by the MECP for the Site following a s.13 request was used. The site specific meteorological data set consists of five years (2016-2020) of hourly readings for surface and upper air conditions for use in the AERMOD model. The height of the Petawawa surface station above sea level of 130 m was used.
Section 14	Area of Modelling Coverage	The area of modelling coverage was designed to meet the requirements outlined in O. Reg. 419/05, s. 14. A multi-tiered receptor grid was developed with reference to section 7.2 of the ADMGO, therefore interval spacing was dependent on the receptor distance from on-site sources.
Section 15	Stack Height for Certain New Sources of Contaminant	See Table 2 - Source Summary Table; no stack heights in this model (actual or modelled) exceed the restriction in section 15 of O. Reg. 419/05.
Section 16	Terrain Data	See Section 6.4 of the ESDM report. Terrain information for the area surrounding the facility was obtained from the MECP Ontario Digital Elevation Model Data web site. The terrain data is based on the North American Datum 1983 (NAD83) horizontal reference datum. This data was run through the AERMAP terrain pre-processor to estimate base elevations for receptors and to help the model account for changes in elevation of the surrounding terrain.



Table 3: Dispersion Modelling Input Summary Table

Relevant Section of the Regulation	Section Title	Description of How the Approved Dispersion Model was Used
Section 17	Averaging Periods	The appropriate averaging periods (as defined by the regulatory limits outlined in Schedule 3, and the listing of the MECP Guidelines) were modelled for each contaminant. Emission rates were calculated based on averaging periods that matched the averaging period of the respective criterion. See section 6.7 of O. Reg. 419/05.



Table 4: Emissions Summary Table

Contaminant	CAS Number	Total Facility Emission Rate (g/s)	Standard	Averaging Period	Limiting Effect	Schedule	Max POI Concentration ($\mu\text{g}/\text{m}^3$)	Percentage of Ministry POI Limit (%)	Air Dispersion Model Used
Ammonia	7664-41-7	6.76E-03	1000	24 hour	URT	URT	2.48E-01	0.02%	AERMOD 19191
Ammonia	7664-41-7	6.76E-03	100	24 hour	Health	Standard	2.48E-01	0.25%	AERMOD 19191
Benzene	71-43-2	1.43E-07	4.5	annual	Health	AAV	0.00E+00	0.00%	AERMOD 19191
Benzene	71-43-2	1.43E-07	0.45	annual	Health	Standard	0.00E+00	0.00%	AERMOD 19191
Butane	106-97-8	8.16E-06	3600	24 hour	Health	SL-JSL	3.46E-04	0.00%	AERMOD 19191
Carbon dioxide	124-38-9	2.09E+02	255800	24 hour	Health	SL-PA	7.64E+03	2.99%	AERMOD 19191
Carbon monoxide	630-08-0	1.68E+00	6000	30 minute	Health	Standard	3.54E+02	5.91%	AERMOD 19191
Cyclohexane	110-82-7	4.99E-08	6100	24 hour	Health	Standard	1.83E-06	0.00%	AERMOD 19191
Cyclohexane	110-82-7	4.99E-08	61000	24 hour	URT	URT	1.83E-06	0.00%	AERMOD 19191
Decamethylcyclotrisiloxane	541-02-6	3.92E-05	500	24 hour	Health	SL-JSL	1.44E-03	0.00%	AERMOD 19191
Decamethyltetrasiloxane	141-62-8	3.68E-07	0.5	24 hour	Health	SL-JSL	1.35E-05	0.00%	AERMOD 19191
Dodecamethylpentasiloxane	141-63-9	4.56E-07	0.75	24 hour	Health	SL-PA	1.67E-05	0.00%	AERMOD 19191
Ethane	74-84-0	4.43E-04	14500	24 hour	Health	SL-JSL	1.88E-02	0.00%	AERMOD 19191
Ethyl benzene	100-41-4	1.94E-07	1000	24 hour	Health	Standard	7.10E-06	0.00%	AERMOD 19191
Ethyl benzene	100-41-4	1.94E-07	10000	24 hour	URT	URT	7.10E-06	0.00%	AERMOD 19191
Ethyl benzene	100-41-4	1.94E-07	1900	10 minute	Odour	Guideline	5.60E-05	0.00%	AERMOD 19191
Heptane, n-	142-82-5	1.37E-06	11000	24 hour	Health	Standard	5.02E-05	0.00%	AERMOD 19191
Hexamethylcyclotrisiloxane	541-05-9	6.09E-06	25	24 hour	Health	SL-JSL	2.23E-04	0.00%	AERMOD 19191
Hexamethyldisiloxane	107-46-0	1.93E-07	1200	24 hour	Health	SL-JSL	7.05E-06	0.00%	AERMOD 19191
Hexane, n- (n-Hexane and Hexane isomers only)	110-54-3	2.36E-07	25000	24 hour	URT	URT	8.64E-06	0.00%	AERMOD 19191
Hexane, n- (n-Hexane and Hexane isomers only)	110-54-3	2.36E-07	7500	24 hour	Health	Standard	8.64E-06	0.00%	AERMOD 19191
Hexane, n- (n-Hexane and Hexane isomers only)	110-54-3	2.36E-07	25000	24 hour	URT	URT	8.64E-06	0.00%	AERMOD 19191



