APPLICATION
SITE-SPECIFIC STANDARD FOR HEXAVALENT CHROMIUM
OWENS CORNING COMPOSITE MATERIALS CANADA LP
GUELPH PLANT

Prepared for: **OWENS CORNING COMPOSITE MATERIALS CANADA LP**

Prepared by: **MONTROSE ENVIRONMENTAL SOLUTIONS CANADA INC.**

March 2025
Point Edward, Ontario

Suite 210, 704 Mara St.
Point Edward, ON N7V 1X4
T 519.336.4101
www.montrose-env.com

TABLE OF ATTACHMENTS

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Attachment 1
Site-Specific Standard Application Form

Ontario

Ministry of the Environment,
Conservation and Parks

Request for Approval Under s. 35(1) of Local Air Quality Regulation for a Site-Specific Standard

General Information

Information requested in this form is collected under the authority of the *Environmental Protection Act*, R.S.O. 1990 (EPA) and the *Environmental Bill of Rights*, C. 28, Statutes of Ontario, 1993, (EBR) and will be used to evaluate requests for approval of a site-specific standard under Section 35 of Ontario Regulation 419/05: Air Pollution – Local Air Quality (the Regulation) made under the EPA. This form must be completed with respect to all requirements listed below and in accordance with the requirements of sections 32 to 34.1 of the Regulation in order for it to be considered a request. The Ministry of the Environment, Conservation and Parks may request additional information from the requestor during the technical review of any form accepted as complete.

1. Requestors are responsible for ensuring that they complete the most recent request form. Request forms and supporting documentation are available from the Client Services and Permissions Branch (CSPB) toll free at 1-800-461-6290 (locally at 416-314-8001), from your local District Office of the Ministry of the Environment, Conservation and Parks, and on the Ministry website on rules for complying with the local air quality regulation.
2. Technical questions regarding the site-specific standard process may be directed to the Technical Assessment and Standards Development Branch (TASDB) at the address below. Questions regarding completion and submission of this request should be directed to either Technical Assessment and Standards Development Branch or the Environmental Permissions Branch of the Ministry of the Environment, Conservation and Parks at the address below or to your local Ministry of the Environment, Conservation and Parks District Office which has jurisdiction over the area where the facility is located. A list of these District Offices is available on the Ministry Internet site.
3. A complete request package consists of a completed, signed request form and all supporting information required by the Regulation and any additional information requested by the Ministry identified in this form and the guidance material.
4. Three copies of the request package must be submitted to the Ministry of the Environment, Conservation and Parks.

   The original should be sent to:

   Ministry of the Environment, Conservation and Parks
   Director, Local Air Quality Regulation, s.35
   Technical Assessment and Standards
   Development Branch
   40 St. Clair Avenue West, 7th Floor
   Toronto ON M4V 1M2
   Phone : 416-327-5519
   Toll Free: 1 800 461-6290
   Email: SDB-REG419@ontario.ca

   A copy should be sent to:

   Ministry of the Environment, Conservation and Parks
   Director, Local Air Quality Regulation, s.35
   Environmental Permissions Branch
   135 St. Clair Avenue West, 1st Floor
   Toronto ON M4V 1P5
   Phone: 416-314-8001
   Toll Free: 1-800-461-6290
   Email: enviropermissions@ontario.ca

   A copy of this request package must also be sent to the local District Office that has jurisdiction over the area where the facilities are located.
5. Information contained in this request form is not considered confidential and will be made available to the public upon request. Information submitted as supporting information may be claimed as confidential but will be subject to the *Freedom of Information and Protection of Privacy Act* (FIPPA) and the EBR. If you do not claim confidentiality at the time of submitting the information, the Ministry of the Environment, Conservation and Parks may make the information available to the public without further notice to you. For more information, please refer to Section 2.10.1 of Guideline A-12: Guideline for the Implementation of Air Standards in Ontario (GIASO).

Cette publication hautement spécialisée {Request for Approval Under s. 35(1) of Local Air Quality Regulation for a Site-Specific Standard} n'est disponible qu'en anglais conformément au Règlement 671/92, selon lequel il n'est pas obligatoire de la traduire en vertu de la Loi sur les services en français. Pour obtenir des renseignements en français, veuillez communiquer avec le Ministère de l'Environnement, de la Protection de la nature et des Parcs au 416 314-8001 ou par courriel à enviropermissions@ontario.ca.

Instructions

This form should be used to request a site-specific standard in accordance with the Local Air Quality Regulation and should be accompanied by a description of the circumstances surrounding this request. In accordance with s. 32(1), a person who cannot comply with provincial air standard(s) within the phase-in period(s) may be eligible to request a site-specific standard under section 35 of the Regulation. A site-specific standard, if approved, replaces the standard in Schedule 3 as the compliance point for a facility for a period of five to ten years.

