St. Marys Cement Inc. (Canada)
Air Quality Study

ALCF ECA Amendment Application for St. Marys Cement

2026-11-20

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Prepared for

St. Marys Cement Inc. (Canada)
410 Bowmanville Avenue
Bowmanville, ON, L1C 7B5

Submitted to

Ministry of the Environment, Conservation and Parks

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Table of Contents

Abbreviations and Glossary **6**

Executive Summary **8**

1.0 Introduction **10**

1.1 Facility Description 11
1.2 Purpose of the Study 11
1.3 Scope and Objectives 12
1.4 Study Limitations 12

2. Assessment Approach **13**

2.1 Study Area 13
2.2 Factors Influencing Local Air Quality 15
2.3 Data Sources 15
2.4 Study Period 16
2.5 Air Quality Contaminants Considered in the Study 17
2.6 Cumulative Screening Assessment Approach 20
2.6.1 Step 1: Potential for Emissions to Increase with ALCF Use 22
2.6.2 Step 2: Assessment of Significance of Facility Contribution 22
2.6.3 Step 3: Identification of Other Local Sources 24
2.6.4 Step 4: Characterizing the Background Air Quality for the Study Area 24
2.6.5 Step 5: Cumulative Assessment and Evaluation of the Effect of Increased ALCF Use 25

3. Industrial Emissions in the Study Area **26**

3.1 St. Marys Cement 26
3.1.1 ALCF Use Context 33
3.1.2 Changes to Local Traffic Related to ALCFs 34
3.2 Local Industrial Facilities 35
3.3 Summary of Findings 38

4. Ambient Air Quality **41**

4.1 National Air Pollution Surveillance Program 41
4.2 Durham York Energy Centre Monitoring Program 42

4.3 Air Quality in Study Area 43
4.4 Meteorological Parameters 47
4.5 Trends in Local Air Quality 47

5. Other Local, Regional and Transboundary Influences 49
5.1 Transportation and Community Growth 49
5.2 Other Sources in the Study Area 50
5.3 Regional and Transboundary Air Pollution 51
5.4 Natural and Episodic Influences on Local Air Quality 51
5.5 Summary of Findings 52

6. Cumulative Air Quality Screening Assessment 53
6.1 Screening Evaluation 53
6.1.1 Step 1: Potential for Emissions to Increase with ALCF Use 53
6.1.2 Step 2: Significance of the Facility Contribution 56
6.2 Summary of the Screening Evaluation 59

7. Summary of Findings 60
7.1 Industrial Emissions in the Study Area 60
7.2 Ambient Air Quality 61
7.3 Other Local, Regional and Transboundary Influences 62
7.4 Cumulative Air Quality Screening 62

8. Closure 63
8.1 Limitations 63
8.2 Standard of Care 63

9. References 64

Table 2-1 Data Sources Used to Characterize Local Air Quality 16
Table 2-2 Data and Periods Considered in the Study 17
Table 2-3 Ambient Air Quality Criteria for Relevant Contaminants 18
Table 2-4 ESDM Report Scenarios 23
Table 3-1 ALCF Consumption Data 34
Table 3-2 NPRI-Reportable Contaminants by Facility for the Study Period 36

Table 4-1	Summary of NAPS Stations	41
Table 4-2	Summary of DYEC Monitoring Stations	42
Table 4-3	Summary of Ambient Monitoring Data	45
Table 6-1	Step 1: ALCF Contaminant Screening	55
Table 6-2	Step 2: Contaminant Screening Process	58
Table 6-3	Assessment of Chromium and Manganese Emission Rates and POI Changes	59

Figure 2-1	Study Area	14
Figure 2-2	Contaminant Screening Process for Cumulative Screening Assessment	21
Figure 3-1	Annual Emissions of By-Products of Combustion Released from St. Marys Cement (tonnes)	27
Figure 3-2	Annual Emissions of Particulate Matter Released from St. Marys Cement (tonnes)	27
Figure 3-3	Annual Emissions of Metals Released from St. Marys Cement (kilograms)	28
Figure 3-4	Annual Emissions of VOCs Released from St. Marys Cement (tonnes)	29
Figure 3-5	Annual Emissions of PAHs Released from St. Marys Cement (kilograms)	30
Figure 3-6	Annual Emissions of Other Key Contaminants (Ammonia, Hydrochloric Acid) Released from St. Marys Cement (tonnes)	30
Figure 3-7	Annual Emissions of Other Key Contaminants (Hexachlorobenzene) Released from St. Marys Cement (grams)	31
Figure 3-8	Annual Emissions of Other Key Contaminants (Dioxins and Furans) Released from St. Marys Cement (grams TEQ)	31
Figure 6-1	Step 2: Contaminant Screening Process	57

Appendix A NPRI Data

Appendix B Ambient Air Monitoring Data

Appendix C Traffic and Population Data

Appendix D Screening Assessment

Abbreviations and Glossary

Abbreviation	Description
AADT	Annual Average Daily Traffic
AAQC	Ontario Ambient Air Quality Criteria
AAR	Acoustic Assessment Report
AAV	Annual Assessment Value
ACB List	Air Contaminants Benchmarks List
ALCF	Alternative Low Carbon Fuels
AQMS	Air Quality Management System
B(a)P	Benzo(a)pyrene
B1	Benchmark 1
B2	Benchmark 2
BMPP	Best Management Practices Plan
CAAQS	Canadian Ambient Air Quality Standards
CCME	Canadian Council of Ministers of the Environment
CEMS	Continuous Emissions Monitoring System
CO	Carbon Monoxide
CPMS	Continuous Process Monitoring System
D&F	Dioxins and Furans
DAV	Daily Assessment Value
DNGS	Darlington Nuclear Generating Station
DYEC	Durham York Energy Centre
ECA	Environmental Compliance Approval
ECCC	Environment and Climate Change Canada
EPA	Environmental Protection Act
ESDM	Emission Summary and Dispersion Modelling
Ministry, MECP	Ministry of the Environment, Conservation and Parks
MTO	Ministry of Transportation
N/A	Not Applicable / Not Available
NAPS	National Air Pollution Surveillance

Abbreviation	Description
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NPRI	National Pollutant Release Inventory
O. Reg.	Ontario Regulation
O_3	Ozone
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
$PM_{2.5}$	Particulate Matter less than 2.5 micrometres in diameter
PM_{10}	Particulate Matter less than 10 micrometres in diameter
POI	Point of Impingement
PUF	Polyurethane Foam
QA/QC	Quality Assurance / Quality Control
RDL	Reporting Detection Limit
SNCR	Selective Non-Catalytic Reduction
SO_2	Sulphur Dioxide
SPM	Suspended Particulate Matter
Study	The Air Quality Study
TEQ	Toxic Equivalency / Toxic Equivalent
TPM	Total Particulate Matter
TSP	Total Suspended Particulate
URT	Upper Risk Threshold
VCNA	Votorantim Cimentos North America
VOCs	Volatile Organic Compounds
WPCP	Water Pollution Control Plant
WSP	WSP Canada Inc.

Executive Summary

WSP Canada Inc. (WSP) was retained by St. Marys Cement Inc. (Canada) (St. Marys Cement), a subsidiary of Votorantim Cimentos North America, to provide permitting and technical support for an amendment to the existing Alternative Low Carbon Fuel (ALCF) Environmental Compliance Approval (ECA) for the Bowmanville Cement Plant (the Facility). The ALCF ECA Amendment Application seeks approval to increase the maximum ALCF use from 400 tonnes per day to 800 tonnes per day and to incorporate planned modifications to ALCF ancillary equipment, including upgrades to the calciner and a process improvement to increase combustion residence time.

This Air Quality Study (the Study) was prepared in response to anticipated public concerns regarding the use of ALCFs at the Facility. Although not required under Ontario Regulation (O. Reg.) 419/05 or O. Reg. 79/15, the Study was undertaken to provide a broader assessment of air quality in the Bowmanville-Courtice area, recognizing the presence of multiple facilities with similar types of emissions. The Study has two purposes:

- to characterize existing air quality conditions and historical trends within the Bowmanville-Courtice area; and
- to assess the potential incremental effect of increasing ALCF use at the Facility from 400 tonnes per day to 800 tonnes per day, including whether the proposed increase could materially affect local air quality conditions.

To characterize existing conditions, the Study reviewed publicly available information on Facility and local industrial emissions, including National Pollutant Release Inventory data; ambient air quality monitoring data from the National Air Pollution Surveillance Program and Durham York Energy Centre monitoring programs; transportation activity and community growth; and regional and transboundary influences within an approximately 10 km Study Area.

To assess the proposed increase in ALCF use, contaminants with the potential to increase were evaluated using a five-step screening approach: (1) potential for emissions to increase with ALCF use; (2) significance of the Facility contribution based on the Emission Summary and Dispersion Modelling (ESDM) Report; (3) identification of other local sources; (4) characterization of background air quality; and (5) a cumulative screening assessment for contaminants not screened out in the earlier steps. Ontario Ambient Air Quality Criteria (AAQC) were used as the primary ambient air quality benchmarks.

The Study found that industrial emissions within the Study Area have generally remained stable or decreased over the period reviewed. Reported emissions from the Facility decreased for several principal contaminant groups, while other industrial facilities within the Study Area emit contaminants in common with the Facility.

Ambient monitoring indicates that air quality within and surrounding the Study Area is generally good. The majority of monitored concentrations were below the applicable air quality criteria, although some exceedances occurred for certain contaminants and monitoring locations. Air quality within the Study Area is also influenced by sources other than local industry, including transportation, residential, commercial, agricultural and construction activities, as well as regional and transboundary sources, wildfire events and meteorological conditions.

The assessment of the proposed increase in ALCF use identified chromium and manganese as the only contaminants emitted from the kiln requiring further consideration following the initial screening. These increases did not result in an increase in the maximum predicted off-site Point of Impingement (POI) concentrations. Chromium and manganese were therefore screened from further quantitative assessment.

Based on the information reviewed and the results of the cumulative screening assessment, the proposed increase in ALCF use from 400 tonnes per day to 800 tonnes per day is not expected to materially change overall air quality conditions within the Study Area.

This Study is not intended to demonstrate compliance with O. Reg. 419/05. Compliance with O. Reg. 419/05 is addressed through the ESDM Report submitted in support of the ALCF ECA Amendment Application.

1.0 Introduction

WSP Canada Inc. (WSP) was retained by St. Marys Cement Inc. (Canada), a subsidiary of Votorantim Cimentos North America (VCNA), to provide permitting and technical support for an amendment to the existing Alternative Low Carbon Fuel (ALCF) Environmental Compliance Approval (ECA) issued under Part II.1 of the Ontario Environmental Protection Act for the Bowmanville Cement Plant located at 410 Bowmanville Avenue in Bowmanville, Ontario (the Facility). The Facility currently operates under its existing ECA No. 0550-CEAHMA issued September 19, 2022 which permits the use of ALCFs in the cement manufacturing process.

The proposed ALCF ECA Amendment Application will seek approval to increase the maximum ALCF use from 400 tonnes per day to 800 tonnes per day and to incorporate planned modifications associated with ALCF ancillary equipment. These modifications include upgrades to the calciner to accommodate increased ALCF use and a process improvement to increase combustion residence time. In addition, the proposed ALCF ECA Amendment Application incorporates modifications that are not related to ALCFs, including main kiln stack modification and addition of Finish Mill #4, which were assessed as part of the limited operational flexibility condition of the current ECA.

As part of the proposed ALCF ECA Amendment Application, St. Marys Cement will request the approved list of ALCF baskets and materials on the ECA to be:

- Material that is biomass fuel derived from harvested plant and forest sources, end of life agricultural sources, Woodwaste or Agricultural Waste, and includes but is not limited to sawdust, wood chips, wood, miscanthus grass, millet, sorghum, hemp, switch grass, and maize;
- Material that is comprised of non-recyclable plastics, including but not limited to manufacturing rejects, material resource recovery facility rejects, nylon (including but not limited to tire fluff), plastics bags and packaging;
- Material that is comprised of construction, renovation & demolition waste, including but not limited to scrap wood, treated lumber, carpets, textiles, sawdust, nylon, floor laminates and asphalt shingles;
- Material that is comprised of non-recyclable paper fiber/wood/plastic composites, including but not limited to single-serve coffee pods, printed papers, paper towels, rejects and trimmings from paper recycling facilities such as ragger tails (residue including plastic trimmings, staples, paper fibre and metal wire), end rolls and cores; and
- Material that is comprised of rubber (non-tire derived), including but not limited to shredded conveyor belts.

WSP has prepared this Air Quality Study (the Study) in support of the proposed ALCF ECA Amendment Application.

1.1 Facility Description

The Facility produces portland cement through a series of crushing, blending and kiln calcining operations and consists of the following main process areas:

- Limestone Quarry (limestone extraction)
- Limestone Crushing and Storage (construction grade limestone processing)
- Cement Manufacturing Operations
  - Raw Material/Conventional Fuel Delivery and Storage
  - ALCF Delivery and Storage
  - Raw Material Preparation
  - Solid Conventional Fuel Preparation and Feed System
  - ALCF Fuel Preparation and Feed System
  - Calcination/Clinker Manufacturing
  - Clinker Grinding and Cement Production
  - Support Operations (i.e., comfort heating, backup power, maintenance shop and QA/QC laboratory)
- Ready-Mix Concrete Operations

These activities and processes onsite release combustion by-products, process emissions, and particulate matter to the atmosphere. More details on the Facility operations and processes can be found in the Emission Summary and Dispersion Modelling (ESDM) Report submitted concurrently with this Study in support of the ALCF ECA Amendment Application.

1.2 Purpose of the Study

This Study was prepared in response to anticipated public concerns regarding the use of ALCFs at the Facility. Although not specifically required under O. Reg. 419/05 or O. Reg. 79/15, the Study was undertaken to provide a broader assessment of air quality in the Bowmanville-Courtice area, recognizing the presence of multiple facilities with similar types of emissions. Specifically, the Study has two purposes:

- To characterize existing air quality conditions and historical trends within the Bowmanville-Courtice area; and
- To assess the potential incremental effect of increasing ALCF use at the Facility from 400 tonnes per day to 800 tonnes per day, including whether the proposed increase could materially affect local air quality conditions.

1.3 Scope and Objectives

The Study considers the Facility emissions and local industrial emissions, ambient air quality monitoring data, transportation activity, community growth, and regional and transboundary influences within the Bowmanville-Courtice area to characterize existing conditions and evaluate potential effects of the proposed increase in ALCF use. The objectives of this Study are to:

- Review historical emissions trends from publicly available reports for the Facility, the ESDM Report, and other relevant emissions information;
- Review emissions trends and available ambient air quality monitoring data for other industrial facilities within the Bowmanville-Courtice area;
- Evaluate available ambient air quality monitoring data and identify observable historical trends;
- Review transportation activity, including traffic data from Highway 401 and Facility-related vehicle movements, together with community growth and other local factors that may affect air quality;
- Examine regional and transboundary air quality influences, including background concentrations and episodic events such as wildfire smoke;
- Apply a cumulative screening assessment to identify contaminants requiring further assessment; and
- Evaluate whether the proposed increase in ALCF use could materially affect local air quality conditions.

1.4 Study Limitations

The review of existing air quality conditions is based on publicly available sources, including emissions inventories, ambient air quality monitoring data, transportation and community information, and other relevant information available at the time the Study was prepared. The availability, completeness, reporting thresholds, assessment periods, and spatial representativeness of these data vary. Accordingly, the Study is intended to identify general trends and provide context for local air quality conditions rather than providing a comprehensive source-by-source cumulative dispersion modelling assessment for all contaminants.

This Study is not intended to demonstrate compliance with O. Reg. 419/05. Compliance with O. Reg. 419/05 is addressed in the ESDM Report prepared in support of the ALCF ECA Amendment Application.

This assessment, which aims to characterize existing conditions and whether there is any potential incremental effect of the proposed increase in ALCF use, is limited to contaminants with estimated maximum emissions or modelled off-site concentrations (presented in the ESDM Report) that have the potential to increase as ALCF use increases from 400 tonnes per day to 800 tonnes per day. The assessment uses the Facility dispersion modelling results presented in the ESDM Report, with available information on other local sources and background air quality, to evaluate the potential for cumulative air quality effects.

2. Assessment Approach

This Study uses two complementary assessment components to evaluate local air quality and the potential effects of the proposed increase in ALCF use. First, available emissions information, ambient air quality monitoring data, transportation activity, community growth, and regional and transboundary influences are reviewed to characterize existing air quality conditions and historical trends. Second, contaminants with the potential to increase as a result of the proposed increase in ALCF use at the Facility are evaluated using the cumulative screening assessment approach described in Section 2.6.

2.1 Study Area

For the purpose of this Study, the Study Area is defined as the area within approximately 10 km of the Facility and is used to characterize local sources and ambient air quality conditions. This Study Area encompasses the Bowmanville-Courtice area within the Municipality of Clarington, Ontario. It includes a mixture of industrial, commercial, residential, transportation, and agricultural land uses.

Industrial facilities considered as local sources are those located within the Study Area for which relevant publicly available emissions or ambient air quality information is available.

Broader regional and transboundary influences are also considered in the Study to provide context for ambient air quality conditions within the Study Area.

The Study Area and key features considered in the assessment are shown in Figure 2-1.

Oshawa
- 61703

Durham College
- 61702

Ritson Rd & Olive Ave
- 61701

Durham York
Energy
Centre - 29003

Rundle Road
Station

St. Marys
Cement
- 5841

Courtice
Station

Port Darlington
Water Polution
Control Plant - 7681

Harmony Creek
Water Pollution Control
Plant - 7376

McAshpalt Industries
Ashpalt Mixing
Plant - 10897

Courtice Water
Pollution
Control - 11690

Darlington
Nuclear Generating
Station - 3163

KEY MAP



SCALE: 1:2,000,000

LEGEND

- ST. MARYS CEMENT FACILITY
- OTHER INDUSTRIAL FACILITIES
- DYEC AMBIENT AIR MONITORING STATIONS
- NAPS STATION
- FACILITY PROPERTY BOUNDARY
- STUDY AREA

0 1,000 2,000 4,000

1:115,000 METRES

NOTE(S)
1. ALL LOCATIONS ARE APPROXIMATE

REFERENCE(S)
1. CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - ONTARIO
2. BASE MAP: EARTHSTAR GEOGRAPHICS, SOURCES: ESRI, TOMTOM, GARMIN, FAO, NOAA, USGS, © OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
3. COORDINATE SYSTEM: NAD 1983 CSRS UTM ZONE 17N

CLIENT
ST. MARYS CEMENT INC. (CANADA)

PROJECT
BOWMANVILLE CEMENT PLANT
410 BOWMANVILLE AVENUE, BOWMANVILLE, ONTARIO

TITLE
STUDY AREA

CONSULTANT

wsp

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APPROVED	JDM

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2.2 Factors Influencing Local Air Quality

Air quality within the Study Area is influenced by a combination of local, regional, and transboundary sources. Local influences include industrial emissions, transportation sources, commercial and residential combustion, construction activity and agricultural sources. Regional and transboundary influences include contaminants transported over greater distances, as well as episodic influences such as wildfire smoke.

Under Canada's Air Quality Management System (AQMS), air zones are geographic areas used to manage local air quality, while airsheds are broader geographic areas that encompass multiple air zones and may cross provincial, territorial and international boundaries (Canadian Councils of Ministers of the Envrionment (CCME), 2019). The Study Area is located within Ontario's Southern Ontario air zone, which excludes the separately designated Sarnia/St. Clair Township and Hamilton air zones (Government of Ontario, 2022).

The relative influence of these sources on air quality can vary with location, season, meteorological conditions and temporary or episodic events. The Study therefore considers Facility-specific information together with available information on other local sources and broader regional and transboundary influences. The information reviewed to characterize existing air quality conditions and historical trends is summarized in Section 2.3.

2.3 Data Sources

Table 2-1 summarizes the information reviewed to characterize existing air quality conditions and historical trends within and surrounding the Study Area. The contaminant-specific assessment of the proposed increase in ALCF use is described separately in Sections 2.5 and 2.6.

