



BCX
ENVIRONMENTAL
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Emission Summary and Dispersion Modelling Report

**Environmental Compliance Approval (Air)
with Limited Operational Flexibility (LOF) #4546-AQ9GMB**

St. Marys Cement Inc. (Canada) – St. Marys Plant

Prepared for: St. Marys Cement Inc. (Canada)
St. Marys Cement Plant

Site Address: 585 Water Street South
St. Marys, Ontario
N4X 1B6

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Executive Summary

This Emission Summary and Dispersion Modelling (ESDM) Report has been updated per Condition 5.2 in St. Marys Cement Inc. [Canada]'s (SMC's) Environmental Compliance Approval (ECA) with Limited Operational Flexibility (LOF), ECA number 4546-AQ9GMB, dated August 31, 2017 for their Portland cement manufacturing plant (Facility) located in St. Marys, Ontario. The site-wide ESDM 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 Facility is located at 585 Water Street South, in St. Marys, Ontario. The plant 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 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 (version 19191) system and site-specific meteorological data provided by the Ministry. The resulting Point-of-Impingement (POI) concentrations were compared to the standards, guidelines and screening levels in the Ministry Air Contaminants Benchmark (ACB) List, dated April 2018.

The results of the AERMOD modelling exercises demonstrate that the maximum POI concentrations for all contaminants are below their respective limits as summarized in Table ES-1 below.