For more information about the site-specific standards process, please refer to the "Guide for Requesting A Site-Specific Standard" (GRSSS); sections 32 to 37.1 of the Regulation; and the "Guideline A-12: Guideline for the Implementation of Air Standards in Ontario" (GIASO). These documents and other related publications are available on the Ministry of the Environment, Conservation and Parks Internet site on rules for complying with the local air quality regulation.

Note: Pre-submission consultation with Technical Assessment and Standards Development Branch will be required for facilities that are requesting a site- specific standard.

Regulatory Authority

Subsection 35(1) of the Local Air Quality Regulation states:

35. (1) The Director may approve a request under section 32 and set a site-specific standard for the contaminant that is the subject of the request if,

- (a) the person making the request has complied with sections 32 to 34.1; and
- (b) the Director is of the opinion that,
  - (i) the person making the request cannot comply with section 20 with respect to the standard set out in Schedule 3 for the contaminant for the averaging period specified under paragraph 0.1 of subsection 33 (1) because,
    - (A) it is not technically feasible for the person to comply, in the case of a person who is relying on any paragraph of subsection 32 (1), or
    - (B) it is not economically feasible for the person to comply, in the case of a person who is relying on a paragraph of subsection 32 (1) other than paragraph 4,
  - (ii) the difference between the standard set out in Schedule 3 for the contaminant for the averaging period specified in paragraph 0.1 of subsection 33 (1) and the site-specific standard set by the Director for the contaminant is the minimum difference necessary to enable the person to comply with section 20 with respect to the contaminant, and
  - (iii) there is no public interest reason sufficient to require the denial of the request.

Section 1. Requestor Information (Owner of works/facility)

Requestor Name (legal name of individual or organization as evidenced by legal documents) Owens Corning Composite Materials Canada LP	Business Number 837230366

Business Name (the name under which the entity is operating or trading if different from the Requestor Name - also referred to as trade name)
Owens Corning Guelph Glass Plant

Requestor Type

☑ Corporation
☐ Municipal Government
☐ Sole Proprietor
☐ Federal Government
☐ Partnership
☐ Other (describe): ______
☐ Individual
☐ Provincial Government

Primary North American Industry Classification System (NAICS) Code 327214	Other NAICS Code

Business Activity Description
(a description of the business endeavour, this should include products sold, services provided or machinery/equipment used, etc.)
Manufacturing of textile glass and glass fiber for reinforcement products

Contact Name Jeff Taylor	Telephone Number 519-823-7328

Section 2. Requestor Physical Address

Civic Address – Street information
(address that has civic numbering and street information includes street number, name, type and direction)

Civic Number	Street Number 247	Street Name York Road

Type	Direction

Unit identifier (i.e. suite or unit number)

Survey Address (Used for a rural location specified for a subdivided township, an unsubdivided township or unsurveyed territory. Not required if Street Information is provided).

Lot and Concession: Used to indicate location within a subdivided township and consists of a lot number and a concession number

Lot	Concession

Part and Reference: used to indicate location within an unsubdivided township or unsurveyed territory, and consists of a part and a reference plan number indicating the location within that plan. Attach copy of the plan.

Part	Reference Plan

Municipality/Unorganized Township or Territory Upper Tier/District
Guelph

Province Ontario	Country Canada	Postal Code N1H 6P6

Section 3. Site Information - (location where activity/works requested for is to take place)

Site Name Guelph Glass Plant	MECP District Office Guelph District Office

Address Information

Same as Requestor Physical Address

☑ Yes ☐ No (If no, please provide site address information below)

Non Address Information (includes any additional information to clarify requestor's physical location)

Telephone Number (including area code) ext.	Fax Number (including area code)

Mobile Number (including area code)	Email Address

Geo Reference (Mandatory)

Description of Location Main Entrance	Map Datum NAD83	Zone 17	
Accuracy Estimate +/- 50m	Geo Referencing Method Google Earth	UTM Easting 562058m E	UTM Northing 4821731m N

Section 4. Technical Contact

Name Penny McInnis	Company Montrose Environmental Solutions Canada Inc.

Address Information

Same as Requestor Physical Address? ☐ Yes ☑ No If no, please provide technical information contact address information below.