Table 2-1 Data Sources Used to Characterize Local Air Quality

Source	Influences Considered	Information Reviewed
St. Marys Cement	Facility Emissions	Environment and Climate Change Canada (ECCC) National Pollutant Release Inventory (NPRI) data to characterize historical trends in annual Facility emissions.
Local Industrial	Industrial Sources within the Study Area	NPRI data to characterize historical trends in annual emissions from relevant industrial facilities within the Study Area. Available ambient air monitoring data for contaminants in common with the Facility.
Local Transportation	Road Dust and Tailpipe Emissions	Historical traffic-volume data for Highway 401 and local roadways to characterize changes in transportation activity within the Study Area.
Local Other Sources	Commercial and Residential Combustion Construction Activity Agricultural Sources	Information on construction activity, commercial and residential combustion, and agricultural sources to provide context regarding other potential local influences on air quality.
Regional and Transboundary Influences	Regional Background Concentrations Transboundary Pollution Natural and Episodic Events	Ambient air monitoring data that have contaminants in common with the Facility, e.g., ECCC National Air Pollution Surveillance (NAPS) Program. Information on regional and transboundary air quality influences, including pollutant transport from outside the Study Area and episodic wildfire-smoke events.

2.4 Study Period

The Study Period varies by dataset based on data availability and the purpose for which the data are used. In general, the most recent complete data available were used, with historical data included where appropriate to characterize trends over time. Table 2-2 summarizes the data sources and corresponding Study Periods used in the assessment.

Table 2-2 Data and Periods Considered in the Study

Report Section	Data	Source	Study Period
3.1	St. Marys Cement	National Pollutant Release Inventory Data	2016 – 2025
3.2	Local Industrial Facilities	National Pollutant Release Inventory Data	2016 – 2025
4.1	Ambient Air Quality	National Air Pollution Surveillance Program Data	2022 – 2024
4.2	Durham York Energy Centre Monitoring Data	Durham York Energy Centre Ambient Air Monitoring Report	2022 – 2025
5.1	Traffic Data	Ministry of Transportation Traffic Volume Data, Air Quality in Ontario 2023 Report	2014 – 2023
5.1	Population Data	Statistics Canada	2011, 2016, 2021
5.3, 5.4	Regional and Transboundary Air Pollution	Air Quality in Ontario 2023 Report	2014 – 2023

2.5 Air Quality Contaminants Considered in the Study

The contaminants considered in this Study were identified based on estimated maximum emissions in the ESDM Report associated with the Facility and their relevance to the characterization and assessment of air quality within the Study Area. These include:

- By-products of combustion, including nitrogen oxides (NOx), sulphur dioxide (SO_2), and carbon monoxide (CO);
- Particulate matter, including Suspended Particulate Matter (SPM), Particulate Matter less than 10 micrometres in diameter (PM_{10}), and Particulate Matter less than 2.5 micrometres in diameter ($PM_{2.5}$);
- Metals;
- Volatile Organic Compounds (VOCs);
- Polycyclic Aromatic Hydrocarbons (PAHs); and
- Other key contaminants including chlorine-containing compounds and dioxins and furans.

Ontario Ambient Air Quality Criteria (AAQC) were selected as the primary ambient air quality benchmarks for the Study. AAQC are non-regulatory, effects-based concentrations established by the Ontario Ministry of the Environment, Conservation and Parks (MECP). They are used for assessing

general ambient air quality resulting from all sources of a contaminant. AAQC are commonly used in environmental assessments, special studies using ambient air monitoring data, assessments of general air quality within a community, and provincial air quality reporting (MECP, 2023). The applicable Ontario AAQC are listed in Table 2-3.

Table 2-3 Ambient Air Quality Criteria for Relevant Contaminants

Contaminant Group	Contaminant	Averaging Period	AAQC [µg/m^3]
By-Products of Combustion	Nitrogen Dioxide	1-hour	400 (0.10 ppm)
		24-hour	200 (0.20 ppm)
	Sulphur Dioxide[(a)]	10-minute	178.2 (67 ppb)
		1-hour	106.4 (40 ppb)
		Annual	10.6 (4 ppb)
	Carbon Monoxide	1-hour	36,200 (30 ppm)
		8-hour	15,700 (13 ppm)
Particulate Matter	Suspended Particulate Matter[(b)]	24-hour	120
		Annual[(c)]	60
	Particulate Matter less than 10 micrometres in diameter	24-hour	50
	Particulate Matter less than 2.5 micrometres in diameter	24-hour[(d)]	27
		Annual[(e)]	8.8
Ozone	Ozone	1-hour	165 (0.080 ppm)
Metals	Mercury	24-hour	2
	Antimony	24-hour	25
	Arsenic	24-hour	0.3
	Barium, total water soluble	24-hour	10
	Beryllium	24-hour	0.01
	Boron	24-hour	120
	Cadmium	24-hour	0.025
		Annual	0.005
	Chromium	24-hour	0.5
	Cobalt	24-hour	0.1
	Copper	24-hour	50
	Iron	24-hour	4
	Lead	24-hour	0.5
		30-day	0.2

Contaminant Group	Contaminant	Averaging Period	AAQC [µg/m³]
Metals	Manganese	24-hour	0.1 as $PM_{2.5}$
			0.2 as PM_{10}
			0.4 as SPM
	Molybdenum	24-hour	120
	Nickel	24-hour	0.1 as PM_{10} 0.2 as SPM
		Annual	0.02 as PM_{10} 0.04 as SPM
	Selenium	24-hour	10
	Silver	24-hour	1
	Strontium	24-hour	120
	Tin	24-hour	10
	Titanium	24-hour	120
	Uranium	24-hour	0.15 as PM_{10} 0.3 as SPM
		Annual	0.03 as PM_{10} 0.06 as SPM
	Vanadium	24-hour	2
	Zinc	24-hour	120
PAHs	Benzo(a)pyrene	24-hour	0.00005
		Annual	0.00001
	Biphenyl	1-hour	60
	Naphthalene	10-minute	50
		24-hour	22.5
Other Key Contaminants	Hydrochloric Acid[(f)]	24-hour	20
	Dioxins, furans and dioxin-like PCBs	24-hour	0.1 pg TEQ/m³

Notes:

(a) 10-minute SO_2 concentrations were converted from the corresponding 1-hour average SO_2 monitoring results using Ministry conversion factor (MECP, 2017)

(b) SPM in Ontario is defined as Suspended Particulate Matter (<44 µm diameter) (MECP, 2023)

(c) Geometric mean (MECP, 2023)

(d) Reflects a three-year average of the annual 98th percentile of the daily 24-hr average concentrations (MECP, 2023)

(e) Reflects a three-year average of the annual average concentrations (MECP, 2023)

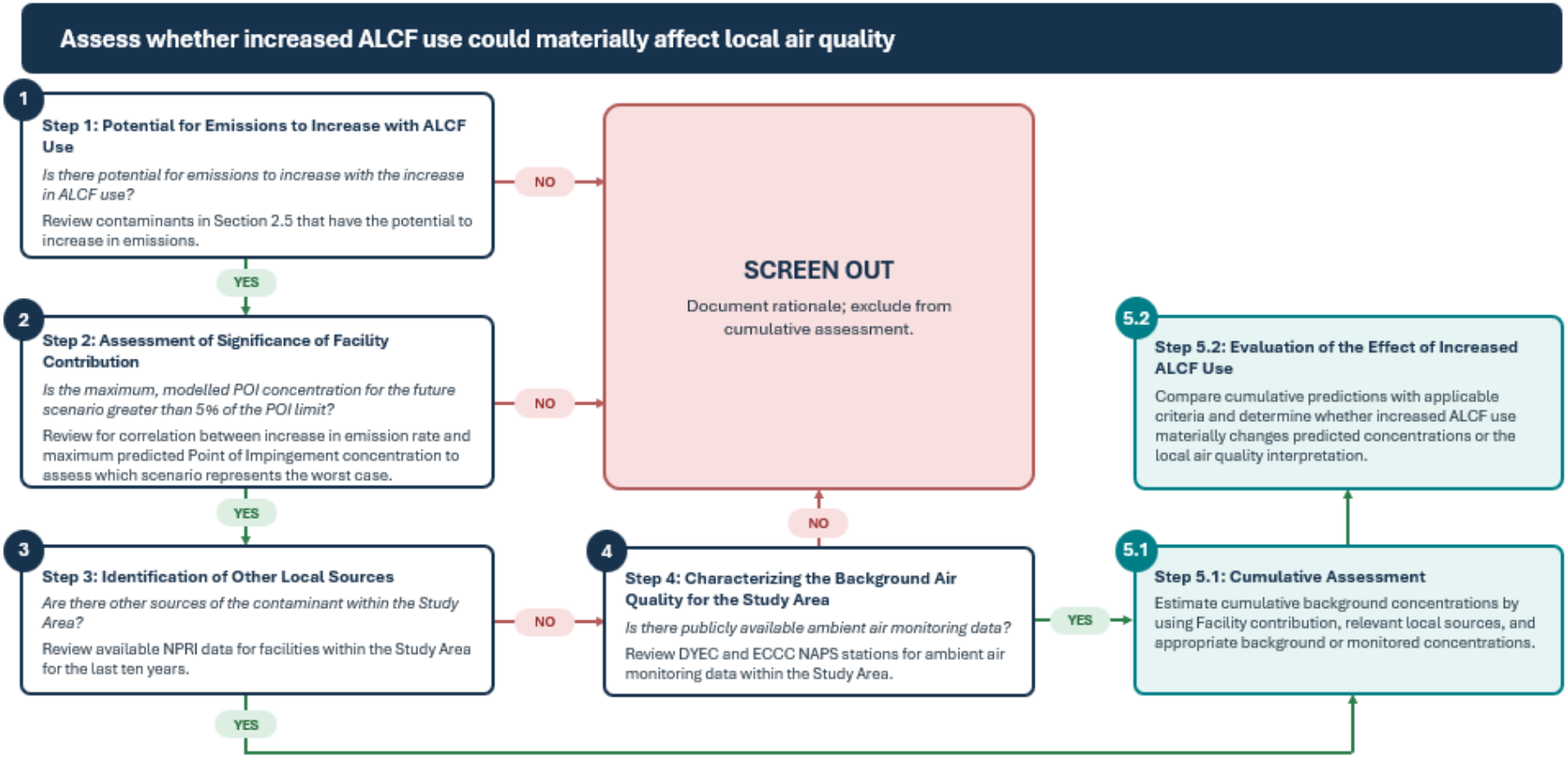
(f) Expressed as hydrogen chloride in the AAQC (MECP, 2023)

It should be noted that within this Study, NOx emissions are quantified as NOx because combustion sources primarily emit nitrogen oxides, consisting mainly of nitric oxide (NO) with a smaller fraction of nitrogen dioxide (NO_2). Following release to the atmosphere, NO reacts with ambient ozone and other oxidants to form NO_2. As the applicable Ontario AAQC is established for NO_2, ambient monitoring and modelled concentrations are expressed as NO_2 for comparison with the applicable criterion. Accordingly, emissions are presented as NOx, while ambient air quality concentrations are presented and assessed as NO_2.

2.6 Cumulative Screening Assessment Approach

The contaminants identified in Section 2.5 are evaluated using a stepwise screening process to assess the potential effects of the proposed increase in ALCF use on local air quality and evaluate whether cumulative dispersion modelling is warranted. The process considers the potential for the estimated maximum emissions in the ESDM Report to increase with the proposed increase in ALCF use, the relative magnitude of the Facility contribution, the presence of other relevant local sources, and the availability of representative background information.

The cumulative screening assessment pathway is presented in Figure 2-2 and described in the following subsections.



Note: All references to emissions and concentrations mean maximum estimated emissions and maximum predicted POI concentrations presented in the Facility's ESDM Report.

Figure 2-2 Contaminant Screening Process for Cumulative Screening Assessment

2.6.1 Step 1: Potential for Emissions to Increase with ALCF Use

The first screening step evaluates the contaminants considered in the Study to assess which have the potential to increase as a result of increasing ALCF use from 400 tonnes per day to 800 tonnes per day. The assessment considers whether changes in fuel composition or consumption could result in increased emissions.

Contaminants for which there is no reasonable potential for emissions to increase with increased ALCF use are screened from further quantitative assessment. For these contaminants, the increased ALCF use would not be expected to result in an incremental change in local air quality, and further cumulative assessment is therefore not warranted.

Contaminants with the potential to increase proceed to the next screening step. The potential for emissions to increase is evaluated based on technical literature and previous assessments of the effects of ALCF use on emissions from cement manufacturing.

2.6.2 Step 2: Assessment of Significance of Facility Contribution

For the contaminants retained through Step 1, the emission estimates and predicted concentrations presented in the ESDM Report are reviewed. This review is conducted at the individual contaminant level and compares the base case with the future scenario, both representing maximum operating scenarios with proposed Facility modifications as outlined in Table 2-4.

Table 2-4 ESDM Report Scenarios

Scenario	ALCF Use	Proposed Modifications Included in the ESDM Report Assessment Under Maximum Operating Conditions	Interpretation
Base Case Scenario	Up to 400 tonnes per day	Proposed Facility modifications that are not related to ALCFs were assessed as part of the limited operational flexibility condition of the ECA: ■ main kiln stack modification ■ addition of Finish Mill #4	Conservative comparison case; not average historical operation
Future Scenario	Up to 800 tonnes per day	Proposed Facility modifications related to ALCFs: ■ upgrades to the calciner to accommodate increased ALCF use and a process improvement to increase combustion residence time ■ modifications associated with ALCF ancillary equipment	Conservative future scenario used to identify potential incremental changes

The first part of Step 2 assesses whether the ESDM Report predicts an increase in the maximum Facility emission rate for the individual contaminant between the base case and future scenario. Contaminants are screened from further assessment if their future-scenario emission rates do not exceed their base case emission rates because the proposed increase in ALCF use would not result in an incremental Facility emission of these contaminants.

For contaminants with a predicted increase in Facility emissions, the maximum modelled Point of Impingement (POI) concentration for the future scenario is compared with the applicable O. Reg. 419/05 POI limit. POI limits are outlined in the Ministry's Air Contaminants Benchmarks List (ACB List), a collection of standards, guidelines, and screening levels used to assess POI concentrations under O. Reg. 419/05. POI limits are defined as Benchmark 1 (B1) values or Benchmark 2 (B2) values. POI limits categorized as B1 represent legally enforceable Ministry standards or guidelines for assessing POI concentrations, whereas POI limits categorized as B2 are conservative screening levels.

Contaminants with a maximum POI concentration at or below 5% of the applicable POI limit for the future scenario are screened from further cumulative assessment because the predicted Facility contribution is low relative to the applicable limit.

Where the maximum POI concentration is greater than 5% of the applicable POI limit for a B1 value, the base case and future scenario dispersion modelling results are compared to assess whether the predicted increase in emissions results in an increase in the maximum off-site POI concentration. A contaminant may be screened from further assessment where the dispersion modelling results

demonstrate that the proposed increase in ALCF use does not increase the maximum predicted off-site concentration. Where an increase in the maximum predicted off-site concentration is identified, the contaminant is carried forward to Step 3 for consideration of other relevant local sources.

2.6.3 Step 3: Identification of Other Local Sources

For contaminants retained through Step 2, publicly available emissions data are reviewed to identify other potential sources of the same contaminant within the Study Area from the Facility and other industrial facilities. The review considers National Pollutant Release Inventory (NPRI) data from 2016 through 2025. The NPRI identifies contaminants released above defined reporting thresholds that are associated with more significant emissions from a given facility. Contaminants reported to NPRI can be considered a reasonable focus for this Study; contaminants not reported to NPRI are generally released at quantities below these thresholds and may be reflective of less significant contributions to local air quality in the context of this screening assessment.

Where one or more relevant local industrial sources are identified, the contaminant is carried forward to the cumulative assessment step (Step 5) to evaluate the combined contribution of the Facility and the identified local sources. Where no relevant local industrial sources are identified, a cumulative assessment is not required on the basis of local industrial emissions, and the contaminant proceeds to Step 4 for consideration of available ambient air quality monitoring data.

2.6.4 Step 4: Characterizing the Background Air Quality for the Study Area

For contaminants retained through Step 3, publicly available ambient air quality monitoring data are reviewed to characterize background air quality within the Study Area. The review considers all contaminants for which relevant monitoring data are available.

The review considers the contaminants monitored, monitoring locations, periods of record, data completeness, applicable averaging periods, and the extent to which each monitoring location is representative of conditions within the Study Area. Available data sources include ambient air quality monitoring conducted for the Durham York Energy Centre (DYEC) and through the Environment and Climate Change Canada (ECCC) National Air Pollution Surveillance (NAPS) Program. Other publicly available monitoring data may also be considered where relevant.

The available monitoring data are used to characterize existing background air quality conditions and historical trends within the Study Area. For contaminants retained for cumulative assessment following Step 3, representative monitoring concentrations, where available, are used to establish background concentrations for the cumulative assessment in Step 5. For contaminants screened out in earlier steps, the monitoring results provide broader context regarding existing air quality conditions within the Study Area.

2.6.5 Step 5: Cumulative Assessment and Evaluation of the Effect of Increased ALCF Use

For contaminants retained for quantitative cumulative assessment following Step 3, cumulative concentrations are estimated using the predicted Facility contribution together with contributions from relevant local sources identified in Step 3 and representative background concentrations identified in Step 4, as applicable. The assessment considers the potential for overlap or double counting where ambient monitoring data may already reflect contributions from identified local sources.

The cumulative assessment is used to characterize existing conditions and evaluate the potential effects of the proposed increase in ALCF use in the context of the Facility and other relevant influences within the Study Area. Estimated cumulative concentrations are compared with the applicable Ontario AAQC. Where the applicable AAQC corresponds to a POI benchmark in the Ministry's ACB List, the benchmarks may also provide relevant context for interpreting the assessment results. The ACB List contains standards, guidelines and screening levels used to assess POI concentrations under O. Reg. 419/05.

The results are also evaluated to assess the incremental Facility contribution associated with increasing ALCF use from 400 tonnes per day to 800 tonnes per day and whether that incremental contribution materially changes existing conditions within the Study Area.

The contaminant-specific screening results, any cumulative assessment completed, and the supporting information presented in Sections 3 to 5 are considered together to evaluate the potential effect of increasing ALCF use from 400 tonnes per day to 800 tonnes per day on local air quality. The screening outcomes, technical basis for each contaminant or contaminant group, and results of the cumulative assessment are presented in Section 6.

3. Industrial Emissions in the Study Area

The Study Area contains several industrial facilities that influence local air quality in addition to the Facility, including municipal wastewater treatment plants, an energy-from-waste facility, an asphalt mixing plant, and a nuclear power plant. Publicly available emissions information for these facilities was therefore considered as part of the Study.

To characterize emissions from industrial facilities within the Study Area, publicly available data from ECCC NPRI were reviewed. The NPRI is a publicly accessible database for tracking pollutant emissions from industrial facilities. Certain facilities are mandated to report the quantities and types of contaminants (referred to by NPRI as substances) they release to the air, water, and land each year. There are several factors that determine if a facility is required to report emissions to the NPRI; ECCC publishes a list of NPRI reportable contaminants and stipulates a reporting threshold for each contaminant. Should a facility's annual emissions of a contaminant exceed the reporting threshold, the facility must report the contaminant emissions to NPRI.

The NPRI data for the Facility and other reporting facilities within the Study Area were reviewed over the Study Period. The Study Period considered annual reported air emissions from 2016 through 2025 to characterize historical emission trends and emissions from local industrial sources.

3.1 St. Marys Cement

St. Marys Cement reports annual emissions of reportable contaminants from the Facility in accordance with NPRI guidance. Reportable contaminants include by-products of combustion, particulate matter, metals, VOCs, PAHs, and other key contaminants, consistent with the contaminants presented in Section 2.5.

A tabular summary of the annual emissions of contaminants from each contaminant group is included in Appendix A – NPRI Data. The following figures show the graphical summary of NPRI data for St. Marys Cement.