Table ES-1 Emission Summary Table

Contaminant Name	CAS #	Maximum Total Emission Rate (g/s)	Air Dispersion Model Used	Maximum POI Concentration (µg/m ³)	Averaging Period		Ministry POI Limit (µg/m ³)	Limiting Effect	Ministry Regulation Schedule #	Percentage of Ministry POI Limit (%)
					Emission Rate	POI Concentration				
Suspended Particulate Matter	SPM	1.13E+01	AERMOD	6.08E+01	24 hr	24 hr	120	Visibility	3	50.6%
Respirable Crystalline Silica	14808-60-7	6.20E-02	AERMOD	2.32E+00	24 hr	24 hr	5	Health	G	46.3%
Nitrogen Oxides	10102-44-0	4.20E+01	AERMOD	4.30E+01	24 hr	24 hr	200	Health	3	21.5%
Nitrogen Oxides	10102-44-0	4.21E+01	AERMOD	1.95E+02	1 hr	1 hr	400	Health	3	48.7%
Sulphur Dioxide	7446-09-5	3.45E+01	AERMOD	8.43E+00	24 hr	24 hr	275	Health & Vegetation	3	3.1%
Sulphur Dioxide	7446-09-5	3.45E+01	AERMOD	5.52E+01	1 hr	1 hr	690	Health & Vegetation	3	8.0%
Carbon Monoxide	630-08-0	9.09E+01	AERMOD	1.76E+02	1 hr	30 min	6000	Health	3	2.9%
Total Reduced Sulphur	TRS	8.60E-03	AERMOD	2.08E-03	24 hr	24 hr	7	Health	3	<0.1%
Total Reduced Sulphur	TRS	8.60E-03	AERMOD	2.26E-02	1 hr	10 min	10	Odour	3	0.2%
Trace Metals										
Antimony	7440-36-0	1.44E-04	AERMOD	5.00E-04	24 hr	24 hr	25	Health	3	<0.1%
Arsenic	7440-38-2	1.83E-03	AERMOD	1.63E-02	24 hr	24 hr	0.3	Health	G	5.4%
Barium	7440-39-3	7.65E-03	AERMOD	2.59E-02	24 hr	24 hr	10	Health	G	0.3%
Beryllium	7440-41-7	2.47E-05	AERMOD	7.00E-05	24 hr	24 hr	0.01	Health	3	0.7%
Cadmium	7440-43-9	1.31E-04	AERMOD	6.20E-04	24 hr	24 hr	0.025	Health	3	2.5%
Chromium	7440-47-3	1.88E-03	AERMOD	1.21E-02	24 hr	24 hr	0.5	Health	3	2.4%
Cobalt	7440-48-4	6.66E-04	AERMOD	6.16E-03	24 hr	24 hr	0.1	Health	G	6.2%
Ferric Oxide	1309-37-1	8.68E-01	AERMOD	7.04E+00	24 hr	24 hr	25	Soiling	3	28.2%
Lead	7439-92-1	8.89E-03	AERMOD	2.20E-02	24 hr	30 day	0.2	Health	3	11.0%
Lead	7439-92-1	8.89E-03	AERMOD	5.71E-02	24 hr	24 hr	0.5	Health	3	11.4%
Manganese	7439-96-5	1.32E-02	AERMOD	5.89E-02	24 hr	24 hr	0.4	Health	3	14.7%
Mercury	7439-97-6	1.58E-03	AERMOD	3.80E-04	24 hr	24 hr	2	Health	3	<0.1%
Nickel	7440-02-0	1.70E-03	AERMOD	1.22E-02	24 hr	24 hr	0.2	Health	DAV/URT	6.1%
Nickel	7440-02-0	1.70E-03	AERMOD	1.35E-03	24 hr	Annual	0.4	Health	AAV	0.3%
Nickel	7440-02-0	1.70E-03	AERMOD	1.35E-03	Annual	Annual	0.04	Health	3	3.4%
Phosphorus	7723-14-0	2.45E-03	AERMOD	5.94E-04	24 hr	24 hr	0.5	Health	JSL	0.1%
Potassium	7440-09-7	1.02E-01	AERMOD	2.47E-02	24 hr	24 hr	1	Health	JSL	2.5%
Selenium	7782-49-2	3.88E-04	AERMOD	2.80E-04	24 hr	24 hr	10	Health	G	<0.1%
Silver	7440-22-4	1.33E-04	AERMOD	3.10E-04	24 hr	24 hr	1	Health	3	<0.1%
Thallium	7740-28-0	1.72E-04	AERMOD	4.17E-05	24 hr	24 hr	0.000344	Health	APOIC	12.1%
Tin	7440-31-5	6.93E-04	AERMOD	4.46E-03	24 hr	24 hr	10	Health	3	<0.1%
Vanadium	7440-62-2	1.04E-02	AERMOD	9.69E-02	24 hr	24 hr	2	Health	3	4.8%
Dioxin and Furans										
TOTAL Dioxin and Furans (TEQ)	CCD	8.37E-10	AERMOD	2.03E-10	24 hr	24 hr	0.0000001	-	-	0.2%
Polyaromatic Hydrocarbons										
Benzo(a)pyrene	50-32-8	3.45E-06	AERMOD	8.36E-07	24 hr	24 hr	0.005	Health	DAV/URT	<0.1%
Benzo(a)pyrene	50-32-8	3.45E-06	AERMOD	8.02E-08	24 hr	Annual	0.0001	Health	AAV	<0.1%
Benzo(a)pyrene	50-32-8	3.45E-06	AERMOD	8.02E-08	Annual	Annual	0.00001	Health	3	0.8%
Naphthalene	91-20-3	3.90E-02	AERMOD	9.45E-03	24 hr	24 hr	22.5	Health	G	<0.1%
Volatile Organic Compounds										
Ammonia	7664-41-7	3.95E-01	AERMOD	9.58E-02	24 hr	24 hr	100	Health	3	<0.1%
Benzene	71-43-2	4.30E-01	AERMOD	1.04E-01	24 hr	24 hr	100	Health	DAV/URT	0.1%
Benzene	71-43-2	4.30E-01	AERMOD	1.00E-02	24 hr	Annual	4.5	Health	AAV	0.2%
Benzene	71-43-2	4.30E-01	AERMOD	1.00E-02	Annual	Annual	0.45	Health	3	2.2%
Carbon Disulphide	75-15-0	4.12E-01	AERMOD	9.66E-02	24 hr	24 hr	330	Odour	G	<0.1%
Carbon Tetrachloride	56-23-5	9.80E-03	AERMOD	2.37E-03	24 hr	24 hr	2.4	Health	3	<0.1%
Carbonyl Sulphide	463-58-1	3.42E+00	AERMOD	8.02E-01	24 hr	24 hr	13	Health	JSL	6.2%
Chloroform	67-66-3	6.50E-03	AERMOD	1.58E-03	24 hr	24 hr	1	Health	3	0.2%
Dibromochloromethane	124-48-1	5.70E-03	AERMOD	1.38E-03	24 hr	24 hr	0.2	Health	JSL	0.7%
Dibromoethane, 1,2-	106-93-4	6.10E-03	AERMOD	1.48E-03	24 hr	24 hr	3	Health	G	<0.1%
Dichloroethane, 1,2-	107-06-2	3.95E-03	AERMOD	9.57E-04	24 hr	24 hr	2	Health	3	<0.1%
Dichloroethene, 1,1-	75-35-4	6.50E-03	AERMOD	1.58E-03	24 hr	24 hr	10	Health	3	<0.1%
Ethylbenzene	100-41-4	2.25E-02	AERMOD	5.90E-02	1 hr	10 min	1900	Odour	G	<0.1%
Hexachlorobenzene	118-74-1	3.45E-05	AERMOD	8.36E-06	24 hr	24 hr	0.011	Health	JSL	<0.1%
Hydrochloric Acid	7647-01-0	8.66E-01	AERMOD	2.10E-01	24 hr	24 hr	20	Health	3	1.0%
Tetrachloroethane, 1,1,1,2-	630-20-6	6.10E-03	AERMOD	1.48E-03	24 hr	24 hr	0.5	Health	JSL	0.3%
Tetrachloroethane, 1,1,2,2-	79-34-5	8.45E-03	AERMOD	2.05E-03	24 hr	24 hr	0.1	Health	JSL	2.0%
Trichloroethane, 1,1,2-	79-00-5	9.80E-03	AERMOD	2.37E-03	24 hr	24 hr	0.3	Health	JSL	0.8%
Trichloroethylene	79-01-6	6.50E-03	AERMOD	1.58E-03	24 hr	24 hr	12	Health	3	<0.1%
Vinyl Chloride	75-01-4	1.14E-02	AERMOD	2.75E-03	24 hr	24 hr	1	Health	3	0.3%
Xylene	1330-20-7	6.60E-02	AERMOD	1.73E-01	1 hr	10 min	3000	Odour	G	<0.1%

G = Ministry Guideline, JSL = Jurisdictional Screening Level, URT - Upper Risk Threshold, APOIC - Acceptable Point-Of-Impingement Concentration, DAV - Daily Assessment Value; AAV - Annual Assessment Value
 - Modelling was completed using AERMOD v19191.