Civic Address – Street information (address that has civic numbering and street information includes street number, name, type and direction)

Civic Number	Street Number 704	Street Name Mara Street
Type	Direction	Unit identifier (i.e. suite or apartment number) Suite 210

Delivery Designator: If signing authority mailing address is a Rural Route, Suburban Service, Mobile Route or General Delivery (i.e., RR#3)

Municipality Point Edward	Postal Station

Province/State Ontario	Country Canada	Postal Code N7V 1X4

Telephone Number (including area code) 519-336-4101 ext.245	Fax Number (including area code) 519-336-4311

Mobile Number (including area code)	Email Address pemcinnis@montrose-env.com

Section 5. Project Information

Type of Request

☐ Initial Request for Approval of Site-Specific Standard ☐ Request to Amend Existing Site-Specific Standard

☑ A Site-Specific Standard has been issued for this site.
This is a subsequent request.

Current Site-Specific Standard Reference Number(s) (Please attach a separate list if more space is required)
Approval Number: 210-16-rv0, Reference Number: 8061-9YNNY9

Current Site-Specific Standard Date(s) of Issue (yyyy/mm/dd) 2016/05/06	Current Expiry Date(s) for Site-Specific Standard(s) (yyyy/mm/dd) 2026/06/30

Summary of Basis for Requesting a Site-Specific Standard
(This summary will be used in the EBR posting notice. Please attach a separate summary if more space is required.)
See attached description

Contaminant Name(s) and CAS Number(s) that is (are) the subject of the Request for an Approval of a Site-Specific Standard:
Hexavalent Chromium (CAS number 18540-29-9)

Reason(s) for Request for a Site-Specific Standard:

Is the facility affected by the mandatory use of an approved dispersion model (in accordance with section 6 of the Regulation)?

☐ Yes (If yes, identify the date that the advanced air dispersion models are required to be used (yyyy/mm/dd)) ▶

☑ No

Is the facility affected by the implementation of air standard(s) included in Schedule 7 of the Regulation?

☐ Yes (If yes, identify the date(s) that the new air standard(s) comes into force (yyyy/mm/dd)) ▶

☑ No

Has the facility been issued an order that requires them to submit a request for a site-specific standard?

☐ Yes (If yes, identify the date(s) in the order and attach a copy. (yyyy/mm/dd)) ▶

☑ No

Has the facility been issued an order that requires them to submit a request for a site-specific standard?

☐ Yes (If yes, identify the date(s) that the new air standard(s) comes into force (yyyy/mm/dd)) ▶

☑ No

Other Supporting Information:

Was the site-specific meteorological data approved prior to completing the Emission Summary and Dispersion Modelling (ESDM) Report (in accordance with s.13(1) of the Regulation)?

☑ Yes (If yes, please attach a copy of the Ministry's Acceptance Letter or s. 13 notice)

☐ No No (If no, please provide reason) ▼

Was Source Testing done in support of the ESDM Report? ☑ Yes ☐ No

If yes, was the Source Testing Pre-Test Plan approved prior to completing the Source Testing (in accordance with s.11 (1)2 of the Regulation)?

☑ Yes (If yes, please attach a copy of the Ministry's Acceptance Letter)

☐ No No (If no, please provide reason) ▼

Was specific criteria developed for the assessment of negligible source(s) under Chapter 7.3 of the Procedure for Preparing an Emission Summary and Dispersion Modelling Report?

☐ Yes (If yes, please attach a copy of the Ministry's Acceptance Letter)

☑ No

Was the plan for the combined assessment of modelled and monitored results approved by the Ministry (in accordance with s.11 (1)3 of the Regulation)?

☐ Yes (If yes, please attach a copy of the Ministry's Acceptance Letter)

☑ No No (If no, please provide reason) ▼

All sources at this facility can be measured accurately using source testing, therefore a CAMM program is not beneficial or necessary for the site-specific standard application.

Has an application for a Environmental Compliance Approval under s.20.2 of the *Environmental Protection Act* for the necessary process modifications identified in the Action Plan been submitted to the Ministry?

☐ Yes Yes (If yes, please provide the Ministry Reference Number)

☑ No

Section 6. Public Consultation/Notification

Separate list attached? ☑ Yes ☐ No

Specify all public consultation/notification activities (such as public meetings, discussions with First Nations, etc.) related to the project that have been completed or are in the process of being completed. Please attach a separate list describing each of these consultation activities and the results achieved. The summary of comments must be in the Public Consultation Report (see below).

Public consultation included Public Liaison Committee meetings, proactive outreach to local government, and maintenance and promotion of a plant website focused on the site-specific standard. Details of the public consultation are included in the Public Consultation Report in this application.

Section 7. List of Attachments - This is a list of all supporting information to this request and is subject to the *Freedom of Information and Privacy Protection Act* and the Environmental Bill of Rights.