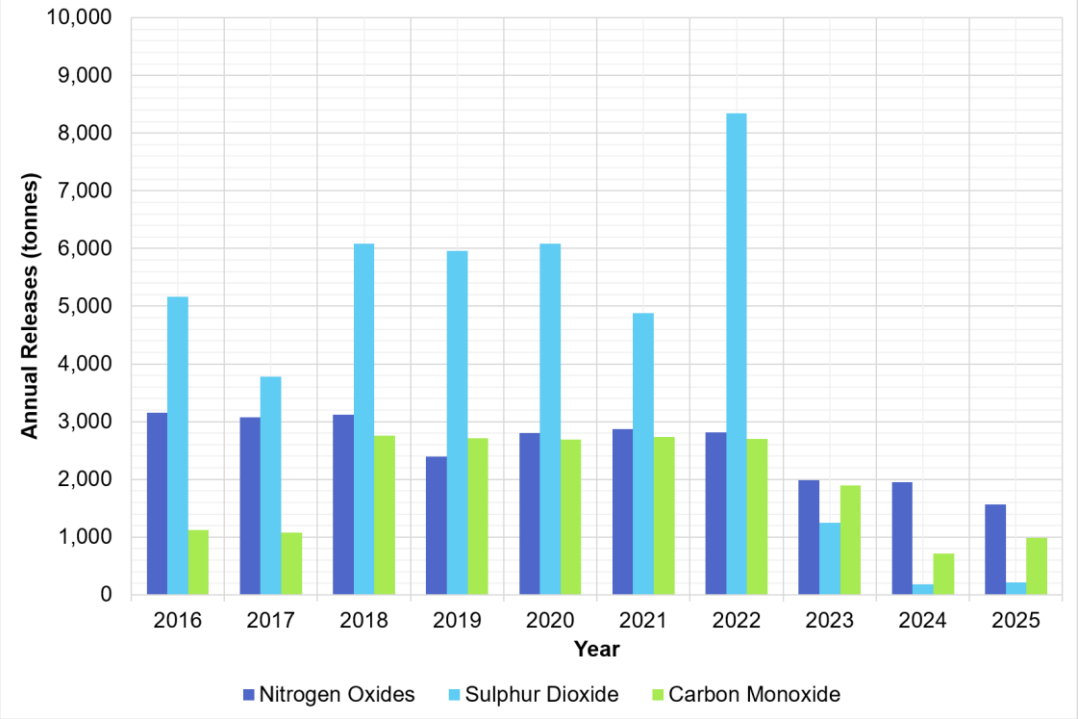


Figure 3-1 Annual Emissions of By-Products of Combustion Released from St. Marys Cement (tonnes)

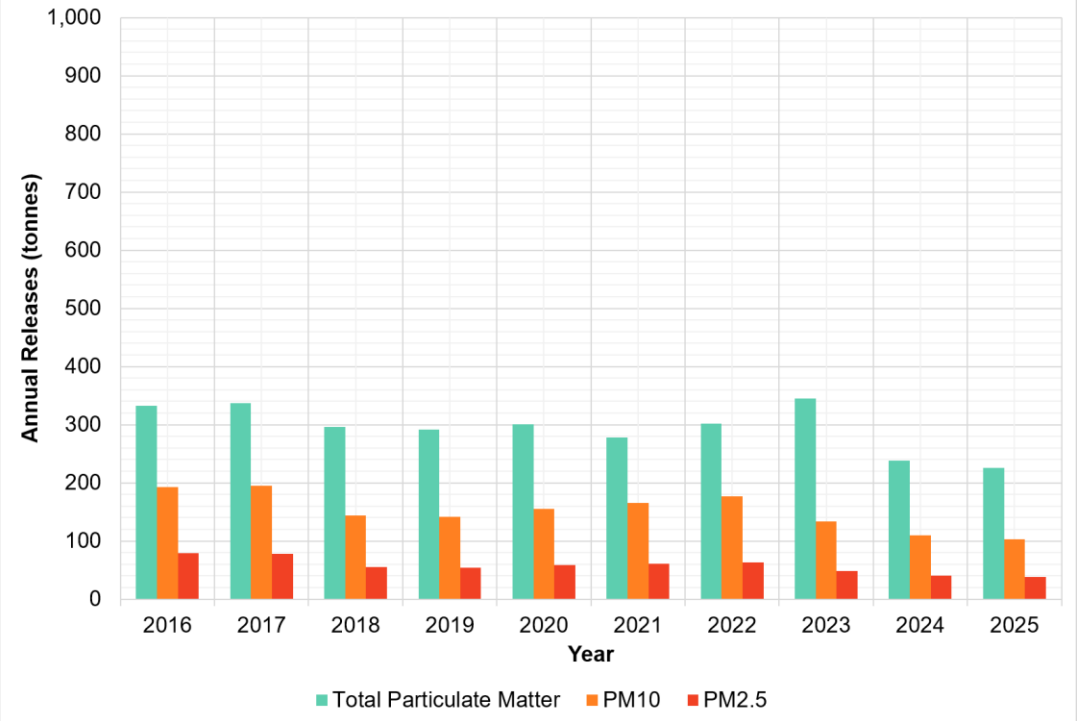


Figure 3-2 Annual Emissions of Particulate Matter Released from St. Marys Cement (tonnes)

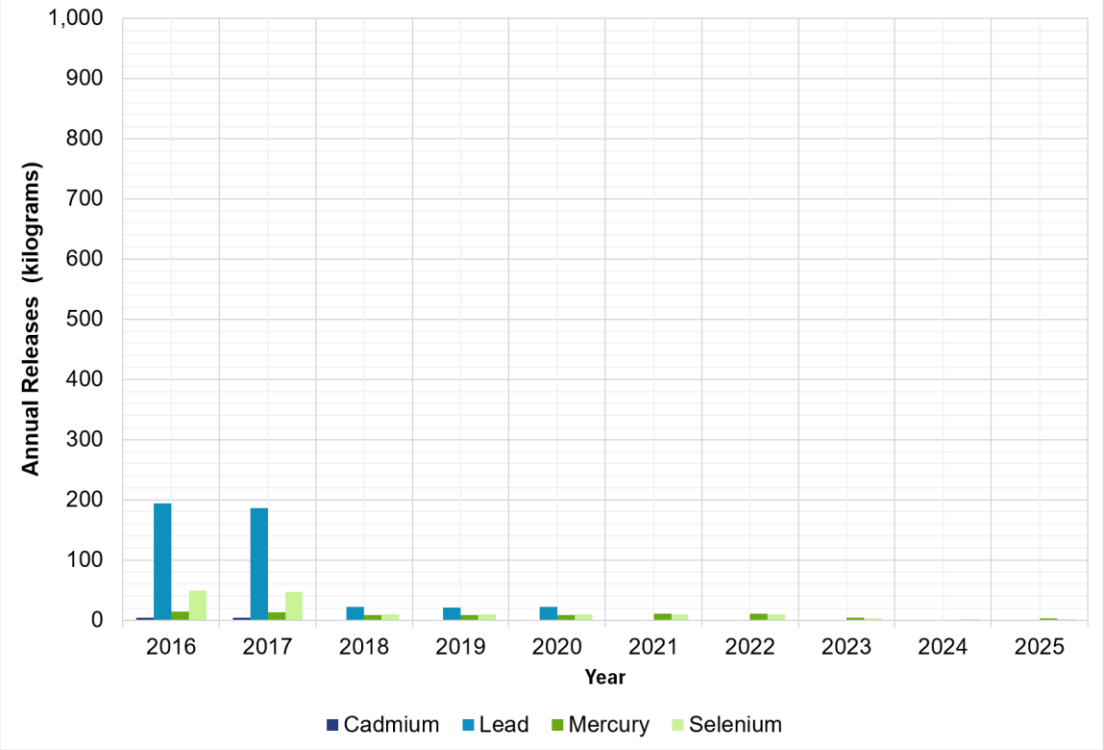


Figure 3-3 Annual Emissions of Metals Released from St. Marys Cement (kilograms)

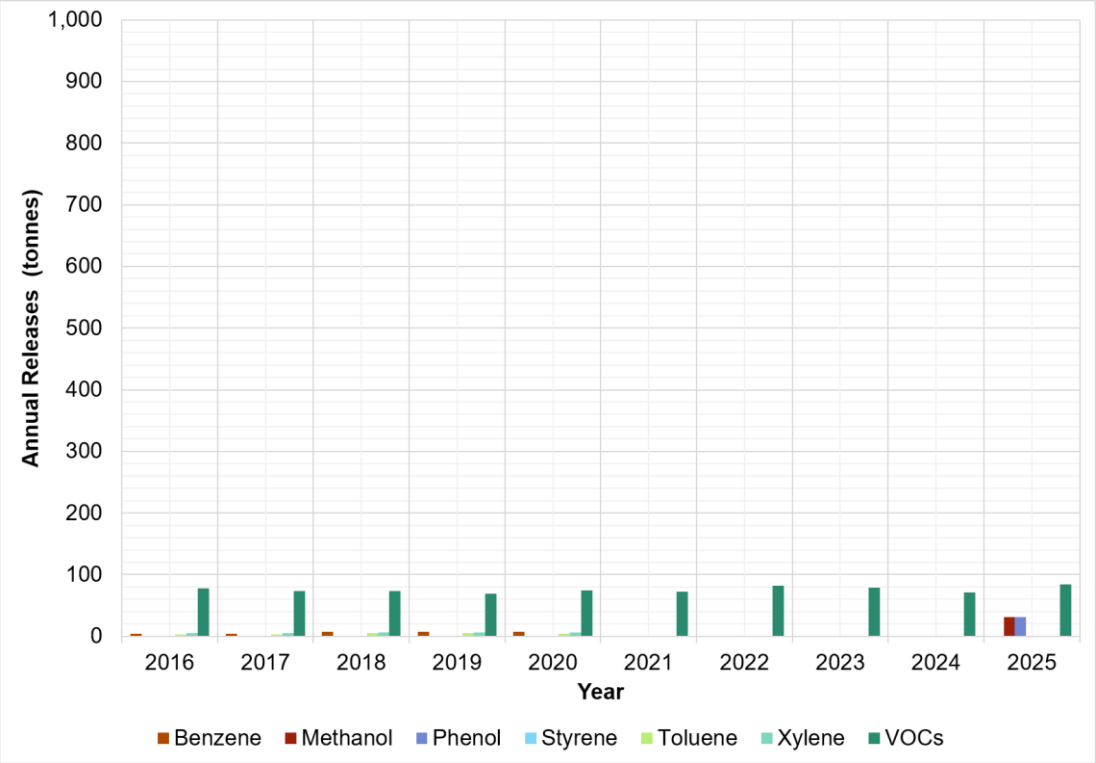


Figure 3-4 Annual Emissions of VOCs Released from St. Marys Cement (tonnes)

Note: Annual releases are estimated in accordance with the applicable reporting methodologies and using facility-specific information. This includes the annual source testing results for the kiln stack at St. Marys Cement. For the 2025 stack testing results, certain substances were reported at the laboratory Reporting Detection Limit (RDL). These RDLs were higher than historically measured concentrations (i.e., methanol and phenol), resulting in conservatively estimated annual releases relative to previous years. Accordingly, the increases reported to the NPRI for these substances do not necessarily indicate a corresponding increase in actual emissions. Although there were increases reported to the NPRI, the Facility is well below the applicable limits for VOCs in the ESDM Report.

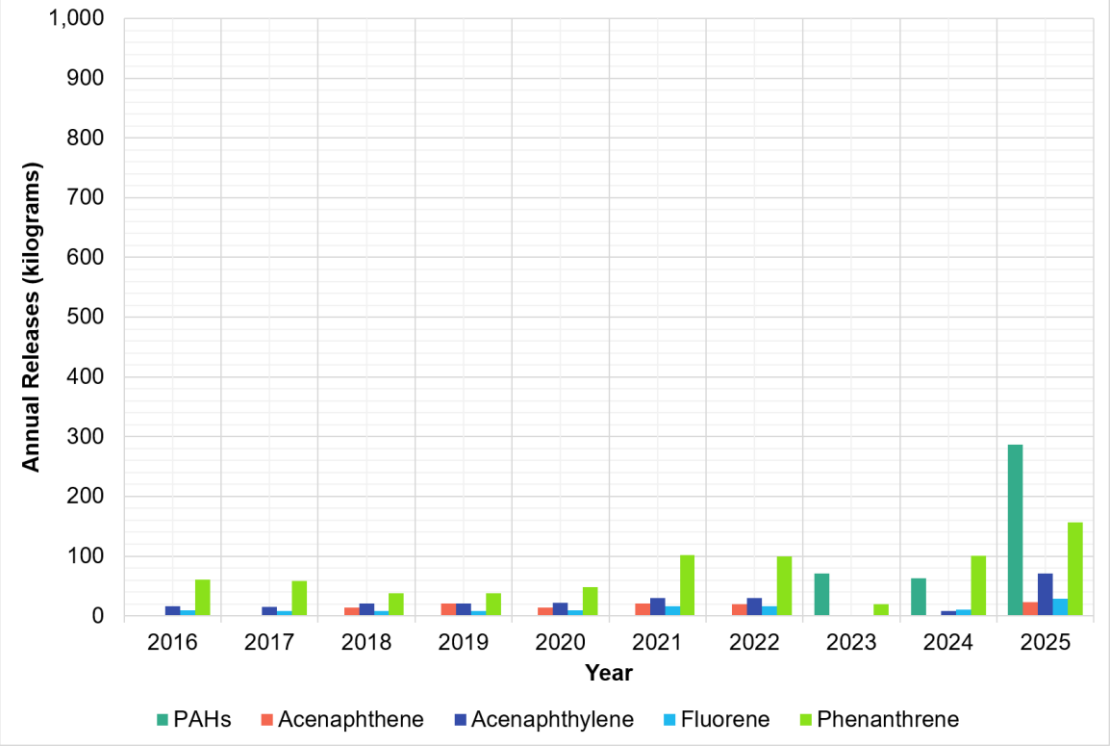


Figure 3-5 Annual Emissions of PAHs Released from St. Marys Cement (kilograms)

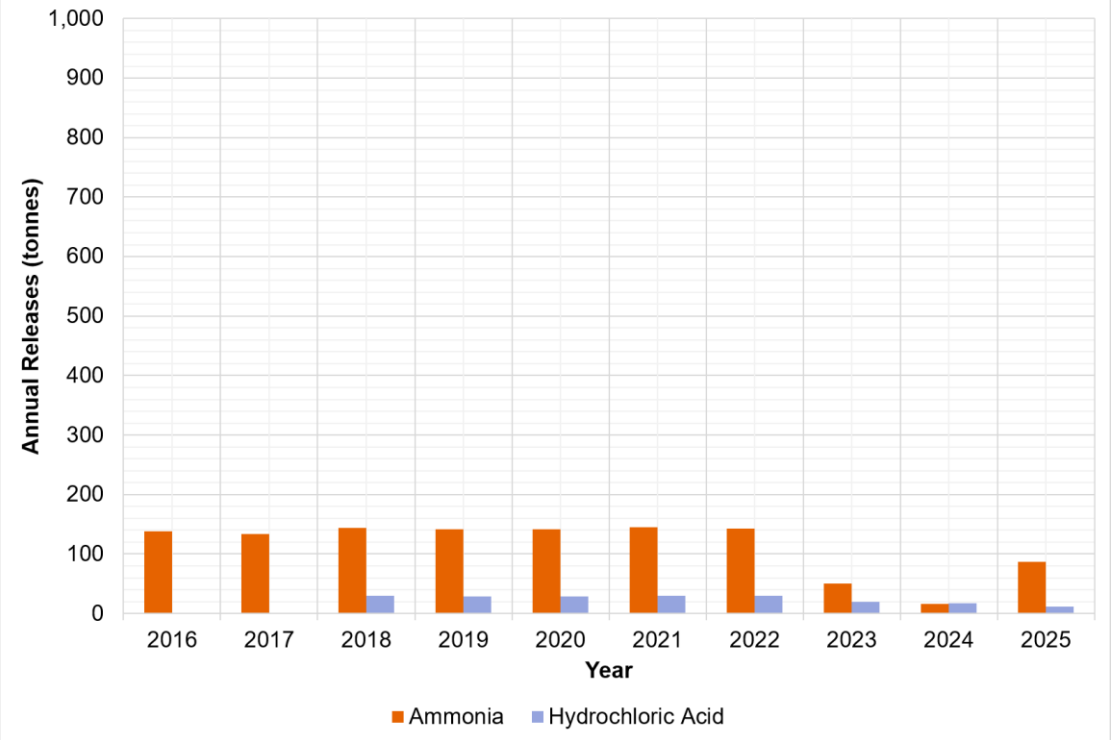


Figure 3-6 Annual Emissions of Other Key Contaminants (Ammonia, Hydrochloric Acid) Released from St. Marys Cement (tonnes)

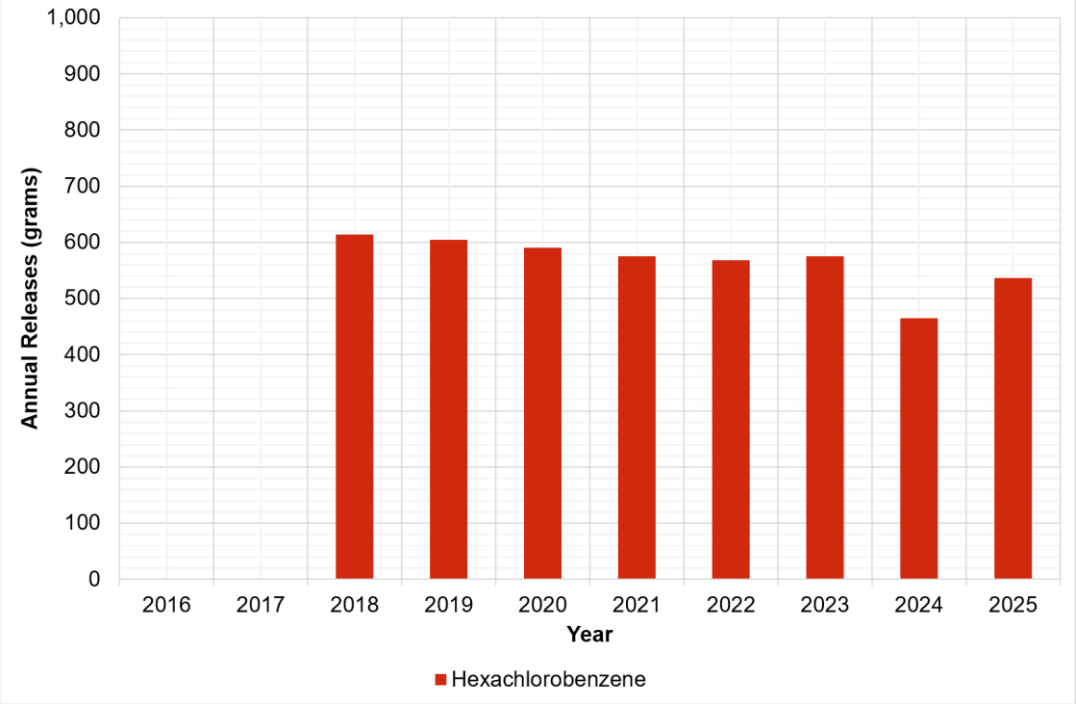


Figure 3-7 Annual Emissions of Other Key Contaminants (Hexachlorobenzene) Released from St. Marys Cement (grams)

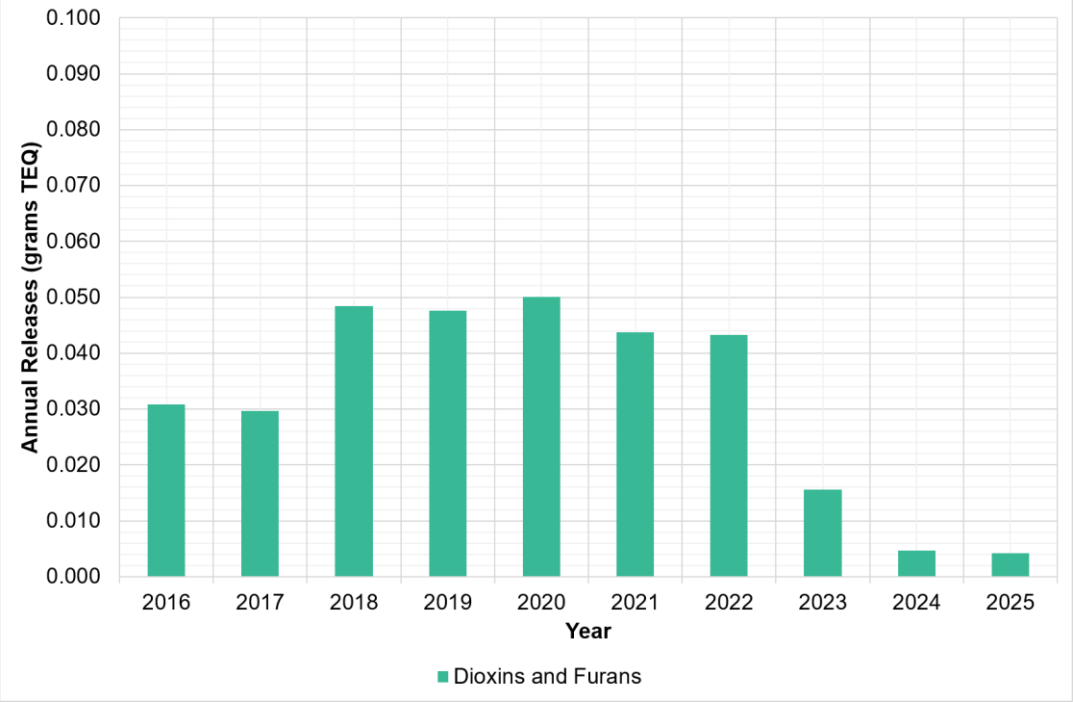


Figure 3-8 Annual Emissions of Other Key Contaminants (Dioxins and Furans) Released from St. Marys Cement (grams TEQ)

The following summary provides key findings related to NPRI emission trends from St. Marys Cement. Note that year-over-year emissions reported to NPRI are not directly comparable to the Point of Impingement (POI) concentrations predicted in accordance with O. Reg. 419/05. NPRI-reportable emissions represent facility-wide emission amounts, whereas POI concentrations represent worst-case predicted off-site concentrations from modelling all sources operating at their maximum emissions scenario. The POI concentrations for the base case and future scenario, which were assessed as part of the Facility's ESDM Report, are presented and discussed in Section 6.