Table 4: Emissions Summary Table

Contaminant	CAS Number	Total Facility Emission Rate (g/s)	Standard	Averaging Period	Limiting Effect	Schedule	Max POI Concentration ($\mu\text{g}/\text{m}^3$)	Percentage of Ministry POI Limit (%)	Air Dispersion Model Used
Hexane, n- (n-Hexane and Hexane isomers only)	110-54-3	2.36E-07	2500	24 hour	Health	Standard	8.64E-06	0.00%	AERMOD 19191
Hydrogen sulphide	7783-06-4	1.09E-02	13	10 minute	Odour	Standard	3.15E+00	24.20%	AERMOD 19191
Hydrogen sulphide	7783-06-4	1.09E-02	7	24 hour	Health	Standard	3.99E-01	5.69%	AERMOD 19191
Hydrogen sulphide	7783-06-4	1.09E-02	70	24 hour	URT	URT	3.99E-01	0.57%	AERMOD 19191
Isooctane	540-84-1	6.77E-08	1750	24 hour	Health	SL-JSL	2.48E-06	0.00%	AERMOD 19191
Methane	74-82-8	9.56E-01	37330	24 hour	Health	SL-PA	3.49E+01	0.09%	AERMOD 19191
Methyl ethyl ketone (2-Butanone)	78-93-3	2.30E-07	10000	24 hour	URT	URT	8.44E-06	0.00%	AERMOD 19191
Methyl ethyl ketone (2-Butanone)	78-93-3	2.30E-07	1000	24 hour	Health	Standard	8.44E-06	0.00%	AERMOD 19191
Methyl isobutyl ketone	108-10-1	5.94E-08	1200	24 hour	Odour	Guideline	2.17E-06	0.00%	AERMOD 19191
Mixed Odour	NA (odour)	2.63E+03	1	10 minute	Odour	N/A	0.29 @ 140 m setback	29% @ 140 m setback	AERMOD 19191
Nitrogen oxides	10102-44-0	8.95E-01	200	24 hour	Health	Standard	3.40E+01	16.99%	AERMOD 19191
Nitrogen oxides	10102-44-0	8.95E-01	400	1 hour	Health	Standard	1.37E+02	34.28%	AERMOD 19191
Octamethylcyclotetrasiloxane	556-67-2	6.76E-06	500	24 hour	Health	SL-JSL	2.48E-04	0.00%	AERMOD 19191
Octamethyltrisiloxane	107-51-7	2.80E-07	204	24 hour	Health	SL-PA	1.03E-05	0.00%	AERMOD 19191
Propane	74-98-6	3.10E-05	215000	24 hour	Health	SL-JSL	1.32E-03	0.00%	AERMOD 19191
Propylene	115-07-1	6.64E-06	4000	24 hour	Health	Standard	2.43E-04	0.00%	AERMOD 19191
Propylene	115-07-1	6.64E-06	40000	24 hour	URT	URT	2.43E-04	0.00%	AERMOD 19191
Silicon dioxide	7631-86-9	2.12E-03	5	24 hour	Health	SL-MD	7.76E-02	1.55%	AERMOD 19191
Sulphur dioxide	7446-09-5	1.00E+00	100	1 hour	Health & Vegetation	Standard	3.88E+01	38.80%	AERMOD 19191
Sulphur dioxide	7446-09-5	1.00E+00	10	annual	Health & Vegetation	Standard	8.99E-01	8.99%	AERMOD 19191



Table 4: Emissions Summary Table

Contaminant	CAS Number	Total Facility Emission Rate (g/s)	Standard	Averaging Period	Limiting Effect	Schedule	Max POI Concentration ($\mu\text{g}/\text{m}^3$)	Percentage of Ministry POI Limit (%)	Air Dispersion Model Used
Suspended particulate matter (< 44 μm diameter)	NA (tsp)	2.10E+00	120	24 hour	Visibility	Standard	8.01E-01	0.67%	AERMOD 19191
Tetrahydrofuran	109-99-9	6.58E-07	93000	24 hour	Odour	Guideline	2.41E-05	0.00%	AERMOD 19191
Toluene	108-88-3	1.26E-05	2000	24 hour	Odour	Guideline	4.62E-04	0.00%	AERMOD 19191
Xylenes	1330-20-7	2.57E-07	730	24 hour	Health	Standard	9.40E-06	0.00%	AERMOD 19191
Xylenes	1330-20-7	2.57E-07	3000	10 minute	Odour	Guideline	7.42E-05	0.00%	AERMOD 19191
Xylenes	1330-20-7	2.57E-07	7300	24 hour	URT	URT	9.40E-06	0.00%	AERMOD 19191