Attachment	Attached	Reference	Can be Disclosed
Pre-submission Requirements			
Ministry's Acceptance Letter for Site-Specific Meteorological Data or s. 13 notice	☑ Yes ☐ No		☐ Yes ☐ No
Ministry's Acceptance Letter for Source Testing Pre-Test Plan	☑ Yes ☐ No		☐ Yes ☑ No
Ministry's Acceptance Letter for Specific Criteria developed for the assessment of negligible source(s) under Chapter 7.3 of the ESDM Procedure Document.	☐ Yes ☑ No		☐ Yes ☐ No
Ministry's Acceptance Letter for the plan for the combined assessment of modelled and monitored results.	☐ Yes ☑ No		☐ Yes ☐ No
Information Supporting Site-Specific Standard Request			
Emission Summary and Dispersion Modelling (ESDM) Report in accordance with s.33 of the Regulation	☑ Yes		☐ Yes ☑ No
Technology Benchmarking Report	☑ Yes		☐ Yes ☑ No

Attachment	Attached	Reference	Can be Disclosed
Economic Feasibility Report (Optional)	☐ Yes ☑ No		☐ Yes ☐ No
Action Plan	☑ Yes		☐ Yes ☑ No
Public Consultation Report	☑ Yes		☐ Yes ☑ No
Risk Scoring (Optional)	☐ Yes ☑ No		☐ Yes ☐ No

Section 8. Statement of Requestor

I, the undersigned hereby declare that, to the best of my knowledge:

- The information contained herein and the information submitted in support of this request is complete and accurate in every way, and I am aware of the penalties against providing false information as per s.184(2) of the *Environmental Protection Act.*
- The Technical Contact identified in section 4 of this form is authorized to act on my behalf for the purpose of obtaining approval for a site-specific standard under Section 35 of the Local Air Quality Regulation for the equipment/processes identified herein.
- I have used the most recent request form (as obtained from the Ministry Internet site on rules for complying with the local air quality regulation or the Client Services and Permissions Branch at 1-800-461-6290) and I have included all necessary information required by the Regulation, identified on this form and in the guidance material.

Name of Signing Authority (please print)
Jeff Taylor

Title
Plant Leader

Signature

Date (yyyy/mm/dd)
2025/03/25

Address Information

Same as Requestor Physical Address? ☑ Yes ☐ No If no, please provide technical information contact address information below.

Telephone Number (including area code)
519-823-7328 ext.

Fax Number (including area code)

Email Address
Jeff.Taylor@owenscorning.com

Description of Request

The Owens Corning Guelph Glass Plant is requesting an interim site-specific annual standard for hexavalent chromium under Section 32 of Ontario Regulation 419/05. The facility produces fiberglass reinforcements for commercial and industrial markets worldwide. This facility is the sole producer of fiberglass for reinforcements in Ontario and Canada and has been operating in Guelph since 1951. The facility is located at 247 York Road, Guelph, Ontario in the Township of Guelph/Eramosa and Wellington County.

On July 1, 2016, the existing hexavalent chromium air standard came into effect at 0.00014 micrograms per cubic meter (µg/m^3) on an annual average basis. Owens Corning applied for and received a site-specific standard of 0.0024 µg/m^3 until June 30, 2026.

Owens Corning has conducted technology benchmarking as part of this site-specific standard renewal application and due to technical feasibility challenges remains unable to achieve the Schedule 3 standard for hexavalent chromium. However, Owens Corning is committed to reducing POI concentrations of hexavalent chromium, and has developed a combination of options for implementation to achieve additional reductions below the existing site-specific standard.

Owens Corning is requesting a more stringent site-specific annual hexavalent chromium standard of 0.00133 µg/m^3 with additional future reductions down to 0.00068 µg/m^3 over a 10 year period.

Ministry of the Environment, Conservation and Parks

Environmental Monitoring and Reporting Branch

125 Resources Road
Etobicoke ON M9P 3V6
Tel.: 416 235-6300

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction de la Surveillance Environnmentale

125, chemin Resources
Etobicoke ON M9P 3V6
Tél. : 416 235-6300

May 16, 2023
Jeff Taylor, Plant Leader
Owens Corning Composite Materials Canada - LP
247 York Road
Guelph, Ontario
N1H 6P6

Dear Madam/Sir:

Re: Request for Approval under Paragraph 3 of section 13(1) of Regulation 419/05
For use of Site-specific Meteorological Data:
Owens Corning Composite Materials Canada - LP - Owens Corning Guelph Glass Plant (located at 247 York Road, Guelph, Ontario).

In accordance with the application for approval under s.13(1) of Regulation 419/05 for use of site-specific meteorological data, I am approving the use of site-specific data for the above-referenced site as requested by the Owens Corning Composite Materials Canada - LP in the application dated March 2, 2023.