- **By-Products of Combustion:** NOx, SO_2, and CO had lower annual emissions in 2025 than in 2016. Annual emissions of NOx, SO_2, and CO decreased by 50%, 96% and 12%, respectively, between 2016 and 2025.

  Annual NOx emissions reached the lowest in the ten-year record in 2025 at 1,565 tonnes. SO_2 emissions peaked in 2022 at 8,339 tonnes. Following installation of the wet scrubber at the Facility in 2023, SO_2 emissions decreased from 1,251 tonnes to 183 tonnes in 2024. The 2025 releases of 211 tonnes remain 96% and 98% below 2016 and 2022 levels, respectively. CO emissions peaked at 2,756 tonnes in 2018, then plateaued through to 2022. Emissions subsequently decreased to 1,895 tonnes in 2023 and reached a minimum of 713 tonnes in 2024. In 2025, releases increased to 989 tonnes which is 64% below the 2018 level.

- **Particulate Matter:** Emissions of Total Particulate Matter (TPM), PM_{10}, and $PM_{2.5}$ have generally decreased over the Study Period, with 2025 emissions below 2016 levels for all three particulate size fractions. Annual TPM emissions decreased by 32% between 2016 and 2025. Emissions fluctuated from 2016 through 2022 before peaking in 2023, then they subsequently declined to 238 tonnes in 2024 and 225.5 tonnes in 2025. Emissions of PM_{10}, and $PM_{2.5}$ followed similar patterns. Particulate emissions are managed through process controls and baghouses, as well as the Facility's Best Management Practices Plan (BMPP) for fugitive dust.

- **Metals:** Cadmium releases have decreased from 4.6 kg in 2016 to 0.924 kg in 2020, a reduction of 80%. Lead releases decreased from 194 kg in 2016 to 22 kg in 2020, a reduction of 89%. Cadmium and lead have not met the NPRI reporting threshold since 2020. Mercury releases decreased 81%, from 13.6 kg in 2016 to 2.6 kg in 2025. Releases declined through 2019, increased during 2020 and 2021, and then declined to a minimum of 0.921 kg in 2024. Selenium releases decreased by 95% from 49 kg in 2016 to 2.4 kg in 2025.

- **VOCs:** Total VOC emissions increased from 78 tonnes in 2016 to 84 tonnes in 2025. A recent increase of 19% from 71 tonnes in 2024 to 84 tonnes in 2025 can be attributed to an increase in production of approximately 20% in the 2025 calendar year. Benzene, toluene, xylene, and styrene have not met NPRI reporting thresholds since 2021. In contrast, methanol and phenol triggered the NPRI reporting threshold for the first time in 2025. It should be noted that kiln stack testing represents a specific point in time and results are expected to vary year-over-year. Annual releases are estimated in accordance with the applicable reporting methodologies and using facility-specific information. This includes the annual source testing results for the kiln stack at St. Marys Cement. For recent stack testing results, certain substances were reported at the laboratory Reporting

Detection Limit (RDL). For 2025, these RDLs were higher than historically measured concentrations (i.e., methanol and phenol), resulting in conservatively estimated annual releases relative to previous years. Although there were increases reported to the NPRI, the Facility is well below the applicable limits for VOCs in the ESDM Report.

- **PAHs:** Total unspeciated PAH emissions were first reported in 2023 and an increase was also observed for individual PAHs, including acenaphthene, acenaphthylene, fluorene, and phenanthrene. The Facility has noted that these increases reflect normal year-over-year variability in kiln stack testing results. During the 2025 stack testing, the kiln stack flow rate was 15% higher than in the previous year with minor differences observed in combustion conditions and fuel feed. As noted above, stack testing represents a specific point in time and results are expected to vary annually. Although there were increases reported to the NPRI, the Facility is well below the applicable limits for PAHs in the ESDM Report.
- **Other Key Contaminants:** Ammonia releases were relatively stable during 2016 through 2022, ranging from approximately 133 to 145 tonnes per year. They reached a minimum of 16 tonnes in 2024. However, in 2025 releases increased to 87 tonnes, still 37% below 2016 levels and attributed to the use of the Selective Non-Catalytic Reduction (SNCR) system on the kiln stack. Hexachlorobenzene releases have generally decreased each year, remaining 12.6% below 2018 levels. Hydrochloric acid releases were reported for 2018-2025. They were reported at 11 tonnes in 2025, a 61% decrease from 2018. Dioxin and furan releases fluctuated in earlier years, increasing from 0.030800 g TEQ in 2016 to a peak of 0.050100 g TEQ in 2020. They subsequently declined reaching a minimum of 0.0042 g TEQ in 2025, representing an 86% reduction from 2016.

3.1.1 ALCF Use Context

To provide more context on the Facility emission trends, it should be noted that the Facility has incrementally expanded its use of ALCFs over several years. The timeline is summarized below.

- **2014:** St. Marys Cement approved for an ALCF demonstration project under ECA Number 4614-826K9W issued November 5, 2014. The demonstration project considered biomass as an ALCF used at a rate of 100 tonnes per day.
- **2018:** St. Marys Cement conducted fuel demonstration trials to evaluate additional ALCF materials.
- **2021:** St. Marys Cement was approved to use up to 400 tonnes per day of expanded ALCF material baskets under Amended ECA Number 6279-BYRJEP dated March 31, 2021.

The Facility has been able to co-fire ALCFs and remain in compliance with applicable air limits, as documented in the supporting ESDM Reports.

Table 3-1 outlines the maximum approved, maximum actual, and average actual daily feed rate of ALCFs. The maximum actual ALCF use indicates the absolute maximum daily feed rate observed in the calendar year as per the Annual Compliance Reports per Condition 16 of the Facility's existing ECA No. 0550-CEAHMA. The average actual ALCF use indicates the average of the daily average ALCF usage.

The Facility has been able to co-fire ALCFs and remain in compliance with applicable air limits, as documented in the supporting ESDM Reports.

Table 3-1 ALCF Consumption Data

Time Period	Maximum Approved ALCF Consumption [tonnes/day]	Maximum Actual ALCF Consumption [tonnes/day]	Average Actual ALCF Consumption [tonnes/day]
2018[(a)]	96	N/A	N/A
2021	400	N/A	N/A
2022	400	318	100
2023	400	238[(b)]	24[(b)]
2024	400	293	90
2025	400	240	62

Source: Maximum and average ALCF use data taken from the Annual Compliance Report for the calendar year specified.

Notes:

(a) Demonstration project took place at the Facility from September 2018 through December 2018

(b) ALCF equipment repairs in late 2022 led to decreased ALCF use

3.1.2 Changes to Local Traffic Related to ALCFs

Traffic is typically assessed by evaluating the number of vehicles travelling during the morning and afternoon peak hours. A Traffic Impact Brief was prepared to supplement the proposed ALCF ECA Amendment Application and assess impacts on peak-hour traffic due to the proposed increase in ALCF use.

Currently, ALCF trucks arrive at the Facility via Highway 401 and Bowmanville Avenue. All trucks, including ALCF trucks, are permitted to deliver materials to the Facility 24 hours a day, seven days a week, although ALCF deliveries typically occur between 8:00 am and 6:00 pm. During the morning and afternoon peak hours, a maximum of three trucks deliver ALCFs to the Facility.

Upon approval of the increase in ALCF use, trucks would continue to access the Facility via Bowmanville Avenue and Highway 401. As the Facility increases its ALCF use to 800 tonnes per day, more ALCF truck deliveries would be needed throughout the day to meet the ALCF demand. It is anticipated that the delivery schedule may extend to 6:00 am to 8:00 pm to accommodate the increase in ALCF use, while the maximum peak-hour delivery rate would remain at three trucks per hour.

The Traffic Impact Brief shows that the proposed increase in ALCF use from 400 to 800 tonnes per day would not change the peak-hour delivery rate of three trucks per hour.

3.2 Local Industrial Facilities

In addition to the St. Marys Cement facility, the Study Area contains several other industrial facilities that may influence local air quality, including:

- Durham York Energy Centre (DYEC) operated by Covanta Durham York Renewable Energy Limited Partnership located at 1835 Energy Drive in Clarington, Ontario;
- Darlington Nuclear Generating Station operated by Ontario Power Generation Inc. located at 1 Holt Road South in Bowmanville, Ontario;
- Courtice Water Pollution Control Plant operated by the Regional Municipality of Durham located at 100 Osborne Road in Courtice, Ontario;
- Port Darlington Water Pollution Control Plant operated by the Regional Municipality of Durham located at 93 Port Darlington Road in Bowmanville, Ontario;
- Harmony Creek Water Pollution Control Plant operated by Regional Municipality of Durham located at 785 Colonel Sam Drive in Oshawa, Ontario; and
- Asphalt mixing plant operated by McAsphalt Industries Limited located at 1221 Farewell Avenue in Oshawa, Ontario.

All of these facilities have reported emissions to NPRI on an annual basis for various contaminants including contaminants in common with those released from St. Marys Cement. A summary of the contaminants released from St. Marys Cement and the industrial facilities can be found in Table 3-2 and specific reportable amounts have been included in Appendix A – NPRI Data.

Table 3-2 NPRI-Reportable Contaminants by Facility for the Study Period

Contaminant Group	Contaminant	St. Marys Cement	Durham York Energy Centre	Darlington Nuclear Generating Station	Courtice WPCP	Port Darlington WPCP	Harmony Creek WPCP	McAsphalt Plant
By-Products of Combustion	Nitrogen Oxides	✓	✓	✓	—	—	—	—
	Sulphur Dioxide	✓	—	—	—	—	—	—
	Carbon Monoxide	✓	—	—	✓	—	—	—
Particulate Matter	TPM	✓	—	—	—	—	—	—
	PM_{10}	✓	✓	—	✓	—	—	—
	$PM_{2.5}$	✓	✓	✓	✓	—	—	—
Metals	Cadmium	✓	✓	—	✓	✓	—	—
	Cobalt	—	✓	—	✓	—	—	—
	Copper	—	✓	—	—	—	—	—
	Lead	✓	✓	—	✓	—	—	—
	Manganese	—	✓	—	—	—	—	—
	Mercury	✓	✓	—	—	—	—	—
	Selenium	✓	—	—	—	—	—	—
	Zinc	—	✓	—	—	—	—	—
VOCs	Total VOCs	✓	—	—	—	—	—	✓
	Benzene	✓	—	—	—	—	—	—
	Methanol	✓	—	—	—	—	—	—

Contaminant Group	Contaminant	St. Marys Cement	Durham York Energy Centre	Darlington Nuclear Generating Station	Courtice WPCP	Port Darlington WPCP	Harmony Creek WPCP	McAsphalt Plant
	Phenol	✓	—	—	—	—	—	—
	Styrene	✓	—	—	—	—	—	—
	Toluene	✓	—	—	—	—	—	—
	Xylene	✓	—	—	—	—	—	—
PAHs	Total PAHs	✓	—	—	—	—	—	—
	Acenaphthene	✓	—	—	—	—	—	—
	Acenaphthylene	✓	—	—	—	—	—	—
	Fluorene	✓	—	—	—	—	—	—
	Phenanthrene	✓	—	—	—	—	—	—
Other Key Contaminants	Dioxins and Furans	✓	✓	—	—	—	—	—
	Trifluoroacetic Acid	—	—	—	✓	✓	✓	—
	Ammonia	✓	✓	✓	✓	✓	✓	—
	Arsenic	—	✓	—	—	—	—	—
	Hexachlorobenzene	✓	✓	—	—	—	—	—
	Hydrazine	—	—	✓	—	—	—	—
	Hydrochloric Acid	✓	—	—	—	—	—	✓
	Sulphuric Acid	—	—	✓	—	—	—	—

For the purposes of this Study, the contaminants that have been assessed are limited to those that are emitted and reported in common with St. Marys Cement and that fall within the Study Area.

Durham York Energy Centre

Durham York Energy Centre (DYEC) is a facility that creates energy from waste by managing the post diversion of municipal solid waste from Durham Region and York Region. DYEC has been operational since February 2016. Based on the available NPRI data, the waste-to-energy facility NOx emissions were 21% lower in 2025 than in 2016 and decreased by 4.2% from 2024. The clearest pattern is a shift to lower annual releases after 2020. Emissions of particulate and metals have remained relatively stable on an annual trending basis. Cadmium emissions from DYEC reached a high in 2025, increasing by 278% from 2016 levels; However, based on ambient air monitoring data at DYEC, cadmium remains below the AAQC. Ammonia emissions from DYEC increased by 16.9% in 2025 but remained 95% below 2016 levels. Dioxins and furan releases reached a minimum in 2025 at 0.001762 g TEQ, decreasing 99% from 2016 levels.

It should be noted that DYEC applied for an ECA to increase the throughput at their current plant in September 2025. At the time of this Study, the ECA application is still with the Ministry undergoing review (Durham York Energy Centre, 2025).

Darlington Nuclear Generating Station

The Darlington Nuclear Generating Station (DNGS) is a nearby nuclear plant included in this Study's review based on contaminants reported in common with St. Marys Cement. Annual NOx and ammonia releases from DNGS both decreased sharply in 2025, by 73% and 70% from 2024 levels, respectively. $PM_{2.5}$ was only reportable for one year during the Study Period, with 0.36 tonnes reported in 2020.

Other Local Industrial Facilities

Other local industrial facilities considered in the review include the three Water Pollution Control Plants (WPCP): Courtice, Port Darlington, and Harmony Creek for ammonia emissions, and the McAsphalt Industries Limited asphalt mixing plant for total VOC emissions.

Reported ammonia emissions from the WPCPs have remained relatively stable over the Study Period, with some year-to-year variability. VOC emissions from the asphalt plant only became reportable in 2023 and have since remained relatively stable, ranging from 26 to 30 tonnes per year between 2023 and 2025, of a similar magnitude with St. Marys Cement.

3.3 Summary of Findings

The review of industrial emissions in the Study Area considered publicly available NPRI data for St. Marys Cement and other local industrial facilities over the Study Period. The review focused on contaminants reported by St. Marys Cement, including contaminants with the potential to be affected by the proposed increase in ALCF use (base case to future scenario). The key findings are summarized below:

- **St. Marys Cement:** Reported emissions of by-products of combustion, particulate matter, and several metals decreased over the Study Period, reported as being lower in 2025 than in 2016. NOx emissions declined by 50%, while SO_2 emissions declined by 96%. CO emissions were more variable but remained 12% below 2016 levels. Particulate emissions also decreased overall, with TPM, PM_{10} and $PM_{2.5}$ declining by 32%, 47% and 52%, respectively, between 2016 and 2025. Mercury and selenium emissions decreased by 81% and 95%, respectively. Cadmium and lead decreased by approximately 80% and 89% between 2016 and 2020; and have not met the NPRI reporting threshold since 2020. Dioxins and furans decreased by 86% between 2016 and 2025. Ammonia decreased by 37% overall across the Study Period. Hydrochloric acid declined by 61% between 2018 and 2025, continually decreasing after 2022. Hexachlorobenzene was 13% lower in 2025 than its first reportable value in 2018. Total VOC emissions fluctuated within a range of approximately 69-84 tonnes per year, ending at their Study Period maximum in 2025, 7.6% above 2016 as a result of increased production. PAH releases, including total PAHs, acenaphthylene, fluorene, and phenanthrene were more variable and showed marked increases in 2025. This increase can be attributed to the 2025 kiln stack testing results, during which the kiln stack flow rate was 15% higher than in the previous year while minor differences were observed in combustion conditions and fuel feed. The stack testing represents a specific point in time and results are expected to vary year-over-year.

  Although there were increases for some contaminants reported to the NPRI, the Facility is well below the applicable limits for these contaminants in the ESDM Report.

  The proposed increase of ALCF use from 400 to 800 tonnes per day would not change the peak-hour delivery rate of three trucks per hour.

- **Other Local Industrial Facilities:** Six facilities within the Study Area report NPRI contaminants in common with St. Marys Cement; particularly DYEC, DNGS, three WPCPs, and one asphalt mixing plant. Several of these contaminants are reported in common with St. Marys Cement, including NOx, particulate matter, select metals, ammonia, dioxins and furans, hexachlorobenzene, and VOCs. CO is reported in common only by the Courtice WPCP. SO_2 and TPM are reported only by St. Marys Cement.

  DYEC reported NOx emissions decreased overall by 21% from 2016 to 2025. Particulate emissions remained relatively steady. Metal emissions showed mixed trends: mercury decreased substantially by 87%, while several other metals increased. Most notably, cadmium rose from 0.0409 kg in 2022 to 0.2464 kg in 2023 and continued increasing to a maximum of 0.3405 kg in 2025. Ammonia emissions decreased by 95% between 2016 and 2025. Dioxins and furan emissions decreased by 99% over the Study Period.

  DNGS reported NOx emissions varied without a consistent trend, ammonia emissions generally decreased, and $PM_{2.5}$ was generally below the NPRI reporting threshold during the Study Period.

The WPCPs reported ammonia emissions which remained relatively stable, with year-to-year variability. VOC emissions from the asphalt plant became reportable in 2023 and remained relatively stable from 2023 through 2025, with magnitude comparable to St. Marys Cement.

Overall, industrial emissions within the Study Area originate from multiple facilities, with several contaminants reported in common with St. Marys Cement. However, historical NPRI trends do not indicate a general increase across the principal industrial sources reviewed. These findings provide context when considering the regional and transboundary influences and the ambient air quality monitoring data presented in subsequent sections.

4. Ambient Air Quality

Ambient air quality monitoring provides measured concentrations of various contaminants that reflect the combined influence of local, regional and transboundary sources. Publicly available data from the National Air Pollution Surveillance (NAPS) program and the DYEC monitoring program, were reviewed to characterize existing ambient air quality conditions within and surrounding the Study Area.

4.1 National Air Pollution Surveillance Program

The NAPS Program is a network of air quality monitoring stations that collect ambient air quality data from across Canada. NAPS Program data represent measured concentrations of air pollutants in the surrounding environment and are often used to characterize ambient air quality and identify trends over time.

There are three NAPS stations within proximity to the Facility. A summary of the NAPS stations and the monitoring details is provided in Table 4-1.

Table 4-1 Summary of NAPS Stations

Station ID	Station Name	Distance to Facility	Data Period Start	Data Period End	NO_2	NO	NOx	$PM_{2.5}$	O_3
61701	Ritson Road & Olive Avenue	12 km west	1979	2008	✓	—	—	✓	✓
61702	Durham College	17 km northwest	2005	2017	✓	✓	✓	✓	✓
61703	Oshawa	19 km northwest	2018	Ongoing	✓	✓	✓	✓	✓

Of the three NAPS stations identified, the Oshawa station (Station 61703) was selected to characterize regional background air quality since it provides the most recent monitoring record overlapping the Study Period. Continuous monitoring data from the Oshawa station for the parameters in Table 4.1 were presented as hourly averages for the given data period. The principal contaminants of interest from a regional perspective measured by NAPS Program at the Oshawa station include NOx, $PM_{2.5}$, and ozone (O_3). Although ground-level ozone is not emitted directly by industrial processes, it is formed through atmospheric reactions involving NOx and VOCs. The available monitoring results are compared with the applicable Ontario AAQC in Section 4.3.

