

EXECUTIVE SUMMARY

St. Marys Cement Inc. (Canada) (SMC) operates a cement manufacturing facility at 585 Water Street South, in St. Marys, Ontario (Facility).

The facility is currently approved under an Environmental Compliance Approval (ECA) with Limited Operational Flexibility (LOF) No. 6394-D78PR2, issued November 11, 2024. This version of the Emission Summary and Dispersion Modelling (ESDM) Report has been prepared as per Condition 11.2 of the ECA (i.e. Compliance Stack Testing for ALCF Demonstration Project Use – Back-end Riser).

The report has been prepared in accordance with Section 26 of Ontario Regulation 419/05; the Ministry of the Environment, Conservation and Parks' (Ministry) Procedure for Preparing an Emission Summary and Dispersion Modelling Report (March 2018); the Ministry's Air Dispersion Modelling Guideline for Ontario (February 2017) and Basic Comprehensive Certificates of Approval (Air) User Guide (March 2011). The report includes all air emissions from the facility.

Description

The Facility produces Portland cement by combining materials bearing calcium carbonate, silica, alumina and iron oxide at high temperatures to produce cement clinker. The clinker is subsequently ground with finishing materials such as gypsum and limestone to produce cement. The facility consists of the following processes and support units:

- Quarry operations – limestone extraction, processing and shipping;
- Raw material and fuel processing, storage and handling;
- Clinker production – kiln operations; and
- Cement production including ball mills, cement storage and shipping.

The Facility can operate 24 hours per day, 7 days per week and 12 months per year (except during plant shutdowns). The approved facility production limit is 1.1 million tonnes of clinker per year. This ECA also allows for the use of up to 175 tonnes per day of alternative low carbon fuels (ALCF) as a substitute for a portion of conventional fuels in the kiln.

In addition to the cement plant, Canada Building Materials Company (CBM), a Division of St. Marys Cement, operates a separate high calcium dried limestone manufacturing process under ECA No. 9610-D64V98 dated October 23, 2024 at the Facility. Laidlaw Bulk Carriers LP (Laidlaw) operates a dual-fuel fired (i.e. propane and natural gas) truck heating system on site under ECA no. 9917-ASXMEQ, dated December 21, 2017 for the purpose of facilitating raw material handling during winter.

Since SMC, CBM and Laidlaw share roads and emit common contaminants, the three parties have been deemed one single property under Section 4(2)(a) of O. Reg. 419/05. All contaminants for all three parties have been included in this site-wide ESDM report.

Assessment

The primary emissions from this Facility are particulate, nitrogen oxides, sulphur dioxide and carbon monoxide. These primary emissions along with trace amounts of metals/metal oxides and organic compounds as well as ammonia and hydrogen chloride are generated from the use/processing of raw materials and the combustion of fuel required for cement production.

Emissions of both primary and trace contaminants were estimated using a combination of published emission factors, stack test results, mass balance, and manufacturer’s performance specifications.

Maximum emissions were modelled for all contaminants using the Ministry approved US EPA AERMOD system (Version 22112) and site-specific meteorological data provided by the Ministry. To assess compliance, the maximum modelled Point-of-Impingement (POI) concentrations for all contaminants were compared to the standards, guidelines and screening levels in the Ministry Air Contaminants Benchmark (ACB) List, dated April 2023 and summarized in Table 1, “Emission Summary Table”.

Table 1 indicates the maximum POI concentrations for all contaminants are below their respective limits. Therefore, the Facility can operate in compliance with Section 20 of O. Reg. 419/05.