The site-specific meteorological data referenced as the Guelph Turfgrass data is a reasonable reflection of the meteorological conditions for the proposed modelling assessment.

A 5-year (2016 to 2020) meteorological dataset has been prepared by the Ministry of the Environment, Conservation and Parks with wind-sector dependent land use specific to the site identified in the application. The upper air and surface data is from the U.S. National Weather Service's Buffalo and the Environment and Climate Change Canada's Guelph Turfgrass stations respectively, with cloud cover data from the Toronto International airport station.

This site-specific meteorological data was prepared in response to a request submitted under O. Reg. 419/05 and is approved for use at this specific facility until such time as there are significant land use changes in vicinity of the facility.

This meteorological dataset was prepared using the AERMET 22112 meteorological pre-processor computer program. It is to be used in conjunction with the corresponding version of AERMOD to model discharges from the above-referenced facility. You are reminded that this dataset must be reprocessed when the Ministry adopts a newer version of AERMET. The Ministry can provide reprocessed meteorological data upon request.

This s.13(1) approval revokes and replaces the s.13(1) approval in appendix A, issued on November 27, 2014.

Should you have any comments or questions relating to the above site specific meteorological dataset, please send an e-mail to MetDataENE@ontario.ca within 30 days of the date of this correspondence with details, so that this dataset can be modified, if necessary.

Yours truly,

Abby Salb

Abby Salb
Director, Section 13, O. Reg. 419/05

cc: District Manager, Guelph District Office
Director, Section 9, Environmental Protection Act
Environmental Permissions Branch
LEHDER Environmental Services Limited

Appendix A

Ministry of the Environment and Climate Change

Environmental Monitoring and Reporting Branch

125 Resources Road
Etobicoke ON M9P 3V6
Tel.: 416 235-6300
Fax: 416 235-6235

Ministère de l'Environnement et de l'Action en matière de changement climatique

Direction de la Surveillance Environnmentale

125, chemin Resources
Etobicoke ON M9P 3V6
Tél. : 416 235-6300
Téléc. : 416 235-6235

November 27, 2014
Robert Nixon, Engineering Leader
Owens Corning Composite Materials Canada - LP
247 York Road
Guelph, Ontario
N1H 6P6

Dear Madam/Sir:

Re: Request for Approval under Paragraph 3 of section 13(1) of Regulation 419/05
For use of Site Specific Meteorological Data:
Owens Corning Composite Materials Canada - LP-Owens Corning Guelph Glass Plant (located at 247 York Road, Guelph, Ontario)

In accordance with the application for approval under s.13(1) of Regulation 419/05 for use of site specific meteorological data, I am approving the use of site specific data in preparing an Emission Summary Dispersion Modelling (ESDM) as requested by Owens Corning Composite Materials Canada - LP and signed by you dated November 17, 2014.

The site specific meteorological data referenced as the Guelph Turfgrass data is an accurate reflection of the meteorological conditions for the proposed modelling assessment, given the proximity of the meteorological station to the facility's location.

A fully processed meteorological data set for the 5 years from 2009 to 2013 has been prepared by the Ministry of the Environment and Climate Change with wind-sector dependent land use specific to the application area, using wind and temperature data from the Guelph Turfgrass station and other variables from the Waterloo, Kitchener/Waterloo and Toronto Pearson International airport station. This meteorological dataset was prepared using the AERMET 14134 meteorological pre-processor computer program, and can be used to run the AERMOD model. It has been prepared to model discharges only from the above-referenced facility.

The data were prepared in reply to a request submitted in relation to the preparation of an ESDM report under O. Reg. 419/05 and is approved for use in subsequent ESDM reports for this specific facility until such time as (i) the ministry officially adopts a new regulatory version of the AERMET computer program or (ii) there are significant land use changes in vicinity of the facility.

Yours truly,

Yvonne Hall
Director, Section 13, O. Reg. 419/05

cc: District Manager, Guelph District Office
Director, Section 9, Environmental Protection Act
Environmental Approvals Branch

Ministry of the Environment,
Conservation and Parks
Technical Assessment and
Standards Development Branch
40 St. Clair Avenue West
7th Floor
Toronto ON   M4V 1M2
Phone: 416.327.5519
Fax: 416.327.2936

Ministère de l'Environnement, de
la Protection de la nature et des Parcs
Direction des évaluations techniques et de
l'élaboration des normes
40, avenue St. Clair Ouest
7e étage
Toronto, ON   M4V 1M2
Tél: 416 .327.5519
Téléc: 416. 327.2936

Ontario

Via email: gubastien@montrose-env.com

TSS File No.: WCR:SA: 110230:24

2024/01/24

Guy Bastien
Montrose Environmental

Dear Mr. Bastien

Subject: Pre-test plan review for source testing to be conducted at Owens Corning Guelph Glass

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We received your pre-test plan (Project #032615), dated January 17, 2024, prepared on behalf of Owens Corning Guelph Glass (Owens Corning) and referring to source testing to be conducted at their facility in Guelph, Ontario.