4.2 Durham York Energy Centre Monitoring Program

Durham York Energy Centre (DYEC) is operated by Covanta Durham York Renewable Energy Limited Partnership and located at 1835 Energy Drive in Clarington, Ontario. DYEC currently operates under amended Environmental Compliance Approval (ECA) Number 7306-8FDKNX dated February 24, 2016. Under Condition 7 of their ECA, DYEC is required to conduct ambient air monitoring which includes both discrete and continuous monitoring at two monitoring stations for various parameters. An annual summary of the monitoring results included in the ambient air reports published on their website, available to the public. A summary of the monitoring stations and the contaminant groups they monitor shown in Table 4-2 (Rowan Williams Davies & Irwin Inc. (RWDI), 2026).

Table 4-2 Summary of DYEC Monitoring Stations

Station Name	Distance to Facility	NOx	$PM_{2.5}$	SO_2	TSP[1]	Metals[1]	PAHs[1]	D&F[1]
Courtice Station	4.5 km	✓	✓	✓	✓	✓	✓	✓
Rundle Road Station	2.7 km	✓	✓	✓	✓	✓	✓	✓

Notes: [1]indicates discrete monitoring

The DYEC ambient air monitoring program was conducted at the Courtice and Rundle Road stations using a combination of continuous instrumentation and scheduled discrete sampling. Continuous monitoring was conducted for fine particulate matter ($PM_{2.5}$), nitrogen oxides (NOx, including NO and NO_2; see Section 2.5 for more information), and sulphur dioxide (SO_2). Meteorological data, namely wind speed and direction, was measured and provided by the Courtice Water Pollution Control Plant (WPCP).

$PM_{2.5}$, NOx, and SO_2 were measured continuously in real-time using stationary monitors. The measurements were validated then processed into applicable 10-minute, 1-hour, 24-hour, and annual averaging periods to compare to the AAQC (Rowan Williams Davies & Irwin Inc. (RWDI), 2026).

Discrete monitoring was undertaken for O_3, metals, PAHs, and dioxins and furans in accordance with the NAPS sampling schedule. Each sample was collected over a continuous 24-hour period from midnight to midnight of the following day. Total Suspended Particulate (TSP) and associated metals were collected using high-volume air samplers operated on a 6-day cycle. PAHs and dioxins and furans were collected using polyurethane foam (PUF) samplers on a 12-day cycle, with PAHs analyzed every 12 days and dioxins and furans analyzed every 24 days. Each discrete monitoring result represents a 24-hour average concentration and was compared with the corresponding 24-hour AAQC (Rowan Williams Davies & Irwin Inc. (RWDI), 2026). The discrete monitoring results were compared only to the 24-hour AAQC, as the samples were collected over a 24-hour period and are therefore not directly comparable to the annual AAQC.

The *2025 Annual Ambient Air Quality Monitoring Report* presents annual results, exceedances, and assesses long term trends (Rowan Williams Davies & Irwin Inc. (RWDI), 2026). The available monitoring results are compared with the monitoring data from the Oshawa NAPS station and the applicable Ontario AAQC in Section 4.3. A summary of the data presented in the report is included in Appendix B – Ambient Air Monitoring Data.

4.3 Air Quality in Study Area

The available monitoring results from the Oshawa NAPS station and DYEC monitoring stations are compared with the applicable Ontario AAQC in the Table 4-3 for the applicable averaging periods. In Table 4-3, "below criteria" refers to the following:

- Below Criteria: 100% of valid monitored concentrations were below the applicable Ontario AAQC for the corresponding averaging period
- Percentage: Percentage of events of valid monitored concentrations for a contaminant that were below the applicable Ontario AAQC for the corresponding averaging period.

Unless otherwise indicated, contaminant concentrations from the Oshawa NAPS station are the maximum of the values reported from 2022 through 2024 (data from 2025 was not yet publicly available). In addition to NAPS data, DYEC monitoring data are presented as the maximum of the values reported from 2022 through 2025. Where necessary, statistical analyses were performed on the data as described by AAQC:

- Per the *2025 Annual Ambient Air Quality Monitoring Report*, the 1-hour NOx value is the maximum 1-hour running mean from the aforementioned years for each monitoring program (i.e., from 2022 through 2024 for NAPS and from 2022 through 2025 for DYEC). The 24-hour NOx value is the maximum 24-hour running mean from the aforementioned years for each monitoring program. See Section 2.5 for more information on NOx, including NO and NO_2.
- Per the *2025 Annual Ambient Air Quality Monitoring Report*, the 10-minute SO_2 concentrations from DYEC monitoring stations were estimated from the corresponding 1-hour average monitoring results using the Ministry conversion factor (MECP, 2017).
- The 24-hour $PM_{2.5}$ values presented for all stations reflect the most recent three-year average of the annual 98th percentile of daily 24-hour average concentrations, while the annual $PM_{2.5}$ reflects the most recent three-year average of the annual average concentrations (MECP, 2023).
- PM_{10} monitoring is not conducted at the DYEC monitoring stations or the Oshawa NAPS station; However, PM_{10} concentrations were estimated from measured $PM_{2.5}$ concentrations using an established $PM_{2.5}$ to-PM_{10} relationship, whereby $PM_{2.5}$ concentrations were scaled based on the reported ratio between the two particulate matter size fractions for each individual station (Lall, et al., 2004). As the $PM_{2.5}$ concentrations represent the three-year average of the annual 98th percentile of the daily 24-hr average concentrations, PM_{10} concentrations estimated from these values are considered to represent the same averaging basis.

- Suspended Particulate Matter (SPM)[1] is expressed as a geometric mean. SPM is not monitored at the Oshawa NAPS station. However, SPM was estimated from measured $PM_{2.5}$ concentrations using an established $PM_{2.5}$ to-SPM relationship, whereby $PM_{2.5}$ concentrations were scaled based on the reported ratio between the two particulate matter size fractions for each individual station (Lall, et al., 2004). As the $PM_{2.5}$ concentrations represent the three-year average of the annual 98th percentile of the daily 24-hr average concentrations, the SPM concentration estimated are considered to represent the same averaging basis.
- It should be noted that CO is considered in the Study as a by-product of combustion, but regional CO emissions are not considered a concern and not monitored at any of the stations identified in Sections 4.1 and 4.2.

[1] For the purposes of this Study, SPM, total particulate matter (TPM) and total suspended particulate (TSP) are used interchangeably.

Table 4-3 Summary of Ambient Monitoring Data

Contaminant Group	Contaminant	Averaging Period	AAQC	Units	NAPS Oshawa Station	DYEC Courtice	DYEC Rundle Road	Below Criteria? / Percentage
By-Products of Combustion	Nitrogen Dioxide (NO_2)	1-hour	0.10	ppm	0.033	0.045	0.044	Yes
		24-hour	0.20	ppm	0.019	0.026	0.019	Yes
	Sulphur Dioxide (SO_2)	10-min	67	ppb	—	590	363	99.3%
		1-hour	40	ppb	—	188	143	98.3%
		Annual	4	ppb	—	3.9	0.5	Yes
Particulate Matter	Suspended Particulate Matter (SPM)[a]	24-hour	120	µg/m^3	107.6[c]	141.8[b]	148.3[b]	99.3%
	Particulate Matter less than 10 micrometres in diameter (PM_{10})	24-hour	50	µg/m^3	32.3[c]	44.4[f]	35.9[f]	Yes
	Particulate Matter less than 2.5 micrometres in diameter ($PM_{2.5}$)	24-hour[d]	27	µg/m^3	17.4	24.0	19.4	Yes
		Annual[e]	8.8	µg/m^3	6.3	6.5	6.1	Yes
Ozone	Ozone (O_3)	1-hour	0.080	ppm	0.027	—	—	Yes
Metals	Mercury	24-hour	2	µg/m^3	—	0.000042	0.000042	Yes
	Antimony	24-hour	25	µg/m^3	—	0.0062	0.0047	Yes
	Arsenic	24-hour	0.3	µg/m^3	—	0.0063	0.0054	Yes
	Barium, total water soluble	24-hour	10	µg/m^3	—	0.031	0.031	Yes
	Beryllium	24-hour	0.01	µg/m^3	—	0.00005	0.00008	Yes
	Boron	24-hour	120	µg/m^3	—	0.013	0.016	Yes
	Cadmium	24-hour	0.025	µg/m^3	—	0.0011	0.0012	Yes
	Chromium	24-hour	0.5	µg/m^3	—	0.006	0.013	Yes
	Cobalt	24-hour	0.1	µg/m^3	—	0.00084	0.00090	Yes

Contaminant Group	Contaminant	Averaging Period	AAQC	Units	NAPS Oshawa Station	DYEC Courtice	DYEC Rundle Road	Below Criteria? / Percentage
	Copper	24-hour	50	µg/m^3	—	0.21	0.37	Yes
	Iron	24-hour	4	µg/m^3	—	3.4	2.4	Yes
	Lead	24-hour	0.5	µg/m^3	—	0.009	0.029	Yes
	Manganese	24-hour	0.4	µg/m^3	—	0.061	0.073	Yes
	Molybdenum	24-hour	120	µg/m^3	—	0.013	0.011	Yes
	Nickel	24-hour	0.2	µg/m^3	—	0.0061	0.0046	Yes
	Selenium	24-hour	10	µg/m^3	—	0.0028	0.0054	Yes
	Silver	24-hour	1	µg/m^3	—	0.00067	0.00057	Yes
	Strontium	24-hour	120	µg/m^3	—	0.036	0.052	Yes
	Tin	24-hour	10	µg/m^3	—	0.0091	0.0052	Yes
	Titanium	24-hour	120	µg/m^3	—	0.049	0.083	Yes
	Uranium	24-hour	0.3	µg/m^3	—	0.00013	0.00015	Yes
	Vanadium	24-hour	2	µg/m^3	—	0.0035	0.0046	Yes
	Zinc	24-hour	120	µg/m^3	—	0.37	0.62	Yes
PAHs	Benzo(a)pyrene	24-hour	0.00005	µg/m^3	—	0.0006	0.0012	86.2%
	Biphenyl	1-hour	60	µg/m^3	—	0.072	0.013	Yes
	Naphthalene	24-hour	22.5	µg/m^3	—	0.29	0.17	Yes
Other Key Contaminants	Dioxins, furans and dioxin-like PCBs	24-hour	0.1	pg TEQ/m^3	—	0.024	0.067	Yes

Notes:

(a) SPM in Ontario is defined as Suspended Particulate Matter (<44 µm diameter) (MECP, 2023)
(b) Geometric mean (MECP, 2023)
(c) PM_{10} concentrations were estimated from measured $PM_{2.5}$ concentrations using an established $PM_{2.5}$ to-PM_{10} relationship (Lall, et al., 2004)
(d) Reflects a three year average of the annual 98th percentile of the daily 24-hr average concentrations (MECP, 2023)
(e) Reflects a three year average of the annual average concentrations (MECP, 2023)
(f) PM10 is not monitored as part of the DYEC monitoring program and were estimated from the 3-year average of the annual 98th percentile of the daily 24-hour mean concentrations using an established $PM_{2.5}$ to-PM_{10} relationship (Lall, et al., 2004)

4.4 Meteorological Parameters

A wind rose assessment was included in the ESDM Report prepared in support of the ALCF ECA Amendment Application. Annual wind data for a 5-year period was used to create the wind rose depicting wind direction, speed, and frequencies. Based on the wind rose assessment, the prevailing winds are from westerly directions. They are predominantly blowing from the northwest towards Lake Ontario, south southwest, and east towards St. Marys Cement, Darlington Nuclear Generating Station and Durham York Energy Centre (Ramboll, 2026).

4.5 Trends in Local Air Quality

The discrete monitoring results were assessed against the 24-hour AAQC only, as the 24-hour sampling period does not provide an appropriate basis for comparison with the annual AAQC. The following trends were identified for the individual contaminants:

- **By-Products of Combustion:** Continuous monitoring of nitrogen dioxide was conducted at the Oshawa NAPS station. Continuous monitoring of nitrogen oxides (NOx, including NO and NO_2) was conducted at DYEC monitoring stations. Ambient concentrations of nitrogen dioxide at all three stations were below AAQCs.

  Continuous monitoring of sulphur dioxide was conducted at both DYEC monitoring stations only. From 2022 through 2025, sulphur dioxide concentrations were below the 10-minute and 1-hour AAQC 99.3% and 98.3% of the time across the Courtice and Rundle Road monitoring stations.

- **Particulate Matter:** Discrete monitoring of TSP was conducted at both DYEC monitoring stations. Between 2022 and 2025, approximately 445 valid TSP samples were collected and analyzed across the Courtice and Rundle Road monitoring stations. TSP concentrations were below the applicable 24-hour AAQC in 99.3% of the samples. It should be noted that St. Marys is below the limit for O. Reg. 419/05 limit for suspended particulate matter (SPM); this can be seen in the ESDM Report and Appendix D – Screening Assessment.

  Continuous monitoring of $PM_{2.5}$ was conducted at the Oshawa NAPS station and both DYEC monitoring stations. Measured $PM_{2.5}$ concentrations were below the applicable Ontario AAQC at all three stations PM_{10} concentrations were estimated from measured $PM_{2.5}$ concentrations using an established $PM_{2.5}$ to PM_{10} relationship, in which $PM_{2.5}$ concentrations were scaled based on the ratio between the particulate matter size fractions (Lall, et al., 2004). When compared to the AAQC, the estimated PM_{10} concentrations were below the applicable AAQC.

- **Metals:** Discrete monitoring of various metals at both DYEC monitoring stations are below the relevant AAQCs. Note that the NAPS monitoring station did not monitor metals.

- **PAHs:** Discrete monitoring of PAHs was completed at both DYEC monitoring stations. Between 2022 and 2025, approximately 217 valid samples were collected and analyzed across the Courtice and Rundle Road monitoring stations, with 86.2% of measured benzo(a)pyrene concentrations remained below the 24-hour AAQC. Benzo(a)pyrene was not measured at a high enough frequency to be compared to the annual AAQC. Ambient concentrations of all other PAH compounds were within the applicable AAQC from 2018 through 2025.The ESDM Report prepared in support of the ALCF ECA Amendment Application indicated that Facility has insignificant contribution to benzo(a)pyrene emissions, with maximum POI concentrations at <0.1% of the Ministry limits.
- **Other Key Contaminants:** Discrete monitoring of other key contaminants was limited to dioxins and furans. Concentrations of dioxins and furans at the DYEC monitoring stations are below the AAQC. The NAPS monitoring station did not monitor these ‘other key contaminants’ that are identified in the ESDM Report and highlighted in Appendix D – Screening Assessment.

5. Other Local, Regional and Transboundary Influences

In addition to emissions from industrial facilities discussed in Section 3, air quality within the Study Area is influenced by a range of non-industrial sources and by pollutants transported into the area (i.e., elsewhere in southern Ontario, United States). These influences include transportation, residential and commercial activities, agricultural sources, regional background air quality, transboundary pollutant transport and episodic events such as wildfire smoke.

The relative contribution of these sources varies by pollutant, location and time. Accordingly, this section provides broader context for interpreting the ambient air quality monitoring results presented in Section 4 and for understanding the overall air quality environment within which the proposed increase in ALCF use would occur.

5.1 Transportation and Community Growth

Transportation is an important non-industrial source of air emissions within the Study Area, particularly given the presence of Highway 401 and the surrounding municipal road network. Transportation-related emissions include NOx, $PM_{2.5}$, and VOCs, as well as particulate emissions associated with road dust and vehicle movement.

Transportation remains the largest source of nitrogen oxides (see Section 2.5 for more information on NOx, including NO and NO_2) emissions in Ontario. In 2023, road vehicles accounted for approximately 23% of provincial NOx emissions and other transportation sources, including air, marine, rail and non-road vehicles and engines, accounted for approximately 31%. Combined, the transportation sector accounted for approximately 54% of total provincial NOx emissions in 2023 (MECP, 2025). Transportation also contributed to provincial VOC and $PM_{2.5}$ emissions, although other source sectors make substantial contributions to these pollutants as well. Because transportation makes up a substantial proportion of provincial NOx emissions, NOx is a particularly useful indicator for evaluating longer-term transportation emission trends. Transportation-related NOx emissions have decreased substantially over the longer term. In 2014, road vehicles and other transportation sources emitted approximately 95.1 kilotonnes and 67.5 kilotonnes of NOx, respectively, representing a combined transportation contribution of approximately 162.6 kilotonnes. By 2023, these emissions had decreased to approximately 41.0 kilotonnes from road vehicles and 55.1 kilotonnes from other transportation sources, or approximately 96.1 kilotonnes combined. Over this period, transportation-related NOx emissions decreased by approximately 41%, compared with an approximately 32% decrease in total Ontario NOx emissions.

The decline in transportation-related NOx emissions is particularly evident for road vehicles, for which emissions decreased by approximately 57% between 2014 and 2023 (MECP, 2025). The longer-term

reduction in road-vehicle emissions provides important context when considering changes in traffic activity since vehicle volumes alone do not directly represent the quantity of emissions generated by those vehicles.

At the local level, transportation activity has increased over the same general period. Available Annual Average Daily Traffic (AADT) data for Highway 401 were reviewed at the Holt Road and Waverley Road interchanges, as these are the nearest to the Facility. The available Ministry of Transportation (MTO) traffic data indicates that traffic volumes have generally increased over the period reviewed. This data is summarized in Appendix C – Traffic and Population Data. Population growth within the surrounding community provides additional context for the increase in transportation activity. While both population and Highway 401 traffic volumes have increased, provincial road-vehicle NOx emissions decreased substantially between 2014 and 2023, indicating that increased transportation activity does not necessarily correspond to increased vehicle emissions.

5.2 Other Sources in the Study Area

Residential, commercial and agricultural activities represent additional non-industrial influences on air quality within the Study Area. Unlike the larger industrial sources assessed in Section 3, emissions from these activities are generally distributed across the community rather than associated with individual NPRI-reporting facilities. Relevant emissions include NOx and particulate matter associated with residential and commercial fuel combustion, VOC emissions associated with solvent and other product use, and particulate matter and combustion emissions associated with agricultural activities.

In 2023, residential fuel combustion accounted for approximately 28% of anthropogenic $PM_{2.5}$ emissions in Ontario (MECP, 2025), with wood combustion in fireplaces and wood stoves identified as the major contributor within the residential sector. Other sources of primary $PM_{2.5}$ include transportation and industrial activities, while $PM_{2.5}$ may also form secondarily in the atmosphere from gaseous precursor emissions.

Agricultural activities also represent a distributed source of emissions within the broader Study Area. These activities can contribute particulate matter through soil disturbance, vehicle movement and other agricultural operations, together with NOx and other combustion-related emissions from agricultural equipment.

Construction activities can result in similar emissions, including particulate matter associated with soil disturbance, material handling and vehicle movement, and combustion-related emissions from construction equipment. Construction within and surrounding the Study Area includes residential and infrastructure development, as well as major projects such as the Darlington New Nuclear Project.

Similarly, VOC emissions originate from multiple sources in Ontario. In 2023, general solvent use accounted for approximately 28% of provincial VOC emissions, industrial sources accounted for approximately 20%, and transportation accounted for approximately 22% (MECP, 2025). General solvent use includes activities such as degreasing, adhesives and sealants, and consumer and

commercial products. Provincial VOC emissions decreased from approximately 324.3 kilotonnes in 2014 to 249.0 kilotonnes in 2023, a reduction of approximately 23% (MECP, 2025).

These source contributions indicate that $PM_{2.5}$ and VOC concentrations within the Study Area may reflect emissions from a range of distributed non-industrial sources in addition to the industrial sources identified in Section 3.

5.3 Regional and Transboundary Air Pollution

Air quality within the Study Area is influenced not only by local emission sources, but also by pollutants transported across southern Ontario and from outside the province. The significance of long-range transport varies by pollutant and with meteorological conditions and can contribute to variability in measured ambient concentrations over time. The Ministry identifies long-range transport from the United States and elsewhere as an influence on Ontario air quality (MECP, 2025) .

The principal compounds of interest from a regional and transboundary perspective are ozone (O_3) and $PM_{2.5}$ together with precursor pollutants including NO_2, SO_2 and VOCs. Ground-level ozone is not emitted directly, but forms through atmospheric reactions involving NOx and VOCs. $PM_{2.5}$ can similarly include both directly emitted particulate matter and secondary particulate formed in the atmosphere from gaseous precursors. These atmospheric processes allow emissions originating outside the Study Area to contribute to concentrations measured within the broader airshed.

Modelling presented by the Ministry indicates that transboundary sources can contribute substantially to $PM_{2.5}$ concentrations across Ontario. US-specific contributions to annual $PM_{2.5}$ concentrations were estimated to range from approximately 5% to 80% across the province, depending on location. In the Greater Toronto Area, the combined contribution from U.S. sources and global background was estimated to be up to approximately 50% of annual $PM_{2.5}$ concentrations. The contribution generally increases outside urban areas where fewer local sources of directly emitted $PM_{2.5}$ are present (MECP, 2025) .

The results demonstrate that regional and transboundary sources form an important component of background air quality in southern Ontario, particularly for $PM_{2.5}$ and ozone. Consequently, concentrations measured within and surrounding the Study Area reflect both locally generated emissions and pollutants transported into the broader airshed and should not be attributed solely to sources located within the Study Area.

5.4 Natural and Episodic Influences on Local Air Quality

Natural and episodic events can result in short-term changes in ambient air quality that are independent of routine local, regional and transboundary emission sources. These events are relevant to the interpretation of the monitoring results presented in Section 4 since they can affect concentrations

across broad geographic areas and contribute to short-term and year-to-year variability in measured air quality.

Wildfire smoke is particularly relevant to the interpretation of $PM_{2.5}$ concentrations. Wildfires can generate substantial quantities of fine particulate matter and other combustion-related pollutants, and smoke may be transported over long distances. As a result, wildfire events occurring well outside the Study Area can influence ambient $PM_{2.5}$ concentrations measured within southern Ontario. In 2023, Ontario issued 13 Special Air Quality Statements covering 55 days. Seven of these statements were associated with forecast elevated $PM_{2.5}$ concentrations from wildfire smoke and accounted for 49 of the 55 days covered by air quality statements that year (MECP, 2025).

Meteorological conditions can also influence measured air quality without a corresponding change in local emissions. Weather and atmospheric conditions can affect the transport, dispersion, formation and accumulation of air pollutants and can therefore contribute to variability in measured ambient concentrations. The Ministry identifies weather as one of the factors contributing to year-to-year variability in air quality across Ontario (MECP, 2025). These influences are particularly relevant when interpreting $PM_{2.5}$ and ozone monitoring results because individual elevated concentrations or year-to-year variability may reflect broader regional or episodic conditions in addition to emissions originating within the Study Area. Accordingly, individual monitoring results should be considered in the context of the longer-term monitoring record and regional conditions. This is consistent with the Ministry's conclusion that longer-term trends provide a better indication of changes in Ontario air quality than year-to-year variations (MECP, 2025).

5.5 Summary of Findings

The information reviewed in this section shows that air quality within the Study Area is influenced by a range of non-industrial, regional and episodic sources in addition to the industrial sources assessed in Section 3. Transportation represents an important source of NOx, particulate matter and VOCs; however, provincial transportation-related NOx emissions have decreased despite growth in local traffic and population. Residential, commercial and agricultural activities provide additional distributed sources of particulate matter, NOx and VOCs.

Regional and transboundary transport also contributes to existing air quality conditions, particularly for $PM_{2.5}$ and ozone, while episodic events such as wildfire smoke and changing meteorological conditions can contribute to short-term and year-to-year variability. Consequently, individual ambient monitoring results may reflect a combination of local, regional and episodic influences rather than changes in any single emission source.

Together with the industrial emissions assessment presented in Section 3 and the ambient monitoring results presented in Section 4, these findings characterize the broader air quality environment within which the proposed increase in ALCF use would occur. This information provides context for the contaminant-specific screening evaluation presented in Section 6.

6. Cumulative Air Quality Screening Assessment

This Air Quality Study assessed whether there are any potential incremental effects of increasing ALCF use at the Facility from 400 tonnes per day to 800 tonnes per day using the cumulative air quality screening approach described in Section 2.6. The following sections document the contaminant screening results and assess whether any contaminants require further cumulative assessment.

6.1 Screening Evaluation

6.1.1 Step 1: Potential for Emissions to Increase with ALCF Use

The first screening step assesses whether increasing ALCF use from 400 tonnes per day to 800 tonnes per day could increase kiln-stack emissions for each contaminant group considered in the Study. The assessment considers the source and formation of the contaminants, the potential influence of ALCF composition and feed rate, and the emission-control and monitoring measures applicable to the kiln.

The following factors were considered in assessing the potential for emissions to increase:

- **Main Source of Emissions from Kiln:** considers the nature and source of emissions associated with each contaminant group and whether emissions could be affected by increased ALCF use.
- **Control Technology:** considers the pollution control equipment and process controls used to manage emissions. The Facility has selective non-catalytic reduction (SNCR) to control nitrogen oxide emissions, a wet scrubber to control sulphur dioxide and acid gas emissions, and baghouse dust collector to control particulate emissions. This also includes process optimization and temperature control to prevent conditions that result in incomplete combustion by-products.
- **Source Monitoring:** considers the availability of source-specific monitoring information, including continuous process monitoring systems (CPMS), continuous emissions monitoring systems (CEMS), and annual kiln-stack source testing.

Based on these considerations, metals were identified as having the potential to be affected by changes in ALCF composition. Historical source testing has also shown variability in emissions of VOCs, PAHs and certain chlorine-containing compounds, including higher measured emission rates during some periods of ALCF use. Accordingly, VOCs, PAHs and select chlorine-containing compounds were retained for further assessment where higher emission rates were identified in the ESDM Report.

These contaminant groups were therefore carried forward to Step 2 for contaminant-specific evaluation. Other contaminant groups were screened from further assessment at Step 1, and the rationale is included in Table 6-1.

Table 6-1 Step 1: ALCF Contaminant Screening

Contaminant Group	Main Source of Emission from Kiln	Control Technology	Source Monitoring	Likelihood of change in emissions with increase to 800 tonnes per day of ALCF	Rationale
NOx	Thermal NOx from temperature and shape of burner flames	SNCR	CEMS Annual Stack Source Testing	Unlikely	ALCFs are not anticipated to increase NOx emissions; additionally, the Facility has the ability to tune the SNCR to reduce NOx emissions.
SO_2	Formation from sulphur contained in raw Materials and fuel combustion	Wet Scrubber	CEMS Annual Stack Source Testing	Unlikely	The main source is raw material (limestone) and is controlled with the wet scrubber. It is also expected that sulphur will be in lower amounts with ALCFs compared to coal and petroleum coke.
CO	Incomplete combustion	Combustion Optimization	CPMS Annual Source Testing	Unlikely	Continuous process monitoring is used to optimize and maintain good kiln combustion.
SPM	Raw Meal Feed into preheater	Wet Scrubber Baghouse	Annual Source Testing	Unlikely	ALCFs will not be a significant contributor to increased dust. This is supported by the fact that most of the dust emitted from the Kiln is a result of the raw meal feed (crushed limestone).
PM_{10}	Raw Meal Feed into preheater & Kiln Combustion By-Products	Wet Scrubber Baghouse	Annual Source Testing	Unlikely	
$PM_{2.5}$	Raw Meal Feed into preheater & Kiln Combustion By-Products	Wet Scrubber Baghouse	Annual Source Testing	Unlikely	
Metals	Raw Materials and fuel combustion	Wet Scrubber Baghouse	Annual Source Testing	Potential	Certain trace metals may be in higher concentrations/mass entering the kiln contained in the ALCFs compared to
VOCs	Incomplete combustion & Raw Materials	Combustion Optimization CPMS Temperature Control	Annual Source Testing	Potential	Historical source testing has shown these may increase marginally while using ALCFs. For this reason, they have not been screened out as part of Step 1.
PAHs	Incomplete combustion	Combustion Optimization CPMS Temperature Control	Annual Source Testing	Potential	Historical source testing has shown these may increase marginally while using ALCFs. For this reason, they have not been screened out as part of Step 1.
Dioxin and Furans	Formation may occur with poor temperature control	CPMS Temperature Control	Annual Source Testing	Unlikely	Cement kilns are not a major source of dioxins and furans due to high operating temperatures. (European Commission Joint Research Centre, 2013). Based on the annual source testing, there is no evidence to suggest that releases of dioxins and furans from the Facility are appreciable.
Chlorine-containing Compounds (e.g., hydrogen chloride)	Raw materials and fuel combustion	Bypass System	Annual Source Testing	Potential	Historical source testing has shown that certain chlorine-containing compounds may increase marginally while using ALCFs. For this reason, they have not been screened out as part of Step 1.

6.1.2 Step 2: Significance of the Facility Contribution

The contaminant groups retained from Step 1 were assessed individually using the emission estimates and dispersion modelling results presented in the ESDM Report prepared in support of the ALCF ECA Amendment Application. These were limited to metals, VOCs, PAHs, and selected chlorine-containing compounds. The assessment compares the base case, representing ALCF use of up to 400 tonnes per day, with the future scenario, representing ALCF use of up to 800 tonnes per day.

The assessment first considered whether the ESDM Report predicts an increase in the maximum emission rate for each contaminant. Contaminants whose future scenario emission rates are below their base case scenario emission rates were screened from further assessment, as no incremental Facility emissions are predicted under the future scenario.

For contaminants with a predicted increase in emissions, the maximum modelled POI concentration for the future scenario, as reported in the ESDM Report, was compared to the applicable O. Reg. 419/05 POI limit or other documented screening level. The modelled POI concentration represents the predicted Facility contribution at locations beyond the Facility property boundary which indicates how significant this contribution is relative to the applicable air quality criterion.

For the purposes of this cumulative assessment, where a Ministry Benchmark 1 (B1) value applied (as described in Section 2.6.2), contaminants with a maximum future scenario POI concentration at or below 5% of the applicable POI limit were considered to have a low predicted Facility contribution and were screened from further assessment. The 5% threshold is applied as a screening criterion for this Study and is not an O. Reg. 419/05 compliance criterion. The use of a significance-based screening approach is consistent with the general screening principles described in Ministry Guideline A-10: Procedure for Preparing an ESDM Report, although the specific application of the 5% threshold to modelled POI concentrations was developed for the purposes of this Study.

Where a Ministry Benchmark 2 (B2) value applied, the maximum future scenario modelled POI concentration was compared directly with the applicable B2 value. Contaminants with predicted concentrations below the B2 value were screened from further assessment as B2 limits are screening levels in nature (as described in Section 2.6.2).

Detailed contaminant-specific emission rates and dispersion modelling results are provided in the ESDM Report. The results of this Study's screening assessment, including the basis for retaining or screening individual contaminants, are provided in Appendix D – Screening Assessment.

Most individual contaminants retained following Step 1 were screened out because either no increase in emissions was predicted, a Ministry B2 value applied to the contaminant, or the future scenario POI concentration satisfied the applicable screening criterion (i.e., less than 5% of the POI limit where a Ministry B1 value applied). This is shown in Figure 6-1 and Table 6-2.

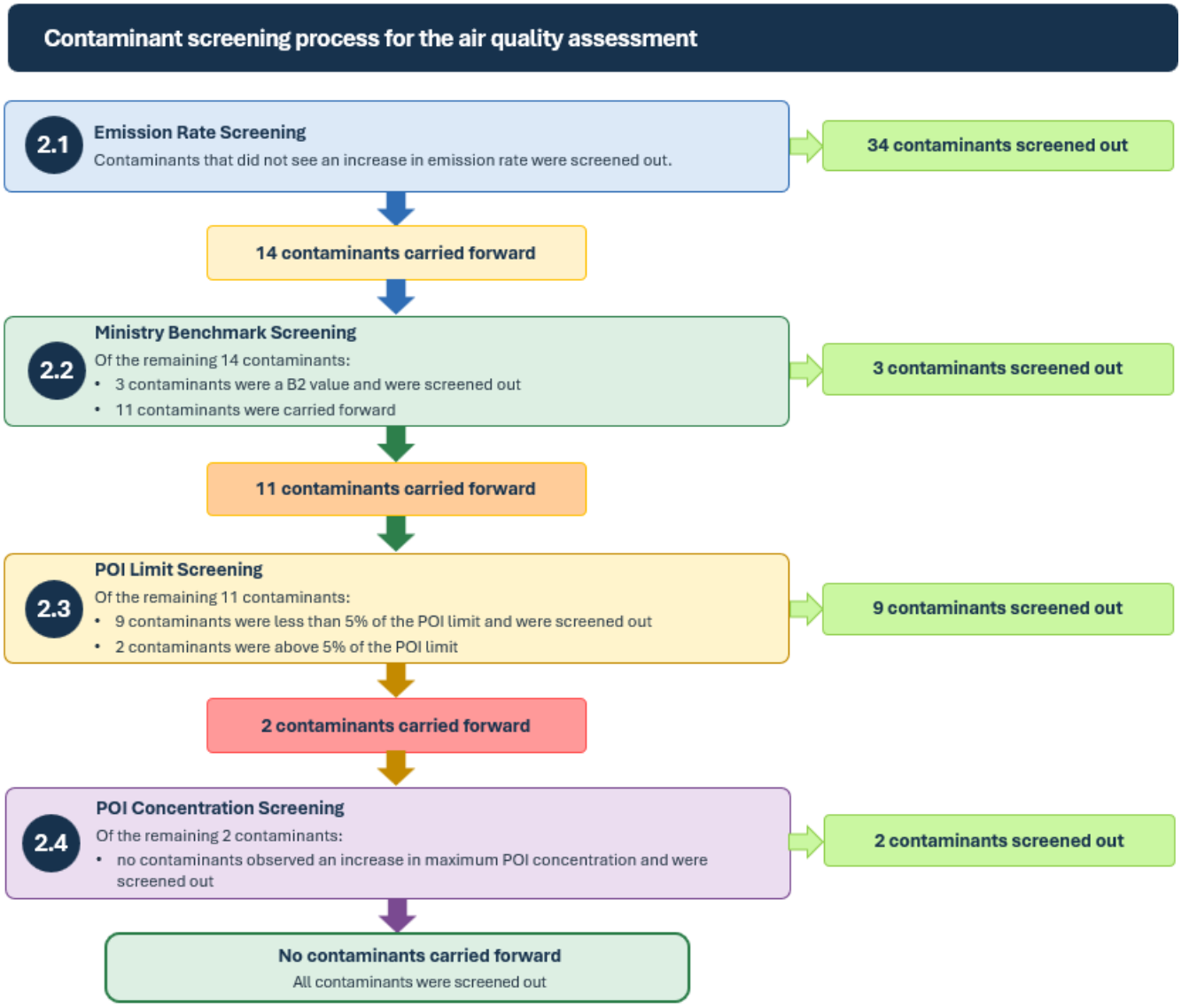


Figure 6-1 Step 2: Contaminant Screening Process

Table 6-2 Step 2: Contaminant Screening Process

Step Number	Step Name	Contaminant Screening
1	Potential for Emissions to Increase with ALCF Use	Metals, VOCs, PAHs, and chlorine-containing compounds identified as having potential for emissions to change.
2.1	Emission Rate Screening	34 contaminants screened out (emission rate did not increase) 14 contaminants carried forward
2.2	Ministry Benchmark Screening	3 contaminants screened out (B2 screening criteria applied) 11 contaminants carried forward
2.3	POI Limit Screening	9 contaminants screened out (less than 5% of POI limit) 2 contaminants carried forward
2.4	POI Concentration Screening	2 contaminants screened out (POI concentration did not increase) 0 contaminants carried forward
3	Identification of Other Local Sources	Not applicable, all contaminants screened out in Step 2; however this was completed and presented in Section 3.
4	Characterizing the Background Air Quality for the Study Area	Not applicable, all contaminants screened out in Step 2; however; this was completed and presented in Section 4.
5	Cumulative Assessment and Evaluation of the Effect of Increase ALCF Use	Not applicable, all contaminants screened out in Step 2

Only chromium and manganese were analyzed in more detail. Table 6-3 summarizes the analysis completed based on the information in the ESDM Report. Although the ESDM Report predicts marginal increases in their maximum emission rates, these increases do not result in corresponding increases in maximum POI concentrations. These contaminants were therefore screened from further quantitative assessment. As a result, no contaminants were carried forward to Steps 3 through 5 of the cumulative assessment framework.

Table 6-3 Assessment of Chromium and Manganese Emission Rates and POI Changes

Contaminant	Emission Rate Change	Maximum POI Concentration Change
Chromium	+0.5%	0%
Manganese	+0.3%	0%

Note: There is no change in the percentage of Ministry POI limit as the maximum predicted POI concentration did not change.

6.2 Summary of the Screening Evaluation

Although no contaminants were carried forward beyond Step 2, the screening results were considered in the context of the broader information compiled in Sections 3 through 5. These sections characterize existing air quality conditions and relevant influences within the Study Area, including Facility and other industrial emissions, transportation activity, ambient monitoring results, and regional and transboundary influences.

The information presented in Sections 3 through 5 provides context regarding existing air quality conditions within the Study Area. While several contaminants emitted by the Facility are also reported by other industrial facilities, these existing emissions are part of the baseline setting and do not represent an incremental effect associated with the proposed increase in ALCF use.

Based on the Step 2 screening results and the supporting information presented in Sections 3 through 5, the proposed increase in ALCF use from 400 tonnes per day to 800 tonnes per day is not predicted to result in an incremental change that warrants further cumulative dispersion modelling.

7. Summary of Findings

The Study considered existing air quality conditions within the Study Area together with the potential incremental effect of increasing ALCF use at the Facility from 400 tonnes per day to 800 tonnes per day. The assessment considered Facility and other industrial emissions, available ambient air quality monitoring data, transportation activity and community growth, other local sources, and regional and transboundary influences.

The key findings of the Study are:

- The proposed increase in ALCF use is not predicted to increase maximum off-site POI concentrations for any contaminant more than 1%. Most contaminants are not predicted to increase in emissions, while the minor predicted increases in chromium and manganese emission rates do not result in increased maximum off-site POI concentrations and, therefore, do not warrant further cumulative assessment.
- Industrial emissions within the Study Area have generally remained stable or decreased over the Study Period. Reported emissions from the Facility decreased for several principal contaminant groups, while other industrial facilities contribute contaminants in common with the Facility.
- Ambient monitoring indicates that air quality within and surrounding the Study Area is generally good. The large majority of monitored concentrations were below the applicable ambient air quality criteria, recognizing that exceedances occurred for certain contaminants and monitoring locations.
- Air quality within the Study Area is influenced by sources other than local industry. These include transportation, residential, commercial, agricultural and construction activities, as well as regional and transboundary sources, wildfire events and meteorological conditions.

Based upon these findings, the proposed increase in ALCF use is not expected to materially change the overall air quality conditions within the Study Area.

7.1 Industrial Emissions in the Study Area

Historical emissions for St. Marys Cement and other NPRI-reporting industrial facilities within the Study Area were reviewed in Section 3. Reported emissions of by-products of combustion, particulate matter and several metals from the Facility generally decreased over the Study Period. Total VOC emissions fluctuated and then increased in 2025 as a result of a 20% increase in production at the Facility. Annual releases are estimated in accordance with the applicable reporting methodologies and using facility-specific information. This includes the annual source testing results for the kiln stack at St. Marys Cement. For recent stack testing results, certain substances were reported at the laboratory Reporting Detection Limit (RDL). For 2025, these RDLs were higher than historically measured concentrations (e.g., methanol and phenol), resulting in conservatively estimated annual releases relative to previous

years. PAH releases, including total PAHs, acenaphthylene, fluorene, and phenanthrene were more variable and showed increases in 2025. This increase can be attributed to the 2025 kiln stack testing results, during which the kiln stack flow rate was 15% higher than in the previous year and there were minor differences observed in combustion conditions and fuel feed. The stack testing represents a specific point in time and results are expected to vary year-over-year.

The Facility has progressively introduced and expanded the use of ALCFs over the period reviewed while adding pollution controls (i.e., wet scrubber). Over this period, reported emissions of several principal contaminant groups, including by-products of combustion, particulate matter and several metals, generally decreased, while total VOC emissions remained relatively stable.

With the increase in ALCFs to 800 tonnes per day, it is anticipated that the delivery schedule may extend to 6:00 am to 8:00 pm to accommodate the increase in ALCF use, while the maximum peak-hour delivery rate would remain at three trucks per hour.

Several other industrial facilities within the Study Area report contaminants in common with the Facility, including NOx, particulate matter, selected metals, VOCs and other contaminants. This Study demonstrates that industrial emissions within the Study Area originate from multiple facilities and provides context for the ambient air quality conditions considered in Section 4.

7.2 Ambient Air Quality

Available ambient air quality monitoring data from the Oshawa NAPS station and the two DYEC monitoring stations were reviewed to characterize existing air quality conditions within and surrounding the Study Area. NOx and $PM_{2.5}$ concentrations were within the applicable Ontario AAQC for the averaging periods assessed, and monitored metals and dioxins and furans at the DYEC stations were also within the applicable AAQC.

From 2022 through 2025, monitored concentrations were generally below the applicable AAQCs. Sulphur dioxide concentrations were below the 10-minute and 1-hour AAQC 99.3% and 98.3% of the time across the Courtice and Rundle Road monitoring stations. SPM concentrations were below the applicable 24-hour AAQC in 99.3% of the discrete samples collected. Between 2022 and 2025, approximately 86.2% of measured benzo(a)pyrene concentrations from discrete monitoring samples were recorded below the 24-hour AAQC.

Overall, the monitoring data indicate that ambient air quality within and surrounding the Study Area is generally good, with concentrations below the applicable air quality criteria for the large majority of monitored results. While exceedances were identified for certain contaminants, these occurred during a relatively small proportion of the monitoring period.

7.3 Other Local, Regional and Transboundary Influences

Section 5 identified a range of additional influences on air quality within the Study Area. Transportation is an important source of NOx, particulate matter and VOC emissions. Although Highway 401 traffic and the surrounding population have increased over the periods reviewed, provincial transportation-related NOx emissions have decreased substantially, including an approximately 57% decrease in road-vehicle NOx emissions between 2014 and 2023. Residential, commercial and agricultural activities provide additional distributed sources of emissions within the Study Area.

Regional and transboundary emissions transported into the Study Area also contributes to existing air quality conditions; specifically for $PM_{2.5}$ in Ontario. Natural and episodic influences can also affect measured concentrations; in 2023, wildfire-related $PM_{2.5}$ forecasts accounted for 49 of the 55 days covered by Special Air Quality Statements in Ontario. Meteorological conditions can further contribute to short-term and year-to-year variability.

7.4 Cumulative Air Quality Screening

Section 6 evaluated the potential incremental effect of increasing ALCF use from 400 tonnes per day to 800 tonnes per day using the screening framework established in Section 2. By-products of combustion, particulate matter and dioxins and furans were screened from further quantitative assessment at Step 1 (Section 6.1.1), while metals, VOCs, PAHs and selected chlorine-containing compounds were carried forward for contaminant-specific assessment at Step 2 (Section 6.1.2).

All but two contaminants were screened from further assessment because either no increase in emissions was predicted, a Ministry B2 value applied to the contaminant, or the future scenario POI concentration satisfied the applicable screening criterion (i.e., less than 5% of the POI limit where a Ministry B1 value applied).

For the two contaminants assessed further (chromium and manganese), the future scenario increase in emissions did not result in an increase in maximum POI concentrations.

Accordingly, the ESDM Report does not predict an incremental increase in the maximum off-site POI concentration for any contaminant as a result of increasing ALCF use from 400 tonnes per day to 800 tonnes per day. No contaminants were therefore carried forward to Steps 3 through 5 of the cumulative assessment framework.

The screening assessment did not identify a need for comprehensive air dispersion modelling. For most contaminants, the screening assessment did not identify increases in emissions between the base case and future scenario.

8. Closure

8.1 Limitations

WSP Canada Inc. prepared this report solely for the use of the intended recipient, St. Marys Cement Inc. (Canada), in accordance with the professional services agreement. The intended recipient is solely responsible for the disclosure of any information contained in this report. The content and opinions contained in the present report are based on the observations and/or information available to WSP Canada Inc. at the time of preparation. The information, recommendations and opinions expressed in this report are for the sole benefit of St. Marys Cement Inc. (Canada) subject to the limitations and purposes described herein.

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8.2 Standard of Care

WSP Canada Inc. has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report. No other warranty, expressed or implied, is made.

9. References

Canadian Council of Ministers of the Environment, 2024. *CAAQS.* [Online]
Available at: https://ccme.ca/en/air-quality-report

Canadian Councils of Ministers of the Envrionment (CCME), 2019. *Guidance Document on Air Zone Management,* Ottawa: Canadian Councils of Ministers of the Envrionment (CCME).

Durham York Energy Centre, 2025. *Facility Approvals: Increasing Capacity to 160,000.* [Online]
Available at: https://www.durhamyorkwaste.ca/facility-approvals/increasing-capacity-to-160-000/
[Accessed 20 October 2026].

European Commission Joint Research Centre, 2013. *Best Available Techniques (BAT) Reference Document for the Production of Cement, Lime and Magnesium Oxide,* Seville: European Bureau for Research on Industrial Transformation and Emissions.

Government of Canada, Statistics Canada, 2025. *Data products, 2021 Census.* [Online]
Available at: https://www12.statcan.gc.ca/census-recensement/2021/as-sa/fogs-spg/page.cfm?lang=e&dguid=2021A00053518017&topic=1&objectid=1#population-recent-history
[Accessed 14 October 2026].

Government of Ontario, 2022. *National Air Quality Management System.* [Online]
Available at: https://www.ontario.ca/document/air-quality-ontario-2020-report/national-air-quality-management-system
[Accessed 30 October 2026].

Lall, R., Kendall, M., Ito, K. & Thurston, G. D., 2004. Estimation of Historical PM2.5 Exposures for Healthy Effects Assessment. *Elsevier,* Volume 38, pp. 5217-5226.

MECP, 2017. *Air Dispersion Modelling Guideline for Ontario,* Toronto: MECP.

MECP, 2023. *Ontario Ambient Air Quality Criteria (AAQC).* [Online]
Available at: https://www.ontario.ca/page/ontarios-ambient-air-quality-criteria

MECP, 2025. *10-Year Trends and Annual Results.* [Online]
Available at: https://www.ontario.ca/document/air-quality-ontario-2023-report/10-year-trends-and-annual-results
[Accessed 19 October 2026].

MECP, 2025. *Air Quality in Ontario 2023 Report,* s.l.: Government of Ontario.

MTO, 2023. *Provincial Highways Traffic Volumes 1988-2019, 2021,* s.l.: Government of Ontario.

Ramboll, 2026. *Emission Summary and Dispersion Modelling Report,* Markham: Ramboll.

Rowan Williams Davies & Irwin Inc. (RWDI), 2026. *2025 Annual Ambient Air Quality Monitoring Report,* Windsor: Durham York Energy Centre.

Appendix A NPRI Data

St. Marys Cement Plant

Table A.1 Annual Emissions of By-Products of Combustion Released from St. Marys Cement (tonnes)

Year	NOx*	SO_2	CO
2016	3151	5162	1123
2017	3071	3779	1077
2018	3123	6082	2756
2019	2392	5960	2712
2020	2802	6085	2693
2021	2868	4885	2737
2022	2813	8339	2701
2023	1985	1251	1895
2024	1954	183	712
2025	1565	211	989

Notes: *expressed as nitrogen dioxide

Table A.2 Annual Emissions of Particulate Matter Released from St. Marys Cement (tonnes)

Year	TPM	PM_{10}	$PM_{2.5}$
2016	332	193	79
2017	337	195	78
2018	297	144	55
2019	291	142	54
2020	301	155	58
2021	278	165	61
2022	301	176	63
2023	346	134	49
2024	238	109	40
2025	226	102	38

Table A.3 Annual Emissions of Metals Released from St. Marys Cement (kilograms)

Year	Cadmium*	Lead*	Mercury*	Phosphorus	Selenium*
2016	5	194	14	NR	49
2017	4	186	13	NR	47
2018	1	22	9	NR	9
2019	1	21	9	NR	9
2020	1	22	9	NR	9
2021	NR	NR	11	NR	10
2022	NR	NR	11	NR	10
2023	NR	NR	4	0.181	3
2024	NR	NR	1	0.150	2
2025	NR	NR	3	0.132	2

Notes: *substance and its compounds, NR = Not Reportable

Table A.4 Annual Emissions of VOCs Released from St. Marys Cement (tonnes)

Year	VOCs	Benzene	Methanol	Phenol*	Styrene	Toluene	Xylene**
2016	78	5	NR	NR	NR	3	5
2017	73	4	NR	NR	NR	3	5
2018	74	7	NR	NR	1	5	6
2019	69	7	NR	NR	1	5	6
2020	75	7	NR	NR	1	5	6
2021	72	NR	NR	NR	NR	NR	NR
2022	82	NR	NR	NR	NR	NR	NR
2023	79	NR	NR	NR	NR	NR	NR
2024	71	NR	NR	NR	NR	NR	NR
2025	84	NR	31	31	NR	NR	NR

Notes: *and its salts, **all isomers, NR = Not Reportable

Table A.5 Annual Emissions of PAHs Released from St. Marys Cement (kilograms)

Year	PAHs	Acenaphthene	Acenaphthylene	Fluorene	Phenanthrene
2016	NR	NR	16	9	61
2017	NR	NR	15	8	59
2018	NR	13	21	8	38
2019	NR	21	21	8	38
2020	NR	14	22	9	48
2021	NR	20	30	16	102
2022	NR	20	30	16	100
2023	71	NR	NR	NR	20
2024	62	NR	8	10	101
2025	286	23	71	29	157

Notes: NR = Not Reportable

Table A.6 Annual Emissions of Other Key Contaminants Released from St. Marys Cement

Year	Ammonia (tonnes)	Hydrochloric Acid (tonnes)	Hexachlorobenzene (grams)	Dioxins and Furans (grams TEQ)*
2016	138	NR	0	0.031
2017	133	NR	0	0.030
2018	144	30	614	0.048
2019	142	29	605	0.048
2020	142	29	590	0.050
2021	145	30	575	0.044
2022	143	30	568	0.043
2023	50	20	575	0.016
2024	16	17	465	0.005
2025	87	11	537	0.004

Notes: *units in grams of Toxic Equivalent, NR = Not Reportable

Durham York Energy Centre

Table A.7 Annual Emissions Released from Durham York Energy Centre (tonnes)

Year	NOx*	PM_{10}	$PM_{2.5}$	Cadmium** (kilograms)	Lead** (kilograms)	Mercury** (kilograms)	Ammonia	Dioxins and Furans (grams TEQ)
2016	144	0.54	0.49	0.09	0.37	0.49	11	0.160
2017	160	0.59	0.38	0.08	0.35	0.12	12	0.008
2018	160	0.31	0.21	0.09	0.36	0.32	10	0.006
2019	155	0.66	0.52	0.12	0.43	0.23	NR	0.002
2020	174	NR	NR	0.11	0.61	0.18	NR	0.005
2021	107	NR	NR	0.06	0.40	0.13	NR	0.010
2022	115	0.62	0.37	0.04	0.30	0.04	1	0.005
2023	119	0.44	0.33	0.25	0.29	0.05	1	0.005
2024	119	0.65	0.53	0.29	0.35	0.16	1	0.003
2025	114	0.53	0.47	0.34	0.41	0.06	1	0.002

Notes: *expressed as nitrogen dioxide, **substance and its compounds, NR = Not Reportable

Darlington Nuclear Generating Station

Table A.8 Annual Emissions Released from Darlington Nuclear Generating Station (tonnes)

Year	NOx*	$PM_{2.5}$	Ammonia
2016	31	NR	NR
2017	38	NR	NR
2018	36	NR	12
2019	26	NR	11
2020	15	0.36	12
2021	10	NR	11
2022	32	NR	12
2023	14	NR	19
2024	56	NR	18
2025	15	NR	5

Notes: *expressed as nitrogen dioxide, NR = Not Reportable

Other Local Industrial Facilities

Table A.9 Annual Emissions of Ammonia Released from Water Pollution Control Plants (tonnes)

Year	Port Darlington WPCP	Harmony Creek WPCP	Courtice WPCP
2016	9	12	31
2017	11	10	37
2018	10	9	37
2019	11	10	43
2020	10	15	31
2021	10	15	29
2022	10	15	29
2023	11	15	38
2024	11	16	40
2025	11	14	37

Table A.10 Annual Emissions of VOCs Released from McAsphalt Plant (tonnes)

Year	VOCs
2016	NR
2017	NR
2018	NR
2019	NR
2020	NR
2021	NR
2022	NR
2023	26
2024	30
2025	27

Notes: NR = Not Reportable

Appendix B Ambient Air Monitoring Data

Table B.1 DYEC Ambient Air Monitoring Data

Contaminant	Averaging Period	AAQC	Courtice Monitoring Station					Rundle Road Monitoring Station				
		ug/m³	2022	2023	2024	2025	Study Period Maximum	2022	2023	2024	2025	Study Period Maximum
Nitrogen Dioxide (NO_2)	1-hour	0.10 ppm	0.042	0.045	0.039	0.039	0.045	0.039	0.040	0.044	0.033	0.044
	24-hour	0.20 ppm	0.026	0.021	0.017	0.020	0.026	0.018	0.017	0.017	0.019	0.019
Sulphur Dioxide (SO_2)	Annual	4 ppb	2	4	4	3	3.9	0.5	0.5	0.3	0.4	0.5
	10-minute	67 ppb	316	468	590	335	590	221	363	5	9	363
	1-hour	40 ppb	138	143	188	121	188	113	143	5	7	143
Particulate Matter less than 2.5 micrometres in diameter ($PM_{2.5}$)	Annual	60 µg/m³	6.00	6.50	6.10	6.30	6.5	5.5	6.1	5.8	6.0	6.1
	24-hour	27 µg/m³	17.40	22.00	19.70	24.00	24.0	16.4	18.0	16.0	19.4	19.4
Particulate Matter less than 10 micrometres in diameter (PM_{10})	24-hour	50 µg/m³	32.22	40.74	36.48	44.44	44.4	30.37	33.33	29.63	35.93	35.9
Suspended Particulate Matter (SPM)	24-hour	120 µg/m³	53.90	141.80	63.90	98.70	141.8	120.9	148.3	87.1	91.9	148.3
Mercury	24-hour	2 µg/m³	0.000035	0.000026	0.000026	0.000042	0.000042	0.000030	0.000042	0.000037	0.000034	0.000042
Antimony	24-hour	25 µg/m³	0.0062	0.0020	0.0032	0.0040	0.0062	0.0027	0.0021	0.0047	0.0021	0.0047
Arsenic	24-hour	0.3 µg/m³	0.0038	0.0020	0.0063	0.0030	0.0063	0.0049	0.0054	0.0024	0.0028	0.0054
Barium	24-hour	10 µg/m³	0.020	0.030	0.017	0.031	0.031	0.025	0.025	0.018	0.031	0.031
Beryllium	24-hour	0.01 µg/m³	0.00004	0.00005	0.00002	0.00005	0.00005	0.00007	0.00008	0.00004	0.00004	0.00008
Boron	24-hour	120 µg/m³	0.009	0.011	0.010	0.013	0.013	0.016	0.016	0.011	0.015	0.016
Cadmium	24-hour	0.025 µg/m³	0.0011	0.0005	0.0004	0.0005	0.0011	0.0007	0.0012	0.0007	0.0005	0.0012
Chromium	24-hour	0.5 µg/m³	0.006	0.005	0.003	0.006	0.006	0.013	0.006	0.011	0.005	0.013
Cobalt	24-hour	0.1 µg/m³	0.00039	0.00051	0.00084	0.00061	0.00084	0.00083	0.00090	0.00046	0.00049	0.00090
Copper	24-hour	50 µg/m³	0.13	0.08	0.07	0.21	0.21	0.07	0.15	0.12	0.37	0.37

Contaminant	Averaging Period	AAQC	Courtice Monitoring Station					Rundle Road Monitoring Station				
		ug/m³	2022	2023	2024	2025	Study Period Maximum	2022	2023	2024	2025	Study Period Maximum
Iron	24-hour	4 µg/m³	1.1	1.3	0.9	3.4	3.4	2.4	2.2	1.2	1.7	2.4
Lead	24-hour	0.5 µg/m³	0.007	0.008	0.009	0.006	0.009	0.029	0.008	0.016	0.013	0.029
Manganese	24-hour	0.4 µg/m³	0.027	0.061	0.035	0.058	0.061	0.065	0.073	0.044	0.043	0.073
Molybdenum	24-hour	120 µg/m³	0.004	0.003	0.002	0.013	0.013	0.003	0.009	0.006	0.011	0.011
Nickel	24-hour	0.2 µg/m³	0.0038	0.0026	0.0061	0.0034	0.0061	0.0036	0.0043	0.0046	0.0028	0.0046
Selenium	24-hour	10 µg/m³	0.0015	0.0015	0.0024	0.0028	0.0028	0.0017	0.0030	0.0054	0.0024	0.0054
Silver	24-hour	1 µg/m³	0.00067	0.00067	0.00011	0.00030	0.00067	0.00057	0.00030	0.00023	0.00024	0.00057
Strontium	24-hour	120 µg/m³	0.029	0.029	0.023	0.036	0.036	0.045	0.052	0.033	0.025	0.052
Tin	24-hour	10 µg/m³	0.0022	0.0027	0.0025	0.0091	0.0091	0.0017	0.0025	0.0052	0.0023	0.0052
Titanium	24-hour	120 µg/m³	0.023	0.037	0.021	0.049	0.049	0.083	0.042	0.035	0.034	0.083
Uranium	24-hour	0.3 µg/m³	0.00006	0.00010	0.00013	0.00013	0.00013	0.00015	0.00010	0.00013	0.00012	0.00015
Vanadium	24-hour	2 µg/m³	0.0016	0.0016	0.0035	0.0031	0.0035	0.0040	0.0034	0.0046	0.0041	0.0046
Zinc	24-hour	120 µg/m³	0.15	0.37	0.15	0.12	0.37	0.62	0.25	0.20	0.22	0.62
Total PAH	24-hour	0.00005 ng/m³	0.14	0.62	0.07	0.46	0.62	0.14	0.09	0.08	0.31	0.31
Benzo(a)Pyrene	24-hour	0.00005 ng/m³	0.0001	0.0006	0.0001	0.0002	0.0006	0.0012	0.0001	0.0001	0.0009	0.0012
Biphenyl	1-hour	60 ng/m³	0.009	0.072	0.004	0.014	0.072	0.008	0.008	0.009	0.013	0.013
Naphthalene	24-hour	22.5 ng/m³	0.05	0.07	0.03	0.29	0.29	0.05	0.03	0.03	0.17	0.17
Dioxins and Furans	24-hour	0.1 pg TEQ/m3	0.024	0.023	0.009	0.012	0.024	0.067	0.010	0.009	0.032	0.067

Appendix C Traffic and Population Data

Table C.1 Traffic Data

Year	Highway 401 at Waverley Road AADT	Highway 401 at Holt Road AADT
1988	52,800	53,000
1989	56,600	56,000
1990	60,400	59,300
1991	59,200	58,100
1992	59,600	58,600
1993	59,600	58,600
1994	64,400	59,100
1995	66,400	62,400
1996	68,400	65,700
1997	70,500	69,000
1998	72,500	72,800
1999	74,000	76,500
2000	73,400	76,600
2001	74,600	79,300
2002	75,800	82,000
2003	77,000	82,600
2004	78,200	87,400
2005	76,900	89,900
2006	79,300	87,800
2007	78,100	95,400
2008	79,100	91,800
2009	80,200	95,100
2010	84,600	81,600
2011	83,900	97,900
2012	86,100	99,900
2013	86,200	101,900
2014	89,200	100,400
2015	88,600	99,200
2016	89,600	98,000
2017	90,700	100,000
2018	91,700	102,000
2019	92,800	104,000
2021	94,900	94,600

Source: (MTO, 2023)

Table C.2 Population Data

Year	Municipality of Clarington	Durham Region
2011	-	608,124
2016	92,013	645,862
2021	101,427	696,992

Source: (Government of Canada, Statistics Canada, 2025)

Appendix D Screening Assessment

Table D.1 Step 1: ALCF Contaminant Screening

Contaminant Group	Main Source of Emission from Kiln	Control Technology	Source Monitoring	Likelihood of Change in Emissions with increase to 800 tonnes per day of ALCF	Rationale
NOx	Thermal NOx from temperature and shape of burner flames	SNCR	CEMS Annual Stack Source Testing	Unlikely	ALCFs are not anticipated to increase NOx emissions; additionally the Facility has the ability to tune the SNCR to reduce NOx emissions.
SO_2	Formation from sulphur contained in raw Materials and fuel combustion	Wet Scrubber	CEMS Annual Stack Source Testing	Unlikely	The main source is raw material (limestone) and is controlled with the wet scrubber. It is also expected that sulphur will be in lower amounts with ALCFs compared to coal and petroleum coke.
CO	Incomplete combustion	Combustion Optimization	CPMS Annual Source Testing	Unlikely	Continuous process monitoring is used to optimize and maintain good kiln combustion.
SPM	Raw Meal Feed into preheater	Wet Scrubber Baghouse	Annual Source Testing	Unlikely	ALCFs will not be a significant contributor to increased dust. This is supported by the fact that most of the dust emitted from the Kiln is a result of the raw meal feed (crushed limestone).
PM_{10}	Raw Meal Feed into preheater & Kiln Combustion By-Products	Wet Scrubber Baghouse	Annual Source Testing	Unlikely	
$PM_{2.5}$	Raw Meal Feed into preheater & Kiln Combustion By-Products	Wet Scrubber Baghouse	Annual Source Testing	Unlikely	
Metals	Raw Materials and fuel combustion	Wet Scrubber Baghouse	Annual Source Testing	Potential	Certain trace metals may be in higher concentrations/mass entering the kiln contained in the ALCFs compared to
VOCs	Incomplete combustion & Raw Materials	Combustion Optimization CPMS Temperature Control	Annual Source Testing	Potential	Historical source testing has shown these may increase marginally while using ALCFs. For this reason, they have not been screened out as part of Step 1.
PAHs	Incomplete combustion	Combustion Optimization CPMS Temperature Control	Annual Source Testing	Potential	Historical source testing has shown these may increase marginally while using ALCFs. For this reason, they have not been screened out as part of Step 1.
Dioxin and Furans	Formation may occur with poor temperature control	CPMS Temperature Control	Annual Source Testing	Unlikely	Cement kilns are not a major source of dioxins and furans due to high operating temperatures. (European Commission Joint Research Centre, 2013). Based on the annual source testing, there is no evidence to suggest that releases of dioxins and furans from the Facility are appreciable.
Chlorine-containing Compounds (e.g., hydrogen chloride)	Raw materials and fuel combustion	Bypass System	Annual Source Testing	Potential	Historical source testing has shown that certain chlorine-containing compounds may increase marginally while using ALCFs. For this reason, they have not been screened out as part of Step 1.

Table D.2 Facility Contribution and Base Case versus Future Scenario Comparison

Screened out in Step 1
Screened out in Step 2.1 – Emission Rate Screening i.e., emission rate did not increase
Screened out in Step 2.2 – Ministry Benchmark Screening i.e., B2 screening criteria applied
Screened out in Step 2.3 – POI Limit Screening i.e., maximum POI concentration was less than 5% of POI limit
Screened out in Step 2.4 – POI Concentration Screening i.e., POI concentration did not increase

Contaminant	Total Facility Emission Rate [g/s]		%Change	Maximum POI Concentration [µg/m³]		MECP Limit			Percentage of MECP POI Limit [%]	
	Base	Future		Base	Future	Averaging Period	Concentration [µg/m³]	Benchmark	Base	Future
Byproducts of Combustion										
Nitrogen Oxides	9.43E+01	9.43E+01	0.0%	3.56E+02	3.56E+02	1-hour	400	B1	89.1%	89.1%
Nitrogen Oxides	9.38E+01	9.38E+01	0.0%	8.04E+01	8.04E+01	24-hour	200	B1	40.2%	40.2%
Sulphur Dioxide	1.44E+01	1.30E+01	-9.7%	5.47E+01	4.93E+01	1-hour	100	B1	54.7%	49.3%
Sulphur Dioxide	1.44E+01	1.30E+01	-9.7%	8.64E-01	8.44E-01	Annual	10	B1	8.6%	8.4%
Carbon Monoxide	9.14E+01	9.14E+01	0.0%	3.46E+03	3.46E+03	0.5 hour	6000	B1	57.6%	57.6%
Particulate Matter										
Particulate Matter	9.50E+00	9.50E+00	0.0%	96.08	96.08	24-hour	120	B2	Below B2	Below B2
Metals										
Antimony	1.33E-05	1.33E-05	0.0%	1.85E-04	1.85E-04	24-hour	25	B1	<0.1%	<0.1%
Arsenic	2.60E-04	2.61E-04	0.4%	1.55E-03	1.55E-03	24-hour	0.3	B1	0.5%	0.5%
Barium	2.53E-03	2.61E-03	3.2%	2.19E-02	2.19E-02	24-hour	10	B1	0.2%	0.2%
Beryllium	3.19E-05	3.14E-05	-1.6%	1.93E-04	1.93E-04	24-hour	0.01	B1	1.9%	1.9%
Cadmium	1.62E-05	1.62E-05	0.0%	5.51E-05	5.51E-05	24-hour	0.025	B1	0.2%	0.2%
Chromium	2.14E-03	2.15E-03	0.5%	5.66E-02	5.66E-02	24-hour	0.5	B1	11.3%	11.3%
Cobalt	1.27E-04	1.39E-04	9.4%	1.22E-03	1.22E-03	24-hour	0.1	B1	1.2%	1.2%
Iron	2.21E-01	2.21E-01	0.0%	2.28E+00	2.28E+00	24-hour	4	B1	57.1%	57.1%
Ferric Oxide	3.16E-01	3.16E-01	0.0%	3.26E+00	3.26E+00	24-hour	25	B1	13.1%	13.1%
Lead	3.54E-04	3.53E-04	-0.3%	2.05E-03	2.05E-03	24-hour	0.5	B1	0.4%	0.4%
Lead	3.54E-04	3.53E-04	-0.3%	7.90E-04	7.90E-04	30 day	0.2	B1	0.4%	0.4%
Manganese	9.02E-03	9.05E-03	0.3%	8.26E-02	8.26E-02	24-hour	0.4	B1	20.7%	20.7%
Mercury	2.54E-04	2.50E-04	-1.6%	2.20E-04	2.16E-04	24-hour	2	B1	<0.1%	<0.1%
Nickel	2.78E-03	2.62E-03	-5.8%	1.15E-02	1.15E-02	Annual	0.04	B1	28.7%	28.7%
Nickel	2.78E-03	2.62E-03	-5.8%	1.15E-02	1.15E-02	Annual	0.4	AAV	Below AAV	Below AAV

Screened out in Step 1
Screened out in Step 2.1 – Emission Rate Screening i.e., emission rate did not increase
Screened out in Step 2.2 – Ministry Benchmark Screening i.e., B2 screening criteria applied
Screened out in Step 2.3 – POI Limit Screening i.e., maximum POI concentration was less than 5% of POI limit
Screened out in Step 2.4 – POI Concentration Screening i.e., POI concentration did not increase

Contaminant	Total Facility Emission Rate [g/s]		%Change	Maximum POI Concentration [µg/m³]		MECP Limit			Percentage of MECP POI Limit [%]	
	Base	Future		Base	Future	Averaging Period	Concentration [µg/m³]	Benchmark	Base	Future
Nickel	2.78E-03	2.62E-03	-5.8%	6.57E-02	6.57E-02	24-hour	2	URT/DAV	Below URT/DAV	Below URT/DAV
Selenium	2.30E-04	2.13E-04	-7.4%	2.16E-04	2.11E-04	24-hour	10	B1	<0.1%	<0.1%
Silver	4.00E-05	4.13E-05	3.2%	1.46E-04	1.46E-04	24-hour	1	B1	<0.1%	<0.1%
Tin	1.40E-04	1.40E-04	0.0%	2.17E-03	2.17E-03	24-hour	10	B1	<0.1%	<0.1%
Vanadium	1.04E-03	1.02E-03	-1.9%	8.55E-03	8.55E-03	24-hour	2	B1	0.4%	0.4%
VOCs										
Acetaldehyde	5.46E-01	5.46E-01	0.0%	5.48E+00	5.48E+00	0.5 hour	500	B1	1.1%	1.1%
Acrolein	5.78E-02	5.78E-02	0.0%	4.94E-02	4.94E-02	24-hour	0.4	B1	12.4%	12.4%
Acrolein	5.78E-02	5.78E-02	0.0%	4.78E-01	4.78E-01	1-hour	4.5	B1	10.6%	10.6%
Benzene	2.32E-01	2.32E-01	0.0%	7.33E-03	7.33E-03	Annual	0.45	B1	1.6%	1.6%
Benzene	2.32E-01	2.32E-01	0.0%	7.33E-03	7.33E-03	Annual	4.5	AAV	0.2%	0.2%
Benzene	2.32E-01	2.32E-01	0.0%	1.98E-01	1.98E-01	24-hour	100	URT/DAV	Below URT/DAV	Below URT/DAV
1,3-Butadiene	6.73E-02	6.73E-02	0.0%	2.13E-03	2.13E-03	Annual	2	B1	0.1%	0.1%
1,3-Butadiene	6.73E-02	6.73E-02	0.0%	2.13E-03	2.13E-03	Annual	20	AAV	Below AAV	Below AAV
1,3-Butadiene	6.73E-02	6.73E-02	0.0%	5.76E-02	5.76E-02	24-hour	300	URT/DAV	Below URT/DAV	Below URT/DAV
Carbon tetrachloride	8.60E-03	9.28E-03	7.9%	7.35E-03	7.94E-03	24-hour	2.4	B1	0.3%	0.3%
Chloroform	1.28E-02	1.39E-02	8.6%	1.10E-02	1.19E-02	24-hour	1.	B1	1.1%	1.2%
Dibromochloromethane	9.09E-03	9.82E-03	8.0%	7.78E-03	8.40E-03	24-hour	0.2	B2	Below B2	Below B2
1,2-Dichloroethane	8.60E-03	9.28E-03	7.9%	7.35E-03	7.94E-03	24-hour	2	B1	0.4%	0.4%
Ethylene dibromide	6.89E-03	6.89E-03	0.0%	5.89E-03	5.89E-03	24-hour	3	B1	0.2%	0.2%
Ethylene glycol	4.50E-01	4.50E-01	0.0%	5.54E+00	5.54E+00	24-hour	12700	B1	<0.1%	<0.1%
Phenol	2.50E+00	2.50E+00	0.0%	2.14E+00	2.14E+00	24-hour	30	B1	7.1%	7.1%
Propionaldehyde	8.79E-02	8.79E-02	0.0%	1.20E+00	1.20E+00	10 minute	10	B1	12.0%	12.0%
1,1,1,2-Tetrachloroethane	8.60E-03	9.28E-03	7.9%	7.35E-03	7.94E-03	24-hour	0.5	B2	Below B2	Below B2
1,1,2,2-Tetrachloroethane	9.09E-03	9.82E-03	8.0%	7.78E-03	8.40E-03	24-hour	0.1	B2	Below B2	Below B2

Screened out in Step 1
Screened out in Step 2.1 – Emission Rate Screening i.e., emission rate did not increase
Screened out in Step 2.2 – Ministry Benchmark Screening i.e., B2 screening criteria applied
Screened out in Step 2.3 – POI Limit Screening i.e., maximum POI concentration was less than 5% of POI limit
Screened out in Step 2.4 – POI Concentration Screening i.e., POI concentration did not increase

Contaminant	Total Facility Emission Rate [g/s]		%Change	Maximum POI Concentration [µg/m³]		MECP Limit			Percentage of MECP POI Limit [%]	
	Base	Future		Base	Future	Averaging Period	Concentration [µg/m³]	Benchmark	Base	Future
Vinyl chloride	2.55E-02	2.76E-02	8.2%	2.18E-02	2.36E-02	24-hour	1	B1	2.2%	2.4%
PAHs										
Benzo(a)pyrene	1.05E-06	1.05E-06	0.0%	3.32E-08	3.32E-08	Annual	0.00001	B1	0.3%	0.3%
Benzo(a)pyrene	1.05E-06	1.05E-06	0.0%	3.32E-08	3.32E-08	Annual	0.0001	AAV	Below AAV	Below AAV
Benzo(a)pyrene	1.05E-06	1.05E-06	0.0%	8.98E-07	8.98E-07	24-hour	0.005	URT/DAV	Below URT/DAV	Below URT/DAV
Naphthalene	7.40E-02	7.40E-02	0.0%	6.33E-02	6.33E-02	24-hour	22.5	B1	0.3%	0.3%
Naphthalene	7.40E-02	7.40E-02	0.0%	1.01E+00	1.01E+00	10 minute	50	B1	2.0%	2.0%
Other Key Contaminants										
Hydrogen Chloride	6.01E-01	6.49E-01	8.0%	5.14E-01	5.55E-01	24-hour	20	B1	2.6%	2.8%
Ammonia	3.51E+00	3.51E+00	0.0%	3.00E+00	3.00E+00	24-hour	100	B1	3.0%	3.0%
RCS	1.69E-01	1.69E-01	0.0%	2.1	2.1	24-hour	5	B1	41.9%	41.9%

Notes:

[1] B1 = Benchmark 1, B2 = Benchmark 2, URT = Upper Risk Threshold, DAV = Daily Assessment Value, AAV = Annual Assessment Value.

Table D.3 Screening Evaluation

Contaminant Group	Step 1 Potential for Emissions to Increase with ALCF Use	Step 2 Significance of Facility Contribution	Step 3 Identification of Other Local Sources	Step 4 Characterizing the Background Air Quality for the Study Area	Step 5 Cumulative Modelling and Evaluation of the Effect of Increased ALCF Use
Byproducts of Combustion (i.e., nitrogen oxides, sulphur dioxide, carbon monoxide)	Screened out Increased ALCF use was not identified as having a reasonable potential to increase kiln-stack emissions of NOx, SO_2 or CO.	Screened out in Step 1			
Particulate Matter (i.e., TPM, PM_{10}, $PM_{2.5}$)	Screened out Increased ALCF use was not identified as having a reasonable potential to increase kiln-stack emissions of TPM, PM_{10} or $PM_{2.5}$.	Screened out in Step 1			
Metals	Carried forward Changes in ALCF composition have potential to affect emissions of individual metals.	Individual metals were reviewed using the ESDM Report. Most contaminants were screened out because no emission increase was predicted or the future-scenario POI concentration met the applicable screening criterion. Chromium and manganese were screened out because their marginal emission-rate increases did not increase the maximum POI concentration.	Screened out in Step 2		
VOCs	Carried forward Historical ESDM Reports indicated that emissions of some VOCs could increase with increased ALCF use.	Individual VOCs were reviewed using the ESDM Report. VOCs were screened out because no emission increase was predicted or the future-scenario POI concentration met the applicable screening criterion.	Screened out in Step 2		
PAHs	Carried forward for contaminant-specific review.	Individual PAHs were reviewed using the ESDM Report and screened out because no emission increase was predicted or the future-scenario POI concentration met the applicable screening criterion.	Screened out in Step 2		

Contaminant Group	Step 1 Potential for Emissions to Increase with ALCF Use	Step 2 Significance of Facility Contribution	Step 3 Identification of Other Local Sources	Step 4 Characterizing the Background Air Quality for the Study Area	Step 5 Cumulative Modelling and Evaluation of the Effect of Increased ALCF Use
Dioxins and Furans	Screened out Increased ALCF use was not identified as having a reasonable potential to increase kiln-stack emissions of dioxins and furans.	Screened out in Step 1			
Chlorine-containing Compounds	Carried forward Selected chlorine-containing compounds were carried forward because emissions could potentially be affected by ALCF composition.	Chlorine-containing compounds were reviewed using the ESDM Report. They were screened out because no emission increase was predicted or the future-scenario POI concentration met the applicable screening criterion.	Screened out in Step 2		

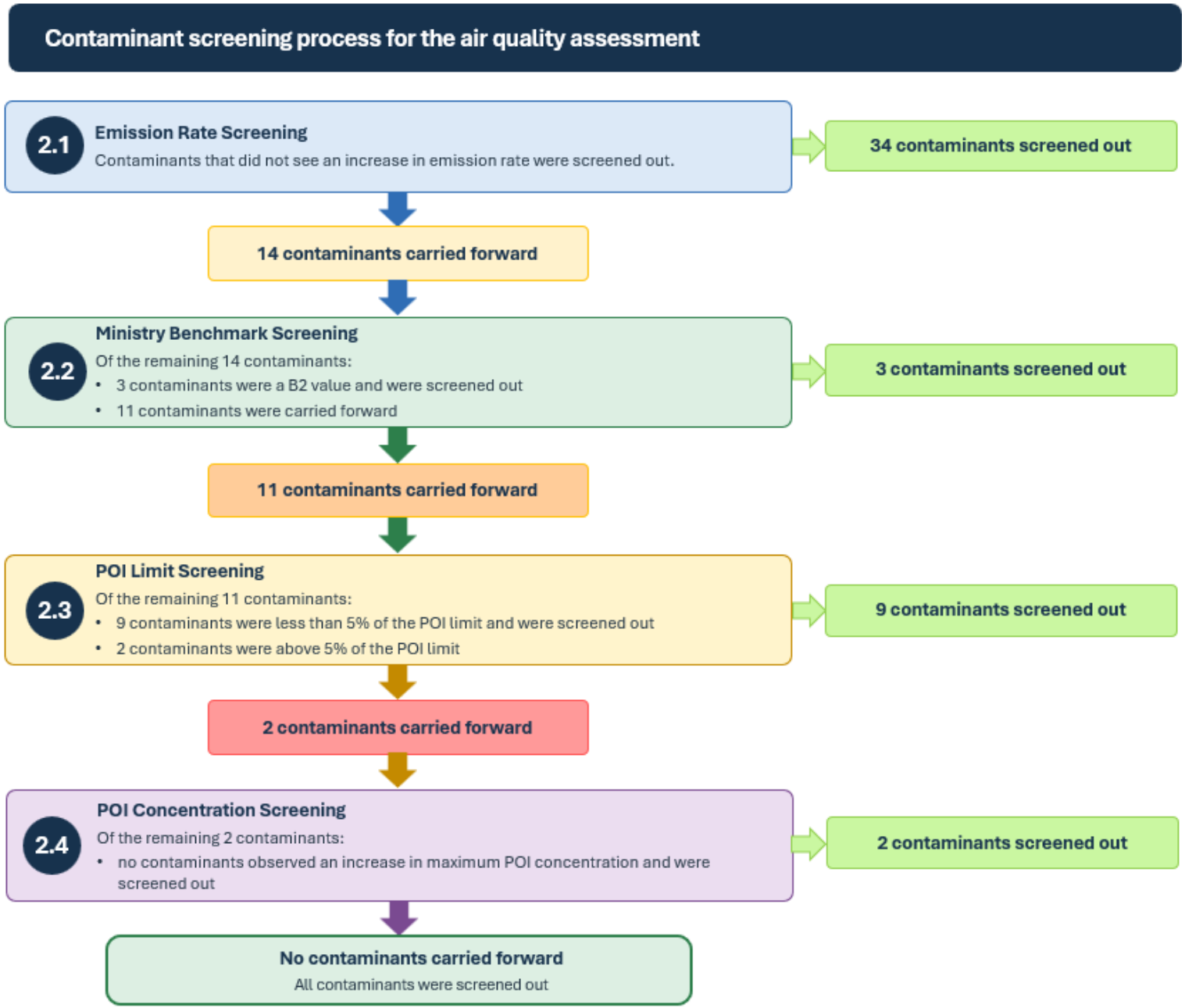

Figure D.1 Step 2: Contaminant Screening Process

Table D.4 Step 2: Contaminant Screening Process

Step Number	Step Name	Contaminant Screening
1	Potential for Emissions to Increase with ALCF Use	Metals, VOCs, PAHs, and chlorine-containing compounds identified as having potential for emissions to change:
2.1	Emission Rate Screening	34 contaminants screened out (emission rate did not increase) 14 contaminants carried forward
2.2	Ministry Benchmark Screening	3 contaminants screened out (B2 screening criteria applied) 11 contaminants carried forward
2.3	POI Limit Screening	9 contaminants screened out (less than 5% of POI limit) 2 contaminants carried forward
2.4	POI Concentration Screening	2 contaminants screened out (POI concentration did not increase) 0 contaminants carried forward
3	Identification of Other Local Sources	Not applicable, all contaminants screened out in Step 2
4	Characterizing the Background Air Quality for the Study Area	Not applicable, all contaminants screened out in Step 2
5	Cumulative Assessment and Evaluation of the Effect of Increase ALCF Use	Not applicable, all contaminants screened out in Step 2

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