Table 1. Emission Summary Table

Contaminant	CAS Number	Total Facility Emission Rate [g/s]	Air Dispersion Model Used	POI Conc. [µg/m³]	MECP Limit						Percentage of MECP POI Limit [%]
				Maximum	Avg. Period Emission Rate	Avg. Period POI Concentration	Value [µg/m³]	Limiting Effect	ACB Source ⁽¹⁾	Category	
Criteria Air Containinants											
PM	PM	1.43E+01	AERMOD v22112	1.03E+02	24 hr	24 hr	120	Visibility	S	B1	86.1%
RCS	14808-60-7	5.41E-01	AERMOD v22112	4.50E+00	24 hr	24 hr	5	Health	G	B1	89.9%
Nitrogen Oxides	10102-44-0	1.17E+02	AERMOD v22112	3.46E+02	1 hr	1 hr	400	Health	S	B1	86.4%
Nitrogen Oxides	10102-44-0	1.17E+02	AERMOD v22112	3.48E+01	24 hr	24 hr	200	Health	S	B1	17.4%
Sulphur Dioxide	7446-09-5	8.10E+01	AERMOD v22112	8.14E+01	1 hr	1 hr	100	Health & Vegetation	S	B1	81.4%
Sulphur Dioxide	7446-09-5	8.10E+01	AERMOD v22112	1.90E+00	Annual	Annual	10	Health & Vegetation	S	B1	19.0%
Carbon Monoxide	630-08-0	1.23E+02	AERMOD v22112	2.32E+02	1 hr	0.5 hr	6000	Health	S	B1	3.9%
Hydrogen Chloride	7647-01-0	1.09E+00	AERMOD v22112	2.16E-01	24 hr	24 hr	20	Health	S	B1	1.1%
Ammonia	7664-41-7	7.31E-01	AERMOD v22112	1.45E-01	24 hr	24 hr	100	Health	S	B1	0.1%
Metals											
Antimony	7440-36-0	2.37E-05	AERMOD v22112	1.30E-04	24 hr	24 hr	25	Health	S	B1	<0.1%
Arsenic	7440-38-2	1.51E-04	AERMOD v22112	7.30E-04	24 hr	24 hr	0.3	Health	G	B1	0.2%
Barium	7440-39-3	6.82E-03	AERMOD v22112	6.45E-02	24 hr	24 hr	10	Health	G	B1	0.6%
Beryllium	7440-41-7	1.63E-05	AERMOD v22112	4.00E-05	24 hr	24 hr	0.01	Health	S	B1	0.4%
Cadmium	7440-43-9	5.35E-05	AERMOD v22112	6.00E-05	24 hr	24 hr	0.025	Health	S	B1	0.2%
Chromium	7440-47-3	1.12E-02	AERMOD v22112	1.79E-02	24 hr	24 hr	0.5	Health	S	B1	3.6%
Cobalt	7440-48-4	1.15E-04	AERMOD v22112	3.80E-04	24 hr	24 hr	0.1	Health	G	B1	0.4%
Iron	7439-89-6	2.10E-01	AERMOD v22112	1.06E+00	24 hr	24 hr	4	Health & Soiling	S	B1	26.5%
Lead	7439-92-1	2.53E-03	AERMOD v22112	1.75E-02	24 hr	24 hr	0.5	Health	S	B1	3.5%
Lead	7439-92-1	2.53E-03	AERMOD v22112	6.76E-03	24 hr	30 day	0.2	Health	S	B1	3.4%
Manganese	7439-96-5	1.24E-02	AERMOD v22112	3.07E-02	24 hr	24 hr	0.4	Health	S	B1	7.7%
Mercury	7439-97-6	1.30E-03	AERMOD v22112	2.60E-04	24 hr	24 hr	2	Health	S	B1	<0.1%
Nickel	7440-02-0	2.19E-03	AERMOD v22112	7.20E-04	Annual	Annual	0.04	Health	S	B1	1.8%
Nickel	7440-02-0	2.19E-03	AERMOD v22112	7.20E-04	24 hr	Annual	0.4	Health	MECP bulletin	AAV	0.2%
Nickel	7440-02-0	2.19E-03	AERMOD v22112	5.84E-03	24 hr	24 hr	2	Health	MECP bulletin	URT/DAV	0.3%
Selenium	7782-49-2	3.85E-04	AERMOD v22112	1.40E-04	24 hr	24 hr	10	Health	G	B1	<0.1%
Silver	7440-22-4	3.96E-05	AERMOD v22112	4.00E-05	24 hr	24 hr	1	Health	S	B1	<0.1%
Tin	7440-31-5	1.29E-04	AERMOD v22112	1.44E-03	24 hr	24 hr	10	Health	S	B1	<0.1%
Vanadium	7440-62-2	2.56E-03	AERMOD v22112	9.92E-03	24 hr	24 hr	2	Health	S	B1	0.5%
Volatile Organic Matter											
Acetaldehyde	75-07-0	0.00E+00	AERMOD v22112	0.00E+00	24 hr	24 hr	500	Health	S	B1	<0.1%
Acetaldehyde	75-07-0	0.00E+00	AERMOD v22112	0.00E+00	0.5 hr	0.5 hr	500	Health	S	B1	<0.1%
Acrolein	107-02-8	0.00E+00	AERMOD v22112	0.00E+00	24 hr	24 hr	0.4	Health	S	B1	<0.1%
Acrolein	107-02-8	0.00E+00	AERMOD v22112	0.00E+00	1 hr	1 hr	4.5	Health	S	B1	<0.1%
Benzene	71-43-2	5.50E-01	AERMOD v22112	1.08E-02	Annual	Annual	0.45	Health	S	B1	2.4%
Benzene	71-43-2	5.50E-01	AERMOD v22112	1.08E-02	24 hr	Annual	4.5	Health	MECP bulletin	AAV	0.2%
Benzene	71-43-2	5.50E-01	AERMOD v22112	1.09E-01	24 hr	24 hr	100	Health	MECP bulletin	URT/DAV	0.1%
1,3-Butadiene	106-99-0	0.00E+00	AERMOD v22112	0.00E+00	Annual	Annual	2	Health	S	B1	<0.1%
1,3-Butadiene	106-99-0	0.00E+00	AERMOD v22112	0.00E+00	24 hr	Annual	20	Health	MECP bulletin	AAV	<0.1%
1,3-Butadiene	106-99-0	0.00E+00	AERMOD v22112	0.00E+00	24 hr	24 hr	300	Health	MECP bulletin	URT/DAV	<0.1%
Carbon tetrachloride	56-23-5	1.20E-02	AERMOD v22112	2.38E-03	24 hr	24 hr	2.4	Health	S	B1	<0.1%
Chloroform	67-66-3	8.10E-03	AERMOD v22112	1.60E-03	24 hr	24 hr	1	Health	S	B1	0.2%
Dibromochloromethane	124-48-1	7.10E-03	AERMOD v22112	1.41E-03	24 hr	24 hr	0.2	Health	SL-JSL	B2	0.7%
1,2-Dichloroethane	107-06-2	7.04E-03	AERMOD v22112	1.39E-03	24 hr	24 hr	2	Health	S	B1	<0.1%
Ethylene dibromide	106-93-4	7.40E-03	AERMOD v22112	1.47E-03	24 hr	24 hr	3	Health	G	B1	<0.1%
Propionaldehyde	123-38-6	0.00E+00	AERMOD v22112	0.00E+00	10 min	10 min	10	Odour	G	B1	<0.1%
1,1,1,2-Tetrachloroethane	630-20-6	7.40E-03	AERMOD v22112	1.47E-03	24 hr	24 hr	0.5	Health	SL-JSL	B2	0.3%
1,1,2,2-Tetrachloroethane	79-34-5	1.10E-02	AERMOD v22112	2.18E-03	24 hr	24 hr	0.1	Health	SL-JSL	B2	2.2%
Vinyl chloride	75-01-4	1.40E-02	AERMOD v22112	2.77E-03	24 hr	24 hr	1	Health	S	B1	0.3%
Polycyclic Aromatic Hydrocarbons (PAHs)											
Acenaphthylene	208-96-8	1.80E-03	AERMOD v22112	3.56E-04	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	0.4%
Acenaphthene	83-32-9	7.45E-04	AERMOD v22112	1.47E-04	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	0.1%
Anthracene	120-12-7	9.40E-04	AERMOD v22112	1.86E-04	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	0.2%
Benzo(a)pyrene	50-32-8	1.22E-05	AERMOD v22112	2.40E-07	Annual	Annual	0.00001	Health	S	B1	2.4%
Benzo(a)pyrene	50-32-8	1.22E-05	AERMOD v22112	2.40E-07	24 hr	Annual	0.0001	Health	MECP bulletin	AAV	0.2%
Benzo(a)pyrene	50-32-8	1.22E-05	AERMOD v22112	2.42E-06	24 hr	24 hr	0.005	Health	MECP bulletin	URT/DAV	<0.1%
Chrysene	218-01-9	2.02E-04	AERMOD v22112	4.00E-05	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	<0.1%
Fluoranthene	206-44-0	4.50E-04	AERMOD v22112	8.91E-05	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	<0.1%
Fluorene	86-73-7	1.04E-03	AERMOD v22112	2.06E-04	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	0.2%
2-Methylantracene	613-12-7	3.89E-04	AERMOD v22112	7.71E-05	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	<0.1%
2-Methylnaphthalene	91-67-6	1.50E-02	AERMOD v22112	2.97E-03	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	3.0%
1-Methylphenanthrene	832-69-9	5.43E-04	AERMOD v22112	1.08E-04	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	0.1%
9-Methylphenanthrene	883-20-5	2.12E-04	AERMOD v22112	4.19E-05	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	<0.1%
Naphthalene	91-20-3	4.30E-02	AERMOD v22112	8.52E-03	24 hr	24 hr	22.5	Health	G	B1	<0.1%
Naphthalene	91-20-3	4.30E-02	AERMOD v22112	1.08E-01	10 min	10 min	50	Odour	G	B1	0.2%
Phenanthrene	85-01-8	3.47E-03	AERMOD v22112	6.87E-04	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	0.7%
Pyrene	129-00-0	2.73E-04	AERMOD v22112	5.41E-05	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	<0.1%
Triphenylene	217-59-4	2.02E-04	AERMOD v22112	4.00E-05	24 hr	24 hr	0.1	-	-	De Minimus Table B-2A	<0.1%

Notes:

(1) ACB Source: "S" - Standard (for Section 20), "G" - Guideline (for Section 20), "SL-JSL" - Screening Level (SL) set by the MECP based on a review of toxicity information and/or other jurisdictional levels (JSL), "SL-PA" - Screening Level - Previously Accepted, "SL-MD" - Screening Level - Ministry Derived.