Source testing is a requirement under amended Environmental Compliance Approval No. 4548-AA3QXU issued June 22, 2016. The testing program will be conducted in two phases in 2024 to assess potential seasonal differences in emissions.

Sources to be tested:

- Source B24- T105 West Furnace Stack
- Source B25- T105 East Furnace Stack
- Source B38- T105 Forehearth Stack
- Source B33- Furnace Hall General Exhaust
- Source B34- Furnace Hall General Exhaust
- Source C79- Furnace Hall General Exhaust

Target contaminant:

- Hexavalent Chromium (Cr^{+6})

Reference methods to be used:

Stack gas parameters	Ontario Source Testing Code (OSTC) Methods ON-1-ON-4
Cr^{+6}	US EPA Method 0061

General facility description:

The Owens Corning plant produces textile glass yarn and fiberglass for reinforcements for the commercial and industrial market. This facility is the sole producer of Continuous Filament Mat (CFM) in Ontario and Canada.

Testing strategy

T105 furnace exhaust gases are exhausted to atmosphere via two stacks. To assess hexavalent chromium emissions from this source, both furnace stacks will be sampled concurrently.

For the first mobilization, Fan C79 will be operated at a constant exhaust rate throughout the program; other roof ventilation fans will not be operated during sampling. For the second mobilization, Fans B33, B34 and C79 will all be operated at constant exhaust rates.

The stacks will be sampled over a period of 80 minutes, while the furnace hall ventilation will be sampled over a period of seven hours per test run at a constant sampling rate and single sampling point.

Operating conditions:

Data related to the operation of Furnace T105 will be monitored during each sampling period. During sampling, the facility will operate at the expected production rate at the time of testing. The expected glass pull rate for the February 2024 testing is 1,175 kg/hr which is approximately 65% of the maximum pull rate for the facility. Hexavalent chromium emissions are primarily related to asset degradation, and not production rates.

Data expected in the final report, consistent with previous testing programs, are listed below:

- T105 Furnace/Forehearth glass pull rate
- Melter O2 flow rate
- Melter glass flow rate
- Forehearth O2 flow rate
- Forehearth gas flow rate

The pre-test plan is approved as the proposed reference methodologies/sampling strategies are acceptable.

We have noted the sampling schedule to commence February 12, 2024. If changes to this schedule occur, please notify both the MECP's Guelph District Office and the Source Testing Group.

Just a reminder that the source testing report is required to be submitted in electronic format to the district office and to the source testing group at sourcetesting@ontario.ca.

If you have any questions with regards to this assessment, I can be reached by phone at 437-995-2835 or by email at sourcetesting@ontario.ca

Sincerely,

Caitlyn Ruddy
Source Assessment Specialist
Technology Standards Section

cc: J. Taylor- Owens Corning (jeff.taylor@owenscorning.com)
J. Lamport- Guelph District Office (jacqueline.lamport@ontario.ca)
J. McKerrall –TSS (jeffrey.mckerrall@ontario.ca)
B. Fullerton- TSS (bill.fullerton@ontario.ca)

File AQ-02 (Owens Corning- Guelph)

Doc.Mgmt # 5AH010009

Subject : [External] - RE: 032615 - Owens Corning Guelph Glass Plant Hexavalent Chromium Notification of Intent to Test
Date : Monday, May 27, 2024 11:32 am
Linked to : Protocols and Notification E-mail
From : "Source Testing (MECP)" <SOURCETESTING@ontario.ca>
To : Guy Bastien <gubastien@montrose-env.com>
Cc : Jeff Taylor <Jeff.Taylor@owenscorning.com>; Penny McInnis <PeMcinnis@montrose-env.com>; Evan Metcalfe <EvMetcalfe@montrose-env.com>; " Lamport, Jacqueline (MECP)" <Jacqueline.Lamport@ontario.ca>; "McKerrall, Jeffrey (MECP)" <Jeffrey.McKerrall@ontario.ca>; "Fullerton, Bill (MECP) " <Bill.Fullerton@ontario.ca>
Attachments : u:\pmcinnis\attach\2024\05\image001(58).png

Some people who received this message don't often get email from sourcetesting@ontario.ca. Learn why this is important

Guy,

We have noted the second round of testing at Owens Corning scheduled for June 17, 2024. The only change from the previous round will be that the three roof ventilation sources will be operating and will be sampled concurrently. We have noted the lab change for this round of testing.

If changes to the sampling schedule occur please notify both the Guelph District Office and the Source Testing Group.

Caitlyn Ruddy
Source Assessment Specialist | Technical Assessment and Standards Development Branch
Ministry of the Environment, Conservation and Parks | Ontario Public Service
437-995-2835 | caitlyn.ruddy @ontario.ca

Taking pride in strengthening Ontario, its places and its people

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From: Guy Bastien <gubastien@montrose-env.com>
Sent: Friday, May 17, 2024 12:37 PM
To: Source Testing (MECP) <SOURCETESTING@ontario.ca>; Lamport, Jacqueline (MECP) <Jacqueline.Lamport@ontario.ca>
Cc: Jeff Taylor <Jeff.Taylor@owenscorning.com>; Penny McInnis <PeMcinnis@montrose-env.com>; Evan Metcalfe <EvMetcalfe@montrose-env.com>
Subject: 032615 - Owens Corning Guelph Glass Plant Hexavalent Chromium Notification of Intent to Test

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

To Whom It May Concern:

Owens Corning Guelph Glass (OC Guelph) has retained Montrose Environmental Group, Ltd. (Montrose) to conduct **hexavalent chromium emissions testing** from selected sources servicing the T105 production line at the facility located at 247 York Road, Guelph, Ontario.

Attached please find a previously approved Test Protocol for the source sampling program. Please note that the Protocol submission included **Business Confidential** Information, which was provided as a separate file for review.

This Test Protocol was originally submitted in January 2024, and was approved for a February 2024 sampling campaign. Attached please find a copy of the Ministry PTP review letter.

Montrose is scheduled to repeat this sampling program over the period of **June 17 - 20, 2024**, with the following changes:

- Three (3) roof ventilation sources will be operating and will be sampled concurrently. The three sources and the areas they service are identified in the January 2024 Test Protocol. The remainder of the sampling program will remain as described in the Test Protocol.

- Subsequent to the completion of the February 2024 sampling program, Bureau Veritas discontinued providing stack sample analytical services. The analytical laboratory will now be as shown below:

Laboratory: **ALS Environmental**

Contact: **Ron McLeod**

Phone: (905) 331-3111, Ext. 222

Ron is based in the ALS Burlington, ON laboratory. However, I believe hexavalent chromium analyses are performed in the ALS Environmental Waterloo, ON Laboratory.

If you have any questions or concerns regarding the proposed sampling program, please feel free to contact me.

Respectfully submitted,

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-- NextPart --

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Attachment 2
Emission Summary and Dispersion Modelling Report

EMISSION SUMMARY & DISPERSION MODELLING REPORT FOR A SITE-SPECIFIC STANDARD

GUELPH PLANT

Prepared for: **OWENS CORNING COMPOSITE MATERIALS CANADA LP**

Prepared by: **MONTROSE ENVIRONMENTAL SOLUTIONS CANADA INC.**

Version 1.0
March 2025
Point Edward, Ontario

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EMISSION SUMMARY & DISPERSION MODELLING REPORT FOR A SITE-SPECIFIC STANDARD

GUELPH PLANT

Prepared for Owens Corning Composite Materials Canada LP, March 2025

LICENSED PROFESSIONAL ENGINEER
P. E. McINNIS
03-28-2025
PROVINCE OF ONTARIO

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VERSION CONTROL

Version	Date	Issue Type	Filename	Description
V0.1	21-Mar-2025	Draft	41296-526 ESDMR 2025-03-21 draft V0.1.docx	Issued to client for review
V1.0	28-Mar-2025	Final	41296-526 ESDMR - Public 2025-03-28 final V1.0.docx	Issued to client

EXECUTIVE SUMMARY

The Owens Corning Composite Materials Canada LP Guelph Glass facility is requesting a renewal of the site-specific annual standard for hexavalent chromium under Section 32 of Ontario Regulation 419/05: Air Pollution – Local Air Quality (O. Reg. 419/05). The Owens Corning Guelph Glass facility is located at 247 York Road, Guelph, Ontario in the Township of Guelph/Eramosa and Wellington County. This Emission Summary and Dispersion Modelling Report (EDSMR) is a required element of Owens Corning's request. This facility currently operates under Amended Environmental Compliance Approval Number 2625-BNET4H.

The NAICS code for the Owens Corning Guelph facility is 327214, Glass Manufacturing, and is required to demonstrate compliance using advanced dispersion models (AERMOD).

The facility produces textile glass yarn and fiberglass for reinforcements for commercial and industrial markets worldwide. This facility is the sole producer of fiberglass for reinforcements in Ontario and Canada and has been operating in Guelph since 1951. Due to the nature of the process, the facility operates continuously 24 hours per day, 365 days per year. The facility has a maximum production capacity of approximately 16,000 tonnes of molten glass per year.

Glass fibers are produced by melting raw materials in gas fired furnaces and transporting the molten glass through forehearth channels to "bushings" where it is mechanically pulled to form the fibers. Subsequently, the fibers are used to make glass yarns, mat and reinforcements. The raw materials used to manufacture these high-tech glass fibers consist of dry solids, in powder and granular form, including clay, sand, limestone, and dolomite.

This ESDM Report contains all significant sources of contaminants present at the facility. Sources of emissions include:

- Raw materials handling and storage
- Glass melting operations
- Production of textile glass
- Production of textile glass products
- Packaging of products

Owens Corning Guelph has an annual site-specific standard of 0.0024 (µg/m^3) for hexavalent chromium. A site-specific standard is a modelled air concentration at a selected Point of Impingement (POI) developed and approved using site-specific emissions, meteorological data, and an approved air dispersion model, combined with a site-specific Action Plan. This compliance approach focuses on actions the facility can take to reduce hexavalent chromium concentrations to the extent possible, taking into consideration available technology and best practices. A site-specific standard is an interim standard established for a specific period of time to ensure continued review of available and feasible technologies.

Several documents are provided as part of the request for a site-specific standard for hexavalent chromium.

These documents include:

- Emission Summary and Dispersion Modelling Report (ESDMR)
- Technology Benchmarking Report
- Action Plan for achieving reductions

For the Owens Corning Guelph facility, emission estimates for hexavalent chromium are based on validated source testing conducted in 2024 on all sources of hexavalent chromium including the glass melting furnace, forehearth, and furnace hall general ventilation. These emission estimates were then modelled using the AERMOD air dispersion model Version 22112 and a 5 year site-specific meteorological dataset processed by the Ontario Ministry of Environment, Conservation and Parks (MECP).

The Action Plan for the Owens Corning Guelph Glass Plant includes a combination of material substitution, process and design changes as well as re-engineering of exhaust stacks. Due to the continuous nature of the process, the material substitution and process changes will be implemented during the next scheduled shutdown for the assets. The modifications to the exhaust stacks is planned for completion in 2026 as it is expected these can be done while the facility continues to operate normally.

The following table summarizes the current facility emissions and POI concentrations as well as the post-Action Plan concentrations.

Emission Summary Table - Hexavalent Chromium

Contaminant	Averaging Time	Emission Rate (g/s)	Location of Point of Impingement (POI)	Maximum Modelled Concentration (ng/m^3)	MECP POI Criteria (ng/m^3)	Schedule	Limiting Effect	% of Criteria
Hexavalent Chromium (Current Average)	24-hour	1.16E-04	All Receptors	4.67	70	URT	Health	6.7%
			Sensitive receptor	3.36	70	URT	Health	4.8%
	Annual		All Receptors	1.06	2.4	SSS	Health	44.1%
			Sensitive receptor	0.41	2.4	SSS	Health	17.1%
Hexavalent Chromium (Current with Uncertainty)	24-hour	1.37E-04	All Receptors	5.67	70	URT	Health	8.1%
			Sensitive receptor	3.97	70	URT	Health	5.7%
	Annual		All Receptors	1.33[1]	2.4	SSS	Health	55.5%
			Sensitive receptor	0.49	2.4	SSS	Health	20.3%
Hexavalent Chromium (After Action Plan)	24-hour	1.31E-04	All Receptors	2.61	70	URT	Health	3.7%
			Sensitive receptor	2.16	70	URT	Health	3.1%
	Annual		All Receptors	0.68	1.33[2]	Proposed SSS	Health	51.4%
			Sensitive receptor	0.23	1.33[2]	Proposed SSS	Health	17.3%

[1] Proposed SSS concentration

[2] Owens Corning is applying for this value as the site-specific standard for hexavalent chromium

Current Emission Summary Table – 1 hour Average (All Other Compounds)

Contaminant	CAS #	1 Hour Emission Rate (g/s)	1 hr Facility MAX GLC (ug/m^3)	1 Hour POI Criteria (ug/m^3)	Schedule	Limiting Effect	% of Criteria
SULPHUR DIOXIDE	7446-09-05	6.15E-01	3.78E+01	100	Schedule 3	Health & Vegetation	37.8%
NITROGEN OXIDES (EXPRESSED AS NO_2)	10102-44-0	1.16E+00	6.61E+01	400	Schedule 3	Health	16.5%

Current Emission Summary Table – 24 hour Average (All Other Compounds)

Contaminant	CