2021

EMISSION SUMMARY & DISPERSION MODELLING REPORT

ANNUAL UPDATE

As per Ontario Regulation 419/05

Prepared for:

Rollstar Metal Forming, a division of Martinrea International Inc.
6655 Northwest Drive
Mississauga, Ontario L4V 1L1

Project No.: 21ELC044

ENVIROLUM CONSULTING INC.

KITCHENER, ON

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Executive Summary

This Emission Summary and Dispersion Modelling (*ESDM*) report was originally prepared to support an application for the Environmental Compliance Approval for the Rollstar Metal Forming facility located at 6655 Northwest Drive in Mississauga, Ontario.

This version of the report updates AERMOD to the newly adopted version 19191 and the sources to include injection molding process.

This report has been prepared in accordance with s.26 of O. Reg. 419/05, the Procedure for Preparing an Emission Summary and Dispersion Modelling Report, Version 4.0, February 2017 (PIBS: 3614e04), the Guide to Applying for an Environmental Compliance Approval, December 2012 (PIBS: 8527e), Part 11.1 of the Environmental Protection Act and Section 9 of the Environmental Protection Act, R.S.O. 1990. All potential sources and contaminants have been identified and assessed for significance; those deemed insignificant have been rationalized and tabulated.

Processes include roll forming, bending, stamping, extrusion, adhesive application, welding, and injection molding. Airborne emissions from the facility include metal fumes, acid fumes, volatile organic compounds, and particulate matter.

Dispersion modelling of the maximum emission scenario was conducted using the AERMOD version 19191. A comparison of the ground level POI concentrations with applicable Ministry of the Environment, Conservation and Parks (*MECP*) criteria indicates that emissions based on the maximum emission scenario are below *MECP* limits and in compliance with O. Reg. 419/05.

Table 1.1: Emission Summary Table

Contaminant	CAS #	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration ($\mu g/m^3$)	Averaging Period (h)	MOE POI Limit ($\mu g/m^3$)	Limiting Effect	Regulation Schedule	% of MOE POI Limit
Ethyl Benzene	100-41-4	6.29E-03	AERMOD v19191	2.89E+00	24	1000	Health	STD	0.3%
				1.45E+01	10 min	1900	Odour	G	0.8%
2-ethylhexanol	104-76-7	1.18E-04	AERMOD v19191	3.32E-01	1	600	Odour	G	0.1%
Methyl Isobutyl Ketone	108-10-1	1.27E-03	AERMOD v19191	7.07E-01	24	1200	Odour	G	0.1%
Toluene	108-88-3	1.50E+00	AERMOD v19191	1.27E+03	24	2000	Odour	G	63.3%
chlorobenzene	108-90-7	2.36E-05	AERMOD v19191	1.21E-02	1	3500	Health	G	<0.01%
				1.99E-02	10 min	4500	Odour	G	<0.01%
Phenol	108-95-2	2.50E-02	AERMOD v19191	1.88E+01	24	30	Health	STD	62.6%
Cyclohexane	110-82-7	8.26E-03	AERMOD v19191	1.68E+00	24	6100	Health	STD	0.0%
2-Ethylhexanal	123-05-7	2.09E-05	AERMOD v19191	1.53E-02	24	50	Health	SL	0.0%
Hydroquinone	123-31-9	4.32E-04	AERMOD v19191	8.78E-02	24	10	Health	SL	0.9%
Iron Oxide	1309-37-1	1.80E-04	AERMOD v19191	1.30E-01	24	25	Soiling	STD	0.5%
Xylene	1330-20-7	2.25E-02	AERMOD v19191	1.02E+01	24	730	Health	STD	1.4%
				5.10E+01	10 min	3000	Odour	G	1.7%
Ethyl Acetate	141-78-6	1.51E-01	AERMOD v19191	4.34E+02	1	19000	Odour	G	2.3%
Ethanol	64-17-5	7.51E-01	AERMOD v19191	2.60E+03	1	19000	Odour	G	13.7%
Methanol	67-56-1	2.50E-02	AERMOD v19191	2.11E+01	24	4000	Health	STD	0.5%
2-propanol	67-63-0	4.47E-01	AERMOD v19191	1.55E+02	24	7300	Health	STD	2.1%
Acetone	67-64-1	2.99E-06	AERMOD v19191	2.19E-03	24	11880	Health	STD	<0.01%
Chloroform	67-66-3	2.29E-04	AERMOD v19191	1.27E-01	24	1	Health	STD	<0.01%
Aluminum Oxide	7429-90-5	5.79E-08	AERMOD v19191	4.17E-05	24	12	Health	SL	<0.01%
Lead	7439-92-1	4.21E-09	AERMOD v19191	3.03E-06	24	0.5	Health	STD	<0.01%
				5.72E-07	30 day	0.2	Health	STD	<0.01%

Manganese	7439-96-5	1.89E-06	AERMOD v19191	1.36E-03	24	0.4	Health	STD	0.3%
Silicon	7440-21-3	7.55E-07	AERMOD v19191	5.44E-04	24	27	Health	SL	<0.01%
Antimony	7440-36-0	1.16E-08	AERMOD v19191	8.35E-06	24	25	Health	STD	<0.01%
Carbon	7440-44-0	7.55E-07	AERMOD v19191	5.44E-04	24	2	Health	SL	0.0%
Copper	7440-50-8	6.29E-07	AERMOD v19191	4.53E-04	24	50	Health	STD	<0.01%
Zinc	7440-66-6	9.59E-06	AERMOD v19191	6.91E-03	24	120	Particulate	STD	<0.01%
Phosphoric Acid	7664-38-2	4.30E-04	AERMOD v19191	8.74E-02	24	7	Health	STD	1.2%
Sulfuric Acid	7664-93-9	2.15E-04	AERMOD v19191	4.37E-02	24	5	Health	STD	0.9%
Nitric Acid	7697-37-2	3.75E-03	AERMOD v19191	7.62E-01	24	35	Corrosion	STD	2.2%
Sulfur	7704-34-9	5.04E-08	AERMOD v19191	3.63E-05	24	2.5	Health	SL	<0.01%
Methyl Ethyl Ketone	78-93-3	7.50E-01	AERMOD v19191	6.33E+02	24	1000	Health	STD	63.3%
Methyl Methacrylate	80-62-6	2.50E-02	AERMOD v19191	1.88E+01	24	860	Odour	G	2.2%
Alkanes, C7-10-iso-	90622-56-3	1.74E-05	AERMOD v19191	3.54E-03	24	175	Health	SL	<0.01%
cumene	98-82-8	1.81E-05	AERMOD v19191	3.68E-03	24	400	Health	STD	<0.01%
Particulate Matter	n/a	1.34E-03	AERMOD v19191	1.35E+00	24	120	Visibility	STD	1.1%

Regulation Schedule

STD: Standard of Reg. 419, listed under Air Contaminants Benchmark List, April 2018, v.2.0

G: Guideline value listed under Air Contaminants Benchmark List, April 2018, v.2.0

SL: Screening Level listed under Air Contaminants Benchmark List, April 2018, v.2.0

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1.0 Introduction and Facility Description

This Emission Summary and Dispersion Modelling (*ESDM*) report was originally prepared to support an application for the Environmental Compliance Approval for the Rollstar Metal Forming facility located at 6655 Northwest Drive in Mississauga, Ontario.

This version of the report updates AERMOD to the newly adopted version 19191 and the sources to include injection molding process.

This report has been prepared in accordance with s.26 of O. Reg. 419/05, the Procedure for Preparing an Emission Summary and Dispersion Modelling Report, Version 4.0, February 2017 (PIBS: 3614e04), the Guide to Applying for an Environmental Compliance Approval, December 2012 (PIBS: 8527e), Part 11.1 of the Environmental Protection Act and Section 9 of the Environmental Protection Act, R.S.O. 1990.

The facility is surrounded by land zoned as employment zones within 500 metres of the facility. The building is leased by Rollstar Metal Forming and is the sole occupant. The zoning map is included in Appendix B.

The site layout of the facility are presented in Figure 1 – Site Location Plan. The identification and location of the emission sources are presented in Figure 2 – Source Location. Dispersion Modelling Receptors are shown in Figure 3. All of these figures can be viewed in Appendix A.

This section provides a description of the facility as required by sub paragraph 1 of s.26(1) of O. Reg. 419/05.

1.1 Purpose and Scope of the ESDM Report

The purpose of this version of the ESDM Report is to update AERMOD version to v19191 and include injection molding process.

All previously approved emission sources are included in this report to determine the maximum emission scenario. These emission sources include:

- Extrusion;
- Adhesive Application;
- Welding; and
- Natural-gas combustion equipment.

Insignificant sources identified have been screened out in accordance with Table B-3 of the ESDM Procedure document and were not included to determine the maximum emission scenario.

1.2 Description of Processes and NAICS Code

Rollstar Metal Forming manufactures metal and plastic automotive assemblies.

The ESDM Report is updated in accordance with s.25 & s. 26 of O. Reg. 419/05 since the North American Industrial Classification System (*NAICS*) code that applies to the facility is 336390 – Other Motor Vehicle Parts Manufacturing, which classifies the facility as a schedule 5 facility.

There are no outdoor storage piles and all roads on-site are paved. The main manufacturing processes at the facility include:

- Roll-forming;
- Bending and stamping;
- PVC Extrusion;
- Adhesive application;
- Welding; and
- Injection molding.

Raw materials, including steel and polyvinyl chloride (PVC) plastic, are received on site. Steel is robotically spot welded where required. PVC is extruded on one (1) of six (6) extrusion lines. Five (5) of the six (6) extrusion lines also have adhesive stations where parts are glued together. The facility also operates two (2) glue mixing stations. Adhesive and solvents are also manually applied to parts. The facility has a total of six (6) injection molding machines located near the warehouse and manual adhesive application area. Auxiliary operations at the facility include natural-gas fired comfort heating equipment, a maintenance welding station, and a cooling tower.

Emissions that are considered significant are released into the natural environment through plant and equipment ventilation.

1.3 Description of Products and Raw Materials

Raw materials used in the production processes include the following:

- Steel
- Polyvinyl Chloride (PVC) resins
- Adhesives
- Solvents
- Acids
- Welding materials

The maximum production capacity is 23,000,000 vehicle parts per year.

1.4 Process Flow Diagram

A process flow diagram for the operations undertaken at the facility is illustrated below in Figure 1.1.

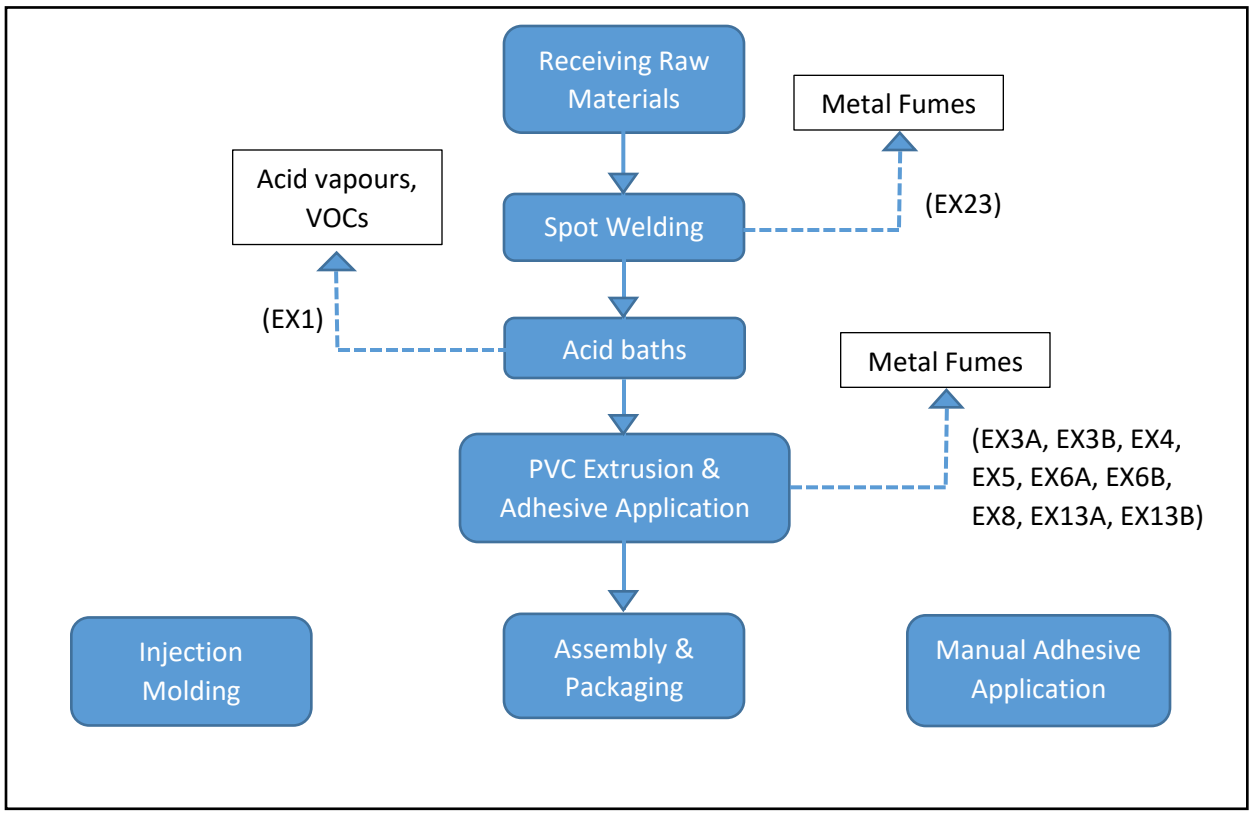


FIGURE 1.1: PROCESS FLOW DIAGRAM

1.5 Operating Schedule

The plant typically operates 24 hours per day, 5 days per week from Sunday night (11:00pm) to Friday night (11:00pm).

2.0 Initial Identification of Sources and Contaminants

A summary listing of significant and insignificant sources and contaminants emitted from the facility have been identified in Table 2.1 as required by sub paragraphs 2 to 5 of s.26(1) of O. Reg. 419/05.

Insignificant or negligible contaminants are discussed in more detail in Section 3.0.

Table 2.1: Source and Contaminants Identification Table

Source Information			Expected Contaminants	Significant (Yes/No)?[1]	Rationale
Source ID	**Source Description**	**General Location**			
HVAC1 - 11 UH1 - 17	Natural Gas Fired Comfort Heating Equipment	Throughout Main Building	By-Products of Combustion	No	Refer to Section 3.2
CHILLER	Chiller Units	Main Building	None	No	Exempt as per O.Reg. 524/98
COMP OUT	Compressor exhaust	Main Building	None	No	Exempt as per O.Reg. 524/98
CT1	Cooling Tower	Main Building	Particulate matter	Yes	
ELEC AC	Electric Air Conditioners	Main Building	None	No	Exempt as per O.Reg. 524/98
EX1	General Exhaust - Extrusion Area	Main Building	Acid emissions, VOCs	Yes	
EX2	Co-extrusion Line 1 Exhaust	Main Building	None	No	not in use
EX3A	Co-extrusion Line 2 Exhaust	Main Building	Plastic fumes and VOCs	Yes	
EX3B	Co-extrusion Line 2 Exhaust	Main Building	Plastic fumes and VOCs	Yes	
EX4	Co-extrusion Line 3 Exhaust	Main Building	Plastic fumes and VOCs	Yes	
EX5	Co-extrusion Line 4 Exhaust	Main Building	Plastic fumes and VOCs	Yes	
EX6A	Co-extrusion Line 5 Exhaust	Main Building	Plastic fumes and VOCs	Yes	
EX6B	Co-extrusion Line 5 Exhaust	Main Building	Plastic fumes and VOCs	Yes	
EX7	Glue Station exhaust	Main Building	VOCs	Yes	
EX8	Co-extrusion Line 8 and Glue Station exhaust	Main Building	Plastic fumes and VOCs	Yes	
EX9	General Exhaust - Extrusion Area	Main Building	None	No	Exempt as per O.Reg. 524/98
EX10	Old Glue Station Exhaust	Main Building	None	No	not in use
EX11	Old Glue Station Exhaust	Main Building	None	No	not in use
EX12	Lab Oven Exhaust	Main Building	None	No	Exempt as per O.Reg. 524/98
EX13A	Co-extrusion Line 7 exhaust	Main Building	Plastic fumes and VOCs	Yes	
EX13B	Co-extrusion Line 7 exhaust	Main Building	Plastic fumes and VOCs	Yes	

Source Information			Expected Contaminants	Significant (Yes/No)?[1]	Rationale
Source ID	Source Description	General Location			
EX14	Weigh station exhaust	Main Building	None	No	Exempt as per O.Reg. 524/98
EX15	Salt Spray Chamber exhaust	Main Building	salt	No	Refer to Section 3.2
EX16	Maintenance Welding exhaust	Main Building	weld fumes	No	Refer to Section 3.2
EX17	Cafeteria exhaust	Main Building	None	No	Exempt as per O.Reg. 524/98
EX18	Cafeteria exhaust	Main Building	None	No	Exempt as per O.Reg. 524/98
EX19	Office exhaust	Main Building	None	No	Exempt as per O.Reg. 524/98
EX20	Washroom exhaust	Main Building	None	No	Exempt as per O.Reg. 524/98
EX21	Washroom exhaust	Main Building	None	No	Exempt as per O.Reg. 524/98
EX22	Change room exhaust	Main Building	None	No	Exempt as per O.Reg. 524/98
EX23	Welding exhaust	Main Building	weld fumes	Yes	
EX24	General Exhaust - Storage Area	Main Building	None	No	Exempt as per O.Reg. 524/98
EX25	General Exhaust - Storage Area	Main Building	None	No	Exempt as per O.Reg. 524/98
EX26	Washroom exhaust	Main Building	None	No	Exempt as per O.Reg. 524/98
M1 – M6	Injection Moulding Machines	Main Building	VOCs, Particulate matter	No	Process is conducted in a closed system and is not exhausted to the outside environment.
IN	Air intakes	Main Building	None	No	Not a source of emissions.

NOTE: [1] Only significant sources are included in model.

3.0 Assessment of the Significance of Contaminants and Sources

In accordance with s.8 of O. Reg. 419/05 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

A summary of the sources considered negligible or having insignificant contaminant emissions is provided in Table 2.1.

The remainder of the sources are significant and are included in the dispersion modelling for the site. These are discussed in more detail in Section 4.0.

3.2 Rationale for Assessment

For each source in Table 2.1 that has been identified as being negligible, an accompanying documented rationale is provided. Negligible or insignificant sources are not included in the model.

3.2.1 Various Auxiliary Exhausts

The following equipment are not expected to emit contaminants and therefore have been deemed exempt from permitting as per O.Reg. 524/98:

- Chiller units (CHILLER)
- Compressor exhaust (COMP OUT)
- Electrical air conditioners (ELEC AC)
- Lab oven exhaust (EX12)
- Weigh station exhaust (EX14)
- Cafeteria exhaust (EX17, EX18)
- Office exhaust (EX19)
- Washroom exhausts (EX20, EX21, EX26)
- Change Room Exhaust (EX22)
- Storage Area General Exhaust (EX24 and EX25)

3.2.2 Natural Gas Fired Heating Equipment Exhaust (Source: HVAC1 to HVAC11, UH1 to UH17)

Natural gas-fired sources including eleven (11) HVAC units and seventeen (17) unit heaters has been deemed negligible since the total facility-wide heat input usage of 6.12 million kilojoules per hour (kJ/hr) is less than 20 million kJ/hr, as per Table B-3B of the Procedure for Preparing an Emission Summary and Dispersion Modelling Report document.

3.2.3 Co-extrusion Line 1 Exhaust (EX2); Glue Station Exhausts (EX10, EX11)

Co-extrusion Line 1 is out of commission, as well as the old glue stations (EX10 and EX11), therefore these sources have been deemed exempt from permitting as per O.Reg. 524/98.

3.2.4 General Exhaust (EX9)

The general exhaust in the extrusion area is not expected to emit contaminants since emissions from extrusion have dedicated exhausts. Therefore, EX9 has been deemed exempt from permitting as per O.Reg. 524/98.

3.2.5 Salt Spray Chamber exhaust (EX15)

The salt spray chamber exhaust is not expected to emit significant amounts of contaminants since the salt is expected to precipitate out of solution rather than evaporate.

3.2.6 Maintenance Welding station (EX16)

The maintenance welding station has been deemed insignificant in accordance with Table B-3 of the MECP's Procedure for Preparing an ESDM Report.

3.2.7 Injection molding (M1-M6)

Process is conducted in a closed system and is not exhausted to the outside environment. Polyvinyl chloride has been assessed as an insignificant contaminant based on de minimus levels, as per Table B-2A in the MECP's "Procedure for Preparing an Emission Summary and Dispersion Modelling Report", Version 4.0, dated February 2017.

4.0 Operating Conditions, Emission Estimating, and Data Quality

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 facility as required by sub paragraphs 6 and 7 of s.26(1) of O. Reg. 419/05.

In accordance with s.8 of O. Reg. 419/05, 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.

4.1 Description of Operating Conditions

As noted in Section 1.2, the NAICS code for the facility is 336390 – Other Motor Vehicle Parts Manufacturing. NAICS code 336390 is listed in Schedule 5 of O.Reg. 419/05, therefore s.20 of O.Reg. 419/05 currently applies.

Operating conditions for emission estimating and modelling represent the worst-case operating scenario generating maximum emissions.

4.2 Emissions Basis and Data Quality

Emissions resulting from all significant facility sources have been included in the emission calculations and are listed in the Source Summary Table. Emission rates are derived from standard emission factors (US EPA and MECP) and engineering calculations. The emissions basis and data quality for each source and the emission sample calculations are included in Appendix C.

5.0 Source Summary Table and Site Plan

5.1 Source Summary Table

Table 5.1 – Source Summary Table summarizes the contaminant emissions calculated for the worst-case facility emissions scenario. Emission rate estimates for each source of significant contaminants are documented in accordance with requirements of sub paragraph 8 of s.26(1) of O. Reg. 419/05.

Emission calculations for Table 5.1 – Source Summary Table are in Appendix C. Emission estimates based on these sources are discussed and developed in Section 4.0.

5.2 Site Plan

The facility's site layouts and plans of the property from which the contaminants are discharged, drawn to scale that shows the property boundary, coordinates of the property boundary, each source of contaminant, and building height are included in Appendix A.

Table 5.1: Source Summary Table

Source ID	Source Description	Source Data						Emission Data					
		Flow Rate (m^3/s)	Exit Gas Temp (°C)	Inner Dia. (m)	Height Above Grade (m)	Height Above Roof (m)	Source Coordinates (x,y) (m)	Contaminant	CAS #	Maximum Emission Rate (g/s)	Emission Estimating Technique	Emissions Data Quality	% of Overall Emissions
HVAC1 - 11 UH1 - 17	Natural Gas Fired Comfort Heating Equipment	-	-	-	-	-	--	Insignificant Emissions	-	-	-	-	-
CT1	Cooling Tower	-	-	1.5	11.4	2.7	610415.1, 4839958.8	Particulate Matter	n/a	1.22E-03	EC	A	90.62%
EX1	General Exhaust - Extrusion Area	11.80	25	1.07	9.2	0.5	610407.4, 4839873.6	Isopropyl alcohol	67-63-0	3.22E-01	MB	AA	72.05%
								Xylene	1330-20-7	9.58E-03	MB	AA	42.51%
								Ethyl benzene	100-41-4	2.59E-03	MB	AA	41.11%
								Chloroform	67-66-3	6.25E-05	MB	AA	27.27%
								Methyl isobutyl ketone	108-10-1	3.47E-04	MB	AA	27.27%
								Alkanes, C7-10-iso-	90622-56-3	1.74E-05	MB	AA	100.00%
								hydroquinone	123-31-9	4.32E-04	MB	AA	100.00%
								Cyclohexane	110-82-7	8.26E-03	MB	AA	100.00%
								Ethyl alcohol	64-17-5	1.18E-03	MB	AA	0.16%
								Ethyl acetate	141-78-6	1.32E-02	MB	AA	8.71%
								methyl alcohol	67-56-1	4.72E-05	MB	AA	0.19%
								chlorobenzene	108-90-7	2.36E-05	MB	AA	100.00%
								cumene	98-82-8	1.81E-05	MB	AA	100.00%
								toluene	108-88-3	6.53E-04	MB	AA	0.04%
								Acetic acid ethyl ester	141-78-6	1.32E-02	MB	AA	8.71%
								Phosphoric Acid	7664-38-2	4.30E-04	EC	A	100.00%
								Sulfuric Acid	7664-93-9	2.15E-04	EC	A	100.00%
								Nitric Acid	7697-37-2	3.75E-03	EC	A	100.00%
EX3A EX3B (Sources 8 & 9)	Co-Extrusion Line 2 Exhaust (S8 - Adhesive Station) (S9 - Cooling Station)	2.36 0.14	25 25	0.30 x 0.61 0.19 x 0.94	9.4 9.6	0.7 0.9	EX3A: 610412.0, 4839880.0	Acetone	67-64-1	2.64E-07	EC	A	8.85%
								2-ethylhexanol	104-76-7	1.04E-05	EC	A	8.85%
								2-ethylhexanal	123-05-7	1.85E-06	EC	A	8.85%
								Thiirane	420-12-2	4.16E-06	EC	A	8.85%

							EX3B: 610413.1, 4839897.1	Toluene	108-88-3	3.00E-01	MB	AA	19.99%
								Ethanol	64-17-5	1.50E-01	MB	AA	19.97%
								Methyl Ethyl Ketone	78-93-3	1.50E-01	MB	AA	20.00%
								2-propanol	67-63-0	2.50E-02	MB	AA	5.59%
								Ethyl acetate	141-78-6	2.50E-02	MB	AA	16.52%
								Methanol	67-56-1	5.00E-03	MB	AA	19.96%
								Methyl methacrylate	80-62-6	5.00E-03	MB	AA	20.00%
								Phenol	108-95-2	5.00E-03	MB	AA	20.00%
EX4 (Sources 6 & 7)	Co-Extrusion Line 3 Exhaust (S6 - Adhesive Station) (S7 - Curing Oven)	2.36	25	0.30 x 0.61	9.4	0.7	610406.8, 4839882.6	Acetone	67-64-1	4.04E-07	EC	A	13.54%
								2-ethylhexanol	104-76-7	1.60E-05	EC	A	13.54%
								2-ethylhexanal	123-05-7	2.83E-06	EC	A	13.54%
								Thiirane	420-12-2	6.37E-06	EC	A	13.54%
								Toluene	108-88-3	3.00E-01	MB	AA	19.99%
								Ethanol	64-17-5	1.50E-01	MB	AA	19.97%
								Methyl Ethyl Ketone	78-93-3	1.50E-01	MB	AA	20.00%
								2-propanol	67-63-0	2.50E-02	MB	AA	5.59%
								Ethyl acetate	141-78-6	2.50E-02	MB	AA	16.52%
								Methanol	67-56-1	5.00E-03	MB	AA	19.96%
								Methyl methacrylate	80-62-6	5.00E-03	MB	AA	20.00%
								Phenol	108-95-2	5.00E-03	MB	AA	20.00%
EX5 (Source 4 & 5)	Co-Extrusion Line 4 Exhaust (S4 - Curing Oven) (S5 - Cooling)	2.36	25	0.30 x 0.61	9.4	0.7	610393.4, 4839872.2	Acetone	67-64-1	9.25E-07	EC	A	30.99%
								2-ethylhexanol	104-76-7	3.65E-05	EC	A	30.99%
								2-ethylhexanal	123-05-7	6.48E-06	EC	A	30.99%
								Thiirane	420-12-2	1.46E-05	EC	A	30.99%
								Toluene	108-88-3	3.00E-01	MB	AA	19.99%
								Ethanol	64-17-5	1.50E-01	MB	AA	19.97%
								Methyl Ethyl Ketone	78-93-3	1.50E-01	MB	AA	20.00%
								2-propanol	67-63-0	2.50E-02	MB	AA	5.59%
								Ethyl acetate	141-78-6	2.50E-02	MB	AA	16.52%
								Methanol	67-56-1	5.00E-03	MB	AA	19.96%
								Methyl methacrylate	80-62-6	5.00E-03	MB	AA	20.00%
								Phenol	108-95-2	5.00E-03	MB	AA	20.00%

EX6A EX6B (Sources 2 & 3)	Co-Extrusion Line 5 Exhaust (S2 - Adhesive station) (S3 - Extruder/Oven Area)	2.36 2.36	25 25	0.30 x 0.61 0.41 x 0.52	9.3 9.4	0.6 0.7	EX6A: 610400.6, 4839879.3 EX6B: 610401.4, 4839871.0	Acetone	67-64-1	3.58E-07	EC	A	11.98%
								2-ethylhexanol	104-76-7	1.41E-05	EC	A	11.98%
								2-ethylhexanal	123-05-7	2.50E-06	EC	A	11.98%
								Thiirane	420-12-2	5.63E-06	EC	A	11.98%
								Toluene	108-88-3	3.00E-01	MB	AA	19.99%
								Ethanol	64-17-5	1.50E-01	MB	AA	19.97%
								Methyl Ethyl Ketone	78-93-3	1.50E-01	MB	AA	20.00%
								2-propanol	67-63-0	2.50E-02	MB	AA	5.59%
								Ethyl acetate	141-78-6	2.50E-02	MB	AA	16.52%
								Methanol	67-56-1	5.00E-03	MB	AA	19.96%
								Methyl methacrylate	80-62-6	5.00E-03	MB	AA	20.00%
								Phenol	108-95-2	5.00E-03	MB	AA	20.00%
EX7 (Source 10)	Glue Station Exhaust	0.65	25	0.30 x 0.41	9.3	0.6	610368.6, 4839892.2	Xylene	1330-20-7	6.48E-03	MB	AA	28.75%
								Ethyl benzene	100-41-4	1.85E-03	MB	AA	29.44%
								Chloroform	67-66-3	8.33E-05	MB	AA	36.36%
								Methyl isobutyl ketone	108-10-1	4.63E-04	MB	AA	36.36%
EX8 (Source 1)	Co-Extrusion Line 8 and Glue Station Exhaust	0.28	25	0.33 x 0.45	9.4	0.7	610403.5, 4839899.3	Xylene	1330-20-7	6.48E-03	MB	AA	28.75%
								Ethyl benzene	100-41-4	1.85E-03	MB	AA	29.44%
								Chloroform	67-66-3	8.33E-05	MB	AA	36.36%
								Methyl isobutyl ketone	108-10-1	4.63E-04	MB	AA	36.36%
								Acetone	67-64-1	3.89E-07	EC	A	13.02%
								2-ethylhexanol	104-76-7	1.54E-05	EC	A	13.02%
								2-ethylhexanal	123-05-7	2.72E-06	EC	A	13.02%
								Thiirane	420-12-2	6.12E-06	EC	A	13.02%
EX13A EX13B (Source 1)	Co-Extrusion Line 7 Exhaust	0.28 0.28	25 25	0.33 x 0.45 0.33 x 0.45	9.4 9.4	0.7 0.7	EX13A: 610386.7, 4839879.2 EX13B: 610391.0, 4839848.8	Acetone	67-64-1	6.45E-07	EC	A	21.61%
								2-ethylhexanol	104-76-7	2.55E-05	EC	A	21.61%
								2-ethylhexanal	123-05-7	4.52E-06	EC	A	21.61%
								Thiirane	420-12-2	1.02E-05	EC	A	21.61%
								Toluene	108-88-3	3.00E-01	MB	AA	19.99%
								Ethanol	64-17-5	1.50E-01	MB	AA	19.97%
								Methyl Ethyl Ketone	78-93-3	1.50E-01	MB	AA	20.00%

								2-propanol	67-63-0	2.50E-02	MB	AA	5.59%
								Ethyl acetate	141-78-6	2.50E-02	MB	AA	16.52%
								Methanol	67-56-1	5.00E-03	MB	AA	19.96%
								Methyl methacrylate	80-62-6	5.00E-03	MB	AA	20.00%
								Phenol	108-95-2	5.00E-03	MB	AA	20.00%
EX23 (Source 12)	Welding Exhaust	2.36	25	0.25 x 0.46	9.9	1.2	610344.1, 4839919.2	Iron Oxide	1309-37-1	1.80E-04	EC	A	100.00%
								Calcium	7440-70-2	1.26E-07	EC	A	100.00%
								Carbon	7440-44-0	7.55E-07	EC	A	100.00%
								Copper	7440-50-8	6.29E-07	EC	A	100.00%
								Manganese	7439-96-5	1.89E-06	EC	A	100.00%
								Phosphorus	8049-19-2	2.52E-07	EC	A	100.00%
								Silicon	7440-21-3	7.55E-07	EC	A	100.00%
								Sulfur	7704-34-9	5.04E-08	EC	A	100.00%
								Aluminum	7429-90-5	5.79E-08	EC	A	100.00%
								Antimony	7440-36-0	1.16E-08	EC	A	100.00%
								Lead	7439-92-1	4.21E-09	EC	A	100.00%
								Zinc	7440-66-6	9.59E-06	EC	A	100.00%
								Particulate Matter	n/a	1.26E-04	EC	A	9.38%

NOTE: Source ID in brackets matches ID on Exhaust System Plant Layout - Aug 1, 2017

EF: Emission Factor
EC: Engineering Calculation
MB: Mass Balance

AA: Above average data quality
A: Average data quality

6.0 Dispersion Modelling

Section 20 of O. Reg. 419/05 currently applies to the facility and the modelled impact to 24-hour Point of Impingement (*POI*) criteria can be assessed using AERMOD version 19191. The Lakes Environmental, AERMOD View version 9.9.0 was used to model the facility's emissions.

The dispersion modelling of the maximum emission scenario was conducted in accordance with the Ministry publication "Air Dispersion Modelling Guideline for Ontario" (*ADMGO*) PIBS 5165e03 (July 2016).

The entire building on site was included in the model to allow for building downwash. A multi-tier receptor grid was placed around the facility in accordance with the ADMGO. The contaminant emissions from the entire facility are modelled as individual point sources. The cooling tower was modeled as a volume source. All contaminants were modelled using the multi-chemical run feature. The model containing the multi-chemical run results is included in the modelling file labelled as "**Rollstar Metal Forming 2021**".

The emission rates used in the dispersion model meet the requirements of Section 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.

The location and modelling coordinates of the point sources and the facility's property line is labelled in Figure 3 in Appendix A.

There is no child care facility, health care facility, senior's residence, long-term care facility or an educational facility located at the facility.

Dispersion modelling has been conducted using contaminant specific emission rates for each source located at the facility and source details as summarized in the Source Summary Table, Table 5.1.

The 24-hour average concentrations are compared against criteria listed in the publication "Air Contaminants Benchmarks (*ACB*) List: Standards, guidelines and screening levels for assessing point of impingement concentrations of air contaminants", Version 2 dated April 2018.

6.1 Dispersion Modelling Input Summary Table

The input data used to conduct the AERMOD modelling is summarized in Table 6.1 – Dispersion Modelling Input Summary Table. 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.

Table 6.1: Dispersion Modelling Input Summary Table

Section of the Regulation	Section Title	Description of How the Approved Dispersion Model was Used
Section 8	Negligible Sources	Not included in modelling. See Table 2.1 – Sources and Contaminants Identification Table.
Section 9	Same Structure Contamination	Not applicable.

Section of the Regulation	Section Title	Description of How the Approved Dispersion Model was Used
Section 10	Operating Conditions	All contaminants were modelled using the Multi-Chemical Run and is based on maximum worst-case operating time of 24 hours per day, 7 days per week, 52 weeks per year.
Section 11	Source of Contaminant Emission Rates	s.11 (1)1: at least as high as worst case emissions. See Table 5.1 and Sections 4.1 and 4.2.
Section 12	Combined Effect of Assumptions for Operating Conditions and Emission Rates	The Operating Conditions were estimated in accordance with s.10(1) 1 and s.11(1) of O. Reg. 419 and are therefore considered to result in the highest concentration at the POI that the facility is capable of for the contaminants emitted. See sections 4.1 and 4.2 of the ESDM report.
Section 13	Meteorological Conditions	A 5 year meteorological dataset provided by the MECP was loaded in AERMOD. Central Urban – Toronto Urban surface data for 1996-2000.
Section 14	Area of Modelling Coverage	A nested grid was used in AERMOD to establish receptors around the site as required by s.14. Property line receptors were placed at 10 m spacing.
Section 15	Stack Height for Certain New Sources of Contaminant	Actual stack heights as listed in Table 5.1: Source Summary Table were used in the model.
Section 16	Terrain Data	Four official MECP Digital Elevation GeoTIFF file (030M) was used for the modelling.
Section 17	Average Periods	1hr, 24hr, 30days, and 10 minute averaging periods were applied to the AERMOD modelling.

6.2 Land Use Zoning Designation Plan

Land Use Zoning Designation Plan found in Appendix B describes the nearby land use. 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. The dispersion modelling of the site did not use the meteorological data described in paragraph 2 of s.13(1); therefore, a detailed description of the local land use conditions is not required.

6.3 Coordinate System

The Universal Transverse Mercator (*UTM*) coordinate system, as per Section 5.2.2 of the ADMGO, was used to specify model object sources, buildings and receptors. All coordinates were defined in the World Geodetic System, 1984 (*WGS84*).

6.4 Meteorology Data and Anomalies

A description of the local land use conditions is provided in this section as per subparagraph 10 of s.26(1) of O.Reg. 419/05, since meteorological data as described in paragraph 2 of s.13(1) of O.Reg. 419/05 is used.

The digital elevation dataset for Central Urban - Toronto from the MECP's website was entered into the model.

AERMET was not used in this assessment as a pre-processed MECP meteorological dataset was used.

The resultant 24-hour point of impingement concentrations for each contaminant were assessed and adjusted for meteorological anomalies. As outlined in the ADMGO, for assessments of 24-hour average concentrations, the highest 24-hour average predicted concentration in each single meteorological year was discarded such that compliance is based on the highest concentration after the elimination of these five 24-hour average concentrations.

6.5 Terrain

The GeoTIFF file 030M data is used in this assessment and was obtained from the MECP.

6.6 Dispersion Modelling Input and Output Files

The input and output files for the dispersion modelling have been provided as an electronic file along with this application.

7.0 Emission Summary Table and Conclusions

7.1 Emission Summary Table

POI concentrations using the facility-wide maximum emission scenario described in section 4.0 are shown in Table 7.1 – Emission Summary Table as required by sub paragraph 14 of s.26(1) of O. Reg. 419/05.

The POI concentrations listed in Table 7.1 – Emission Summary Table, were calculated based on the emission rates listed in Table 5.1 – Source Summary Table.

Contaminants in Table 7.1 were compared against criteria listed in the publication ACB List.

7.2 Assessment of Contaminants with No MECP POI Limits

Subparagraph 14, subsection viii of s.26(1) of O. Reg. 419/05 requires 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.

No contaminants were identified as part of this assessment that do not have Ministry POI limits and are not on the Jurisdictional Screening Level (*JSL*) list.

7.3 Conclusions

This ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05. The POI concentrations listed in Table 7.1 – Emission Summary Table were compared against criteria listed on the ACB List.

The ground level POI concentrations were compared with applicable Ministry criteria and indicate that emissions based on the maximum emission scenario are below Ministry limits and in compliance with O. Reg. 419/05.

Table 7.1: Emission Summary Table

Contaminant	CAS #	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m³)	Averaging Period (h)	MOE POI Limit (µg/m³)	Limiting Effect	Regulation Schedule	% of MOE POI Limit
Ethyl Benzene	100-41-4	6.29E-03	AERMOD v19191	2.89E+00	24	1000	Health	STD	0.3%
				1.45E+01	10 min	1900	Odour	G	0.8%
2-ethylhexanol	104-76-7	1.18E-04	AERMOD v19191	3.32E-01	1	600	Odour	G	0.1%
Methyl Isobutyl Ketone	108-10-1	1.27E-03	AERMOD v19191	7.07E-01	24	1200	Odour	G	0.1%
Toluene	108-88-3	1.50E+00	AERMOD v19191	1.27E+03	24	2000	Odour	G	63.3%
chlorobenzene	108-90-7	2.36E-05	AERMOD v19191	1.21E-02	1	3500	Health	G	<0.01%
				1.99E-02	10 min	4500	Odour	G	<0.01%
Phenol	108-95-2	2.50E-02	AERMOD v19191	1.88E+01	24	30	Health	STD	62.6%
Cyclohexane	110-82-7	8.26E-03	AERMOD v19191	1.68E+00	24	6100	Health	STD	0.0%
2-Ethylhexanal	123-05-7	2.09E-05	AERMOD v19191	1.53E-02	24	50	Health	SL	0.0%
Hydroquinone	123-31-9	4.32E-04	AERMOD v19191	8.78E-02	24	10	Health	SL	0.9%
Iron Oxide	1309-37-1	1.80E-04	AERMOD v19191	1.30E-01	24	25	Soiling	STD	0.5%
Xylene	1330-20-7	2.25E-02	AERMOD v19191	1.02E+01	24	730	Health	STD	1.4%
				5.10E+01	10 min	3000	Odour	G	1.7%
Ethyl Acetate	141-78-6	1.51E-01	AERMOD v19191	4.34E+02	1	19000	Odour	G	2.3%
Ethanol	64-17-5	7.51E-01	AERMOD v19191	2.60E+03	1	19000	Odour	G	13.7%
Methanol	67-56-1	2.50E-02	AERMOD v19191	2.11E+01	24	4000	Health	STD	0.5%
2-propanol	67-63-0	4.47E-01	AERMOD v19191	1.55E+02	24	7300	Health	STD	2.1%
Acetone	67-64-1	2.99E-06	AERMOD v19191	2.19E-03	24	11880	Health	STD	<0.01%
Chloroform	67-66-3	2.29E-04	AERMOD v19191	1.27E-01	24	1	Health	STD	<0.01%
Aluminum Oxide	7429-90-5	5.79E-08	AERMOD v19191	4.17E-05	24	12	Health	SL	<0.01%
Lead	7439-92-1	4.21E-09	AERMOD v19191	3.03E-06	24	0.5	Health	STD	<0.01%
				5.72E-07	30 day	0.2	Health	STD	<0.01%
Manganese	7439-96-5	1.89E-06	AERMOD v19191	1.36E-03	24	0.4	Health	STD	0.3%

Silicon	7440-21-3	7.55E-07	AERMOD v19191	5.44E-04	24	27	Health	SL	<0.01%
Antimony	7440-36-0	1.16E-08	AERMOD v19191	8.35E-06	24	25	Health	STD	<0.01%
Carbon	7440-44-0	7.55E-07	AERMOD v19191	5.44E-04	24	2	Health	SL	0.0%
Copper	7440-50-8	6.29E-07	AERMOD v19191	4.53E-04	24	50	Health	STD	<0.01%
Zinc	7440-66-6	9.59E-06	AERMOD v19191	6.91E-03	24	120	Particulate	STD	<0.01%
Phosphoric Acid	7664-38-2	4.30E-04	AERMOD v19191	8.74E-02	24	7	Health	STD	1.2%
Sulfuric Acid	7664-93-9	2.15E-04	AERMOD v19191	4.37E-02	24	5	Health	STD	0.9%
Nitric Acid	7697-37-2	3.75E-03	AERMOD v19191	7.62E-01	24	35	Corrosion	STD	2.2%
Sulfur	7704-34-9	5.04E-08	AERMOD v19191	3.63E-05	24	2.5	Health	SL	<0.01%
Methyl Ethyl Ketone	78-93-3	7.50E-01	AERMOD v19191	6.33E+02	24	1000	Health	STD	63.3%
Methyl Methacrylate	80-62-6	2.50E-02	AERMOD v19191	1.88E+01	24	860	Odour	G	2.2%
Alkanes, C7-10-iso-	90622-56-3	1.74E-05	AERMOD v19191	3.54E-03	24	175	Health	SL	<0.01%
cumene	98-82-8	1.81E-05	AERMOD v19191	3.68E-03	24	400	Health	STD	<0.01%
Particulate Matter	n/a	1.34E-03	AERMOD v19191	1.35E+00	24	120	Visibility	STD	1.1%

Regulation Schedule

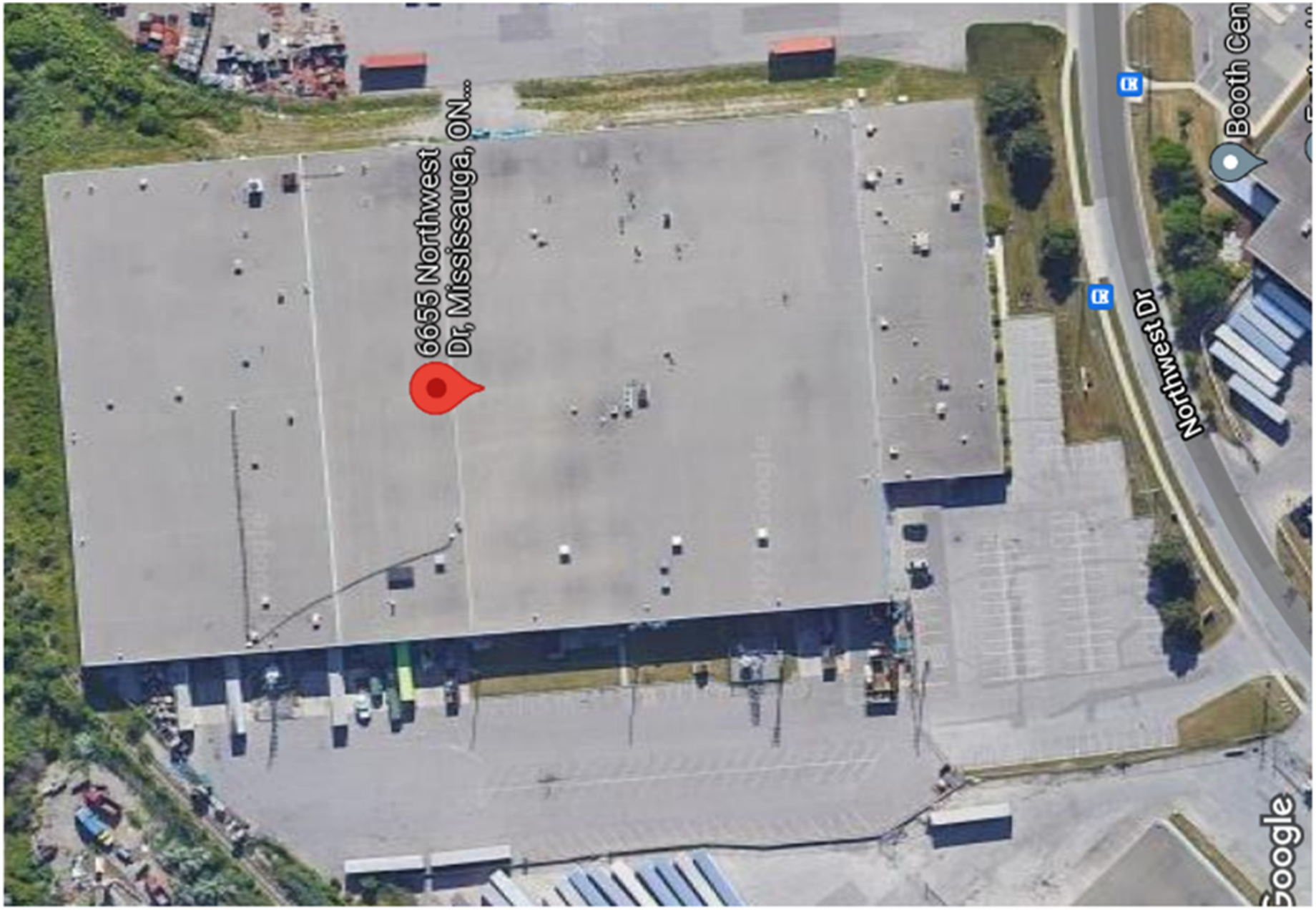
STD: Standard of Reg. 419, listed under Air Contaminants Benchmark List, April 2018, v.2.0

G: Guideline value listed under Air Contaminants Benchmark List, April 2018, v.2.0

SL: Screening Level listed under Air Contaminants Benchmark List, April 2018, v.2.0

APPENDIX A

Figures – Site Plan and Source Locations



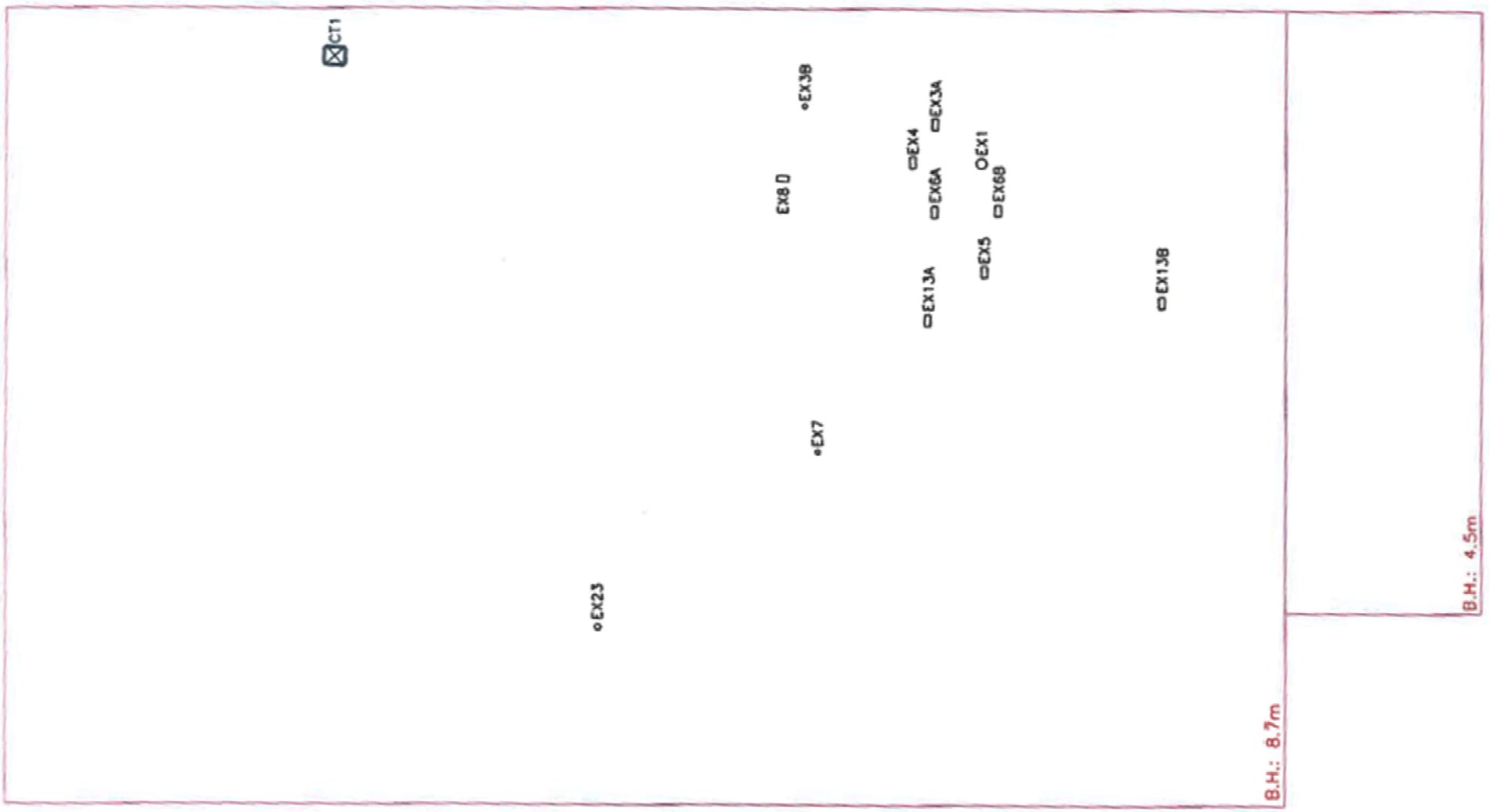
ENVIROLUM Consulting Inc.
Kitchener, Ontario

SITE LOCATION PLAN
EMISSIONS SUMMARY & DISPERSION MODELLING REPORT

Rollstar Metal Forming
Mississauga, Ontario

By: CL	Date: December 12, 2021	Project No. 2ELC044

Figure 1



Source: Original ESDM Report

ENVIROLUM Consulting Inc.
Kitchener, Ontario

SOURCE LOCATIONS
EMISSIONS SUMMARY & DISPERSION MODELLING REPORT

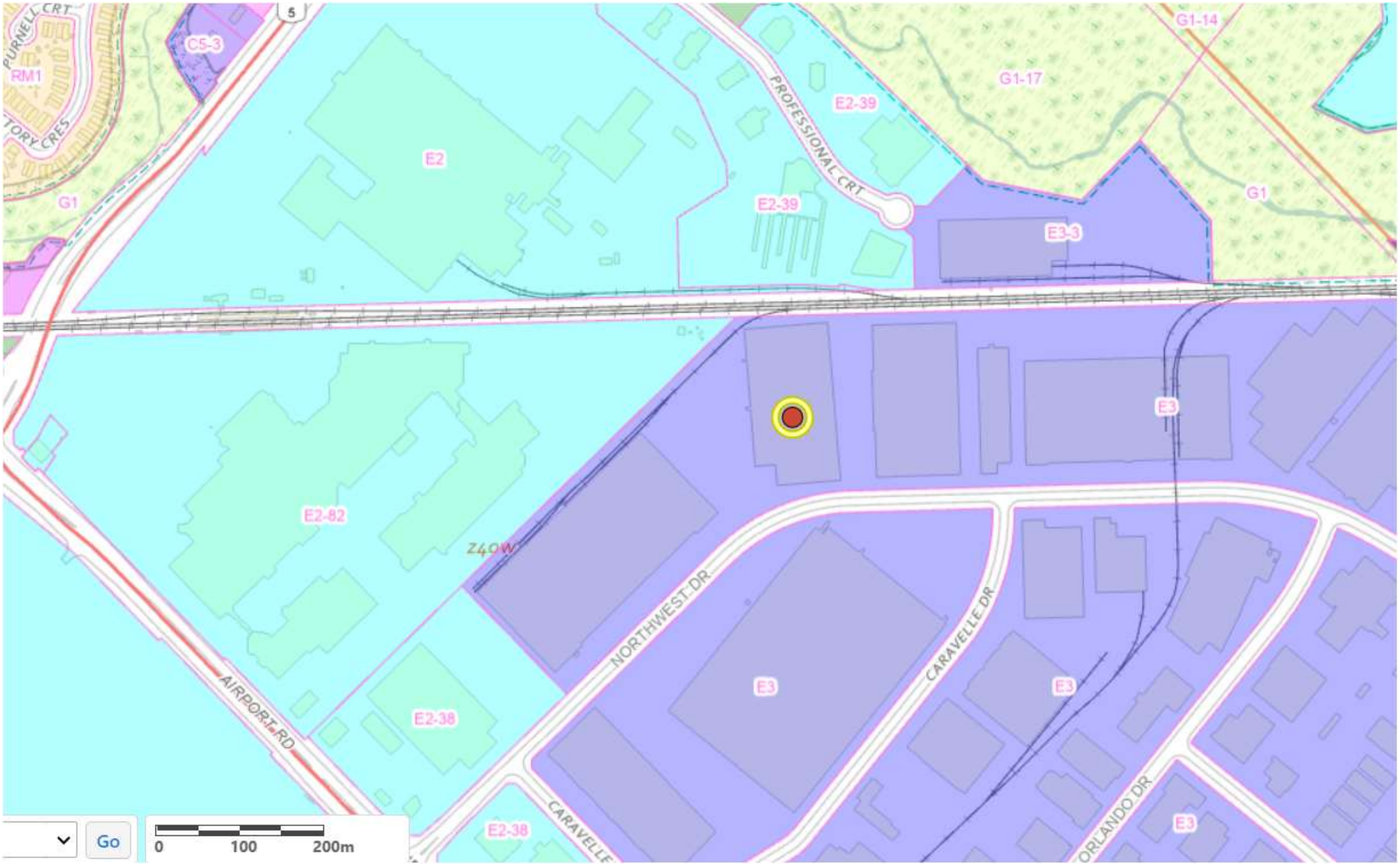
Rollstar Metal Forming
Mississauga, Ontario

By:	CL	Date:	December 21, 2021	Project No.	21ELC044

Figure 2

APPENDIX B

Zoning Map



Source: City of Mississauga Zoning Map, 2021

ENVIROLUM Consulting Inc.
Kitchener, Ontario

ZONING MAP
EMISSIONS SUMMARY & DISPERSION MODELLING REPORT

Rollstar Metal Forming
Mississauga, Ontario

By:	CL	Date:	December 12, 2021	Project No.	2ELC044

Figure 1

APPENDIX C

Emission Calculations

Table C1: Natural Gas Combustion

Contaminant	Emission Factor ($g/10^3 m^3$)
Nitrogen Oxide	1600
Gas	**Higher Heating Value (kJ/m^3)**
Natural Gas	37000

Source ID	Source	Quantity	Individual Capacity (BTU)	Individual Capacity (kJ/hr)	Total Capacity (kJ/hr)	Emission Rate NOx (g/s)
HVAC1, 8-11	Roof Top HVAC Units	5	70,000	73,854	369,271	0.0044
HVAC 2 - 3	Roof Top HVAC Units	2	125,000	131,883	263,765	0.0032
HVAC4	Roof Top HVAC Units	1	90,000	94,955	94,955	0.0011
HVAC5	Roof Top HVAC Units	1	400,000	422,024	422,024	0.0051
HVAC6	Roof Top HVAC Units	1	224,000	236,333	236,333	0.0028
HVAC7	Roof Top HVAC Units	1	240,000	253,214	253,214	0.0030
UH1-3	Unit Heaters	3	150,000	158,259	474,777	0.0057
UH4 - 11	Unit Heaters	8	400,000	422,024	3,376,192	0.0406
UH12-17	Unit Heaters	6	100,000	105,506	633,036	0.0076
	Total		**1,799,000**	**1,898,053**	**6,123,568**	**0.0736**

< than20MkJ/hr, therefore screened out.

NOTES:

[1] Sources that, in combination, represent less than 5% of total property -wide emissions are considered insignificant. As per S. 7.2.2 of Procedure for Preparing an ESDM Report.

[2] Natural gas fired boilers, water heaters, space heaters and makeup air units when the total facility-wide heat input usage is less than 20Mkj/hr, can be screened out.

Table C2: Wet Cooling Tower

Source ID: CT1

Emission Estimation Methodology

Particulate matter (PM) emissions were calculated using the methodology outlined in the US EPA AP-42 document for "Wet Cooling Towers". The total dissolved solids value from Environment Canada's NPRI guidance document for Wet Cooling Towers was used. PM Size fractions were taken from the South Coast Air Quality management District's methodology for calculating the total PM emissions. The make and model of the cooling tower is a Berg BT-9636-10. It is an induced tower.

Emissions calculations were based on operating the cooling tower at maximum capacity, as the worst-case operating condition.

Operating Conditions

Actual Operating Times:	as needed	
Circulating water flow:	450	gallons/min
Circulating water flow:	1703	L/min
Total Liquid drift:	0.00001	L/L
Total Dissolved Solids:	0.003	kg/L

Contaminant	CAS	Emission Rate (g/s)	Emission Estimation Technique	Data Quality
PM10	n/a	8.52E-04	EC	A
Particulate Matter	n/a	1.22E-03	EC	A

EC: Engineering Calculation; A: Average data quality

Sample Calculation

PM10 Emission Rate = Total Liquid Drift x Circulating Water Flow x Total Dissolved Solids
= 0.00001 L/L x 1703 L/min x0.003 kg/L x 1000 g/kg ÷ 60 s/min
= 0.0009 g/s

Total PM Emission Rate = PM10 emssions ÷ 70%

Table C3: Extrusion Line Acid Baths

Source ID: Fugitive to EX1

Description

Steel metal from roll mill enters the acid baths prior to the extrusion line. Phosphoric acid, sulphuric acid and nitric acid baths make up the acid baths process.

Emission Estimation Methodology

Results from an indoor air quality test conducted in June 2003 have been combined with the exhaust flow rate to determine the emissions of contaminants. The process has not changed since the test. The maximum percent concentration of the acids are based on data retrieved from the SDS for Systems BC100 and System 309LT.

Emissions calculations were based on operating the acid baths simultaneously, as the worst-case operating condition.

Phosphoric Acid Sampling result =	0.28	mg/m^3
Sulphuric Acid sampling result =	0.14	mg/m^3
Nitric Acid sampling result =	0.53	mg/m^3

Emission Estimation Technique: Engineering Calculation

Data Quality: Average

Operating Conditions

Exhaust Flow Rate = 11.8 m^3/s

Contaminant	CAS	Max. Wt. Percent Conc	Max Emission Rate (g/s)
Phosphoric acid	7664-38-2	13%	0.00043
Sulfuric acid	7664-93-9	13%	0.00021
Nitric acid	7697-37-2	60%	0.00375

Sample Calculation

Phosphoric acid Emission Rate = Sample Result (EF) x Exhaust Flow rate x Percent Concentration

= 0.28 mg/m^3 x 11.8 m^3/s x 13% ÷ 1000 mg/g

= 0.0004 g/s

Table C4: Adhesive Stations (Manual)

Source ID: EX1

Description

Glues and solvents are manually applied to parts. The fugitive emissions from the process exhaust through EX1.

Emission Estimation Methodology

- Hourly emission rates for adhesive products were determined by dividing the weekly usage rates by the number of hours used per week. While the actual annual usage is significantly lower than the worst-case usage data, the usage amount is based on the data for worst-case usage applied in the original 2015 ECA application.
- A mass balance approach was used to determine emissions.
- The maximum percent concentration of each contaminant was used in the estimates.
- It was assumed 100% of all volatiles are emitted to the atmosphere.
- It was assumed that non-volatile components of the adhesive will remain on the part since they are not volatile and the adhesive is not spray-applied. Therefore, emissions of non-volatiles have been deemed insignificant. Compounds that have a vapour pressure of less than 1kPa have been deemed non-volatile.

Emission Estimation Technique: Mass Balance

Data Quality: Above average

Operating Conditions

				New products replaced:
Actual Operating Times:	16	hours per week		
2020 Annual Usage of Chemlock 487A:	105.98	L/yr		Chemlock 489
2020 Annual Usage of Chemlock 487B:	23	L/yr		Chemlock 456
2020 Annual Usage of Loctite 7951:	22.7	L/yr		Estimated worst-case to be similar to Chemlock 487B
2020 Annual Usage of Ritelok SB16:	2.72	KG/yr		PR1500
2020 Annual Usage of Adhesion Promoter 4298:	344.44	L/yr	0.69	estimated worst-case to be 70% more (mass balance) than Chemlock48
2020 Annual Usage of SC2287A:	614.17	L/yr	0.83	estimated worst-case to be 83% more (mass balance) than Chemlock48

Product	Specific Gravity	Max. Usage Rate	Unit	Contaminant	CAS	Max. Wt. Percent Conc	Max Emission Rate (g/s)
isopropyl alcohol	0.785	0.738	L/half hr	Isopropyl alcohol	67-63-0	100%	0.322
Adhesive Promotor Chemlock #487A	0.87	400	g/week	Xylene	1330-20-7	70%	4.861E-03
				Ethyl benzene	100-41-4	20%	1.389E-03
				Chloroform	67-66-3	0.9%	6.250E-05
Adhesive Promotor Chemlock #487B	0.8	20	g/week	Methyl isobutyl ketone	108-10-1	100%	3.472E-04
				Amino silane monomer	proprietary	5%	non-vol
				Silane	proprietary	0.9%	non-vol
ADH.PROMOTOR LOCTITE 7951	1.5391	20	g/week	p-Chloro-a,a,a-trifluorotoluene	98-56-6	30%	non-vol
				Alkanes, C7-10-iso-	90622-56-3	5%	1.736E-05
Adhesive Ritelok SB16-454 (same as PR1500)	1.08	0.072	L/half hr	Ethyl cyanoacrylate	7085-85-0	95%	non-vol
				acrylic polymer	Trade secret	15%	non-vol
				hydroquinone	123-31-9	1%	4.320E-04
Adhesive Promotor 4298	0.82	680	g/week	Cyclohexane	110-82-7	70%	8.264E-03
				Xylene	1330-20-7	40%	4.722E-03
				Ethyl benzene	100-41-4	10%	1.197E-03
				Ethyl alcohol	64-17-5	10%	1.181E-03
				Acrylate polymer	proprietary	5%	non-vol
				Chlorinated rubber	68609-36-9	5%	non-vol
				Ethyl acetate	141-78-6	4%	4.722E-04
				Isopropyl alcohol	67-63-0	2%	2.361E-04
				ylidenedipphenol-epichlorohyd	25068-38-6	1%	non-vol
				methyl alcohol	67-56-1	0.40%	4.722E-05
				chlorobenzene	108-90-7	0.20%	2.361E-05
				cumene	98-82-8	0.15%	1.806E-05
				toluene	108-88-3	0.15%	1.806E-05
				Maleic anhydride	108-31-6	0.01%	non-vol
SC2287A 1 GAL W/UV Obitex dye	0.89	732	g/week	Acetic acid ethyl ester	141-78-6	100%	1.271E-02
				acrylic polymer	proprietary	5%	non-vol
				Toluene	108-88-3	5%	6.354E-04
				Isopropyl alcohol	67-63-0	1%	1.271E-04

Sample Calculation

isopropyl alcohol Emission Rate = Usage amount x specific gravity x max. wt. percent
= 738 mL/half hour x 0.785 x 100% ÷ 1800 s/half-hr
= 0.0003 g/s

Xylene Emission Rate = Usage amount x specific gravity x max wt. percent x mass conversion x time conversion
= 400 g/week ÷ 16 hrs/week x 70% /3600 s/hr
= 4.861E-03

Contaminant	CAS	Max Emission Rate (g/s)
Isopropyl alcohol	67-63-0	0.322213
Xylene	1330-20-7	0.009583
Ethyl benzene	100-41-4	0.002586
Chloroform	67-66-3	6.25E-05
Methyl isobutyl ketone	108-10-1	0.000347
Alkanes, C7-10-iso-	90622-56-3	1.74E-05
hydroquinone	123-31-9	0.000432
Cyclohexane	110-82-7	0.008264
Ethyl alcohol	64-17-5	0.001181
Ethyl acetate	141-78-6	0.013181
methyl alcohol	67-56-1	4.72E-05
chlorobenzene	108-90-7	2.36E-05
cumene	98-82-8	1.81E-05
toluene	108-88-3	0.000653
Acetic acid ethyl ester	141-78-6	0.013181

Table C5: Adhesive Stations (Batch)

Source ID: EX 7; EX8

Description

Two adhesive stations exhausting through EX7 and EX8.

Emission Estimation Methodology

- It is assumed that it takes 3 hours to prepare one batch of adhesive. Therefore, the amount of chemical per batch is divided by 3 to determine the hourly usage rates. It is conservatively assumed that each station produces a batch of adhesive simultaneously.
- Usage amount is based on data used in the 2015 ESDM Report.
- A mass balance approach was used to determine emissions.
- The maximum percent concentration of each contaminant was used in the estimates.
- It was assumed 100% of all volatiles are emitted to the atmosphere.
- It was assumed that non-volatile components of the adhesive will remain on the part since they are not volatile and the adhesive is not spray-applied. Therefore, emissions of non-volatiles have been deemed insignificant. Compounds that have a vapour pressure of less than 1kPa have been deemed non-volatile.

Emission Estimation Technique: Mass Balance

Data Quality: Above average

Operating Conditions

Actual Operating Times:	24/5	
Maximum Usage of Chemlock 487A:	100	g/batch
Maximum Usage of Chemlock 487B:	5	g/batch

				EX7	EX8
Product	**Contaminant**	**CAS**	**Max. Wt. Percent Conc**	**Max Emission Rate (g/s)**	**Max Emission Rate (g/s)**
Adhesive Promotor Chemlock #487A	Xylene	1330-20-7	70%	6.48E-03	6.48E-03
	Ethyl benzene	100-41-4	20%	1.85E-03	1.85E-03
	Chloroform	67-66-3	0.9%	8.33E-05	8.33E-05
Adhesive Promotor Chemlock #487B	Methyl isobutyl ketone	108-10-1	100%	4.63E-04	4.63E-04
	Amino silane monomer	proprietary	5%	non-vol	non-vol
	Silane	proprietary	0.9%	non-vol	non-vol

Sample Calculation

Xylene Emission Rate = (Usage amount ÷ 3 hrs/batch) x max wt. percent ÷ time conversion

= (100 g/batch ÷ 3 x 70%) ÷ 3600 s/hr

= 6.481E-03

		EX7 + EX 8
Contaminant	**CAS**	**Total Max Emission Rate (g/s)**
Xylene	1330-20-7	1.30E-02
Ethyl benzene	100-41-4	3.70E-03
Chloroform	67-66-3	1.67E-04
Methyl isobutyl ketone	108-10-1	9.26E-04

Table C6: Polyvinyl Chloride (PVC) Extrusion Emissions

Source ID: EX3A, EX3B
Description: The facility

Process Operating Conditions

Emissions calculations were based on operating at a maximum temperature and a maximum throughput rate for each extrusion line, as the worst-case operating condition.

Source Name:	Line 2	Line 3	Line 4	Line 5	Line 8	Line 7
Source ID:	EX3A/B	EX4	EX5	EX6A/B	EX8	EX13A/B
Maximum process temperature (°C):	216	216	216	216	216	216
Maximum Throughput Rate (kg/hr):	20.4	31.2	71.4	27.6	30	49.8

Emission Engineering Calculation
Data Quality: Average

Emission Estimation Methodology

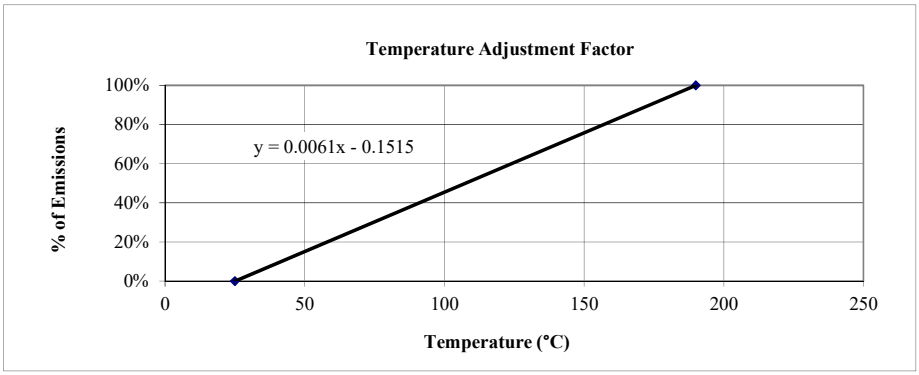
Emission factors have been developed for a number of plastics through studies conducted by the Society of the Plastics Industry and other institutions. In some instances, these studies were conducted at temperatures which vary from the operating temperature of the extruders used at Rollstar. As such, a Temperature Adjustment Factor (*TAF*) was developed to conservatively quantify the emissions that would result from processing PVC at the operating temperatures of the facility.

A linear graph was plotted relating percentage of emissions vs. temperature. The reference study was based on three (3) test runs. For a conservative estimate, it was assumed that the maximum emissions from each test run was used to establish the contaminant emission factors. Therefore it is assumed that 100% of the emissions occurred at 190°C, with 0% of the emissions at 25°C (negligible emissions at ambient temperature). The linear equation for the plot was then used to calculate the TAF (y) for the maximum operating temperature (x) used at the facility. The literature emission factor for each contaminant was then multiplied by the TAF to yield the estimated emission factors at the operating temperature, for each contaminant.

Conditions	Temperature (°C)	% of Emissions
Reference Temperature	190	100%
Negligible Temperature	25	0%

Table C6: Polyvinyl Chloride (PVC) Extrusion Emissions

TAF = (0.0061 x Max. Process Temperature) - 0.1515
= 117%



Contaminant	CAS #	Emission Factor (µg/g)	Adjusted Emission Factor (µg/g)	Line 2 (EX3A/B) (g/s)	Line 3 (EX4) (g/s)	Line 4 (EX5) (g/s)	Line 5 (EX6A/B) (g/s)	Line 8 (EX8) (g/s)	Line 7 (EX13A/B) (g/s)	Total Max Emission Rate (g/s) (g/s)
Acetone	67-64-1	0.04	0.05	2.64E-07	4.04E-07	9.25E-07	3.58E-07	3.89E-07	6.45E-07	**2.99E-06**
2-ethylhexanol	104-76-7	1.58	1.84	1.04E-05	1.60E-05	3.65E-05	1.41E-05	1.54E-05	2.55E-05	**1.18E-04**
2-ethylhexanal	123-05-7	0.28	0.33	1.85E-06	2.83E-06	6.48E-06	2.50E-06	2.72E-06	4.52E-06	**2.09E-05**
Thiirane	420-12-2	0.63	0.73	4.16E-06	6.37E-06	1.46E-05	5.63E-06	6.12E-06	1.02E-05	**4.70E-05**

Sample Calculation

Acetone Emission Rate = Emission Factor x TAF x Maximum Throughput Rate
= 0.04 µg/g x 117% x 20.4 kg/h x 1000 g/kg ÷ 1000000 µg/g ÷ 3600 s/h
Line 2 = 0.0000003 g/s

Table C7: Emissions from Extrusion Adhesive Stations

Source ID: EX3A, EX3B, EX4, EX5, EX6A, EX6B, EX13A, EX13B

Description

Five (5) of the six (6) co-extrusion lines have an adhesive station.

Emission Estimation Methodology

- A mass balance approach was used to determine emissions.
- The maximum percent concentration of each contaminant was used in the estimates.
- It was assumed 100% of all volatiles are emitted to the atmosphere.
- It was assumed that solid components of the adhesive will remain on the part and therefore emissions from solids have been deemed insignificant.

Emission Estimation Technique: Mass Balance

Data Quality: Above average

Operating Conditions

Source Name:	Line 2	Line 3	Line 4	Line 5	Line 7
Source ID:	**EX3A/B**	**EX4**	**EX5**	**EX6A/B**	**EX13A/B**
Actual Operating Times (Hrs/week):	72	96	72	44	96

Maximum usage amount of PL1602: 2 L/hr

Specific gravity of PL1602: 0.9

			Extrusion Lines					
Contaminant	**CAS**	**Max. Wt. Percent Conc**	**Line 2 (EX3A/B)**	**Line 3 (EX4)**	**Line 4 (EX5)**	**Line 5 (EX6A/B)**	**Line 7 (EX13A/B)**	**Total Max Emission Rate (g/s)**
Toluene	108-88-3	60%	0.300	0.300	0.300	0.300	0.300	**1.500**
Ethanol	64-17-5	30%	0.150	0.150	0.150	0.150	0.150	**0.750**
Methyl Ethyl Ketone	78-93-3	30%	0.150	0.150	0.150	0.150	0.150	**0.750**
Methacrylate ester	52628-03-2	5.0%	insignificant					
Titanium dioxide	13463-67-7	5%	insignificant					
2-propanol	67-63-0	5%	0.025	0.025	0.025	0.025	0.025	**0.125**
Ethyl acetate	141-78-6	5.0%	0.025	0.025	0.025	0.025	0.025	**0.125**
Methanol	67-56-1	1%	0.005	0.005	0.005	0.005	0.005	**0.025**
Methyl methacrylate	80-62-6	1%	0.005	0.005	0.005	0.005	0.005	**0.025**
Phenol	108-95-2	1%	0.005	0.005	0.005	0.005	0.005	**0.025**

Sample Calculation

Toluene Emission Rate = Usage amount x specific gravity x max. wt. percent

= 2L/hr x 0.9 x 60% x 1000g/kg ÷ 3600 s/hr

= 0.3000 g/s

Table C7: Spot Welding Emissions

Source ID: EX23

Description: Non-consumable welding is the process by which 2 different metal parts are joined by heating the parts at contact and forming a new connection with the heated parts of these metals. Resistance spot welding is a process that produces individual spot welds to join overlapping metal sheets. Spot welding relies on two electrodes to apply pressure and current. Emissions are exhausted through EX23.

Process Operating Conditions

Operating times:	8	hrs per day
Number of parts:	3000	parts/day
Number of parts:	375	parts/hr
Part density:	7850	kg/m^3
Coating density:	6570	kg/m^3
Max. spot welds per sheet:	4	welds/part
Weld diameter:	7.00E-03	m

Emission Estimation Methodology

-Emissions are released from the base molten metal. The weld diameter, depth of material volatized, the maximum number of sheets/parts welded, and the number of spot welds per sheet/part were multiplied with the contaminant's concentration retrieved from the Safety Data Sheet (SDS) to determine the substance emission rates. Additionally, the emission rate was multiplied by two to account for a spot weld on either side of the metal.
-For the emission rates, it was assumed that a total depth of 0.5 micrometer of the base metal and coating is volatilized per weld on both surfaces. This is conservative since the 0.5 micrometer depth is applied to both the base metal and coating. This assumption has been used for another facility with resistance welding operations and was reviewed and approved by the MECP.
-Particulate Matter (*PM*) emissions were determined assuming the maximum weight percent of PM was 100%.
- It is assumed that 100% of the iron emissions will be converted to Iron Oxide. Therefore, the iron emission rate was converted to Iron Oxide using stoiciometric calculation.

Substance	CAS #	Avg. Wt. Percent	Maximum Emission g/s
Steel			
Particulate Matter	n/a	100%	1.26E-04
Iron	7439-89-6	99%	1.25E-04
Calcium	7440-70-2	0.1%	1.26E-07
Carbon	7440-44-0	0.6%	7.55E-07
Copper	7440-50-8	0.5%	6.29E-07
Manganese	7439-96-5	1.5%	1.89E-06
Phosphorus	8049-19-2	0.2%	2.52E-07
Silicon	7440-21-3	0.6%	7.55E-07
Sulfur	7704-34-9	0.04%	5.04E-08
Coating			
Aluminum	7429-90-5	0.06%	5.79E-08
Antimony	7440-36-0	0.01%	1.16E-08
Iron	7439-89-6	0.80%	8.43E-07
Lead	7439-92-1	0.004%	4.21E-09
Zinc	7440-66-6	9.10%	9.59E-06

Table C7: Spot Welding Emissions

Sample Calculations

Particulate Matter Emission Rate = Weld Area x Volatized metal Thickness x Density x Number of Parts x Welds per Part x Max. Wt. Percent x 2 Sides

= [π x (0.007 m / 2)^2] x 0.0000005 m/weld x 7850 kg/m^3 x 375 parts/hr x 4 welds/part x 100 % x 2 x 1000 g/kg ÷ 3600 s/hr

= 0.00013 g/s

Aluminum Emission Rate = Weld Area x Volatized metal Thickness x Density x Number of Parts x Welds per Part x Max. Wt. Percent x 2 Sides

= [π x (0.007 m / 2)^2] x 0.0000005 m/weld x 6570 kg/m^3 x 375 parts/hr x 4 welds/part x 100 % x 2 x 1000 g/kg ÷ 3600 s/hr

= 0.0000001 g/s

Iron Oxide Emission Rate = Total Iron Emission rate x (mol Iron Oxide ÷ mol Iron) x (Molecular Weight Iron Oxide ÷ Molecular Weight Iron)

= (0.000000843 + 0.000125) g/s Iron x (2 mol Iron Oxide ÷ 4 mol Iron) x (159.7 g/mol Iron Oxide ÷ 55.8 g/mol Iron)

= 0.00018 g/s

Total Process Emissions Summary

Substance	CAS #	Emission Rate (kg/year)	Estimation Method	Data Quality
Iron Oxide	1309-37-1	1.80E-04	EC	A
Calcium	7440-70-2	1.26E-07	EC	A
Carbon	7440-44-0	7.55E-07	EC	A
Copper	7440-50-8	6.29E-07	EC	A
Manganese	7439-96-5	1.89E-06	EC	A
Phosphorus	8049-19-2	2.52E-07	EC	A
Silicon	7440-21-3	7.55E-07	EC	A
Sulfur	7704-34-9	5.04E-08	EC	A
Aluminum	7429-90-5	5.79E-08	EC	A
Antimony	7440-36-0	1.16E-08	EC	A
Lead	7439-92-1	4.21E-09	EC	A
Zinc	7440-66-6	9.59E-06	EC	A
Particulate Matter	n/a	1.26E-04	EC	A

EC - Engineering Calculations

A - Average Data Quality

Emissions from Injection Moulding

Process	Maximum Usage per day (kg/day)	Max Annual Usage (kg/yr)	Product	Emission Estimation Technique	Substance	CAS #	Emission Factor (lb/ton)*	Emission Rate (kg/yr)	Emission Rate (g/s)
Injection Molding	248	86,800	PVC Black FA 66104-3298	EF	Total VOCs	NA-M16	0.0614	2.66	0.00008
					Polyvinyl chloride	75-01-4	0.0078	0.34	0.00001
					Total Particulate Matter	NA-M08	0.1302	5.65	0.00018
PVC Extrusion	various total	305,550	Various, see Table below	EF	Total VOCs	NA-M16	0.1200	18.33	0.00058
					Vinyl Chloride	75-01-4	0.0078	1.19	0.00004

Notes

Maximum daily usage rates provided by client, via email dated December, 9, 2021.

* Emission factors retrieved from "Emission Calculation Fact Sheet", Plastics Production and Products Manufacturing, Michigan Department of Environmental Quality.

Sample Calculation for Particulate Matter from Injection Molding

Emission Rate (kg/yr) = materials used x emission factor
= 86800 kg x 0.1302 lb/ton ÷ 2000 ton/lb
= 5.65 kg/yr

2021 Inventory

	Part #	SDS Name	Max Usage Per Day	Process
PVC - Black FA 66104-32-98	Mitsubishi 6021	FA 66104-3298 01 BLACK	248kg	Molding
PVC1C1053TS Black 30 Gloss	Compound 6045	1C1053TS	0kg	Co-extrusion
PVC 65A	Mitsubishi 6121A	FA66104-3378 ANTHRACITE	35kg	Co-extrusion
PVC 95A	Mitsubishi 6120A	CA69362-359 BLACK	88kg	Co-extrusion
PVC CA 69021-358 Black Vinika	Mitsubishi 6007	CA69021-358 BLACK	0kg	Co-extrusion
PVC GMP.PVC.003 Teknor	Teknor 6098	APEX 85-J438N BLACK 621	100kg	Co-extrusion
PVC GMP.PVC.007 Vinika	Mitsubishi 6048	CA68112-3243 01 CET BLACK	0kg	Co-extrusion
PVC GMP.PVC.056 Paintable	Mitsubishi 6099	CA2351A-3120 BLACK	0kg	Co-extrusion
PVC GMP.PVC.061 FA66104	Mitsubishi 6055	FA66104-3378 ANTHRACITE	214kg	Co-extrusion
PVC GMP.PVC.0064 FA68044	Mitsubishi 6000	FA68044-359 BLACK	0kg	Molding
PVC GMP.PVC.086	Teknor 6001	APEX 85-J438N BLACK 621	0kg	Molding
PVC MSDC543 TEKNOR 1545-40DST BLK431	Teknor 6136	NP JADE ASH 1545-0105	15kg	Co-extrusion
PVC APEX 1545-D40 ST BLACK 477	Teknor 6137	APEX 1545-D40 ST BLACK 477	421kg	Co-extrusion

APPENDIX D

Insignificant Sources and Contaminants

Table D1: Insignificant Sources/Contaminants

Processing Area / Equipment	Insignificant	
	Contaminant	Source
Natural Gas Fired Comfort Heating Equipment	By-Products of Combustion	HVAC1 to HVAC11 UH1 to UH17
Chiller Units	Insignificant	CHILLER
Compressor Exhaust	Insignificant	COMP OUT
electric AC Units	Insignificant	ELEC AC
Cafeteria exhausts	Insignificant	EX17, EX18
Office Exhaust	Insignificant	EX19
Washroom Exhausts	Insignificant	EX20, EX21, EX26
Change room Exhaust	Insignificant	EX22
Storage Area General Exhaust	Insignificant	EX24, EX25
General Exhaust in Extrusion area	Insignificant	EX9
Salt Spray Chamber	Insignificant	EX15
Maintenance Welding Station	Insignificant	EX16
Injection Moulding Machines	Insignificant	M1

Table D2: Insignificant Contaminants Based on De Minimus Levels

Contaminant	CAS #	Total Facility Emission Rate (g/s)	Maximum POI Concentration ($\mu g/m^3$)	24-hour Threshold Concentration* ($\mu g/m^3$)	Check
Thiirane	420-12-2	4.70E-05	3.45E-02	0.1	Insignificant
Calcium	7440-70-2	1.26E-07	9.07E-05	0.1	Insignificant
Phosphorus	8049-19-2	2.52E-07	1.81E-04	0.1	Insignificant
Polyvinyl chloride	75-01-04	4.84E-05	2.91E-02	0.1	Insignificant

*As per Table B-2A in the MECP's "Procedure for Preparing an Emission Summary and Dispersion Modelling Report", Version 4.0 dated February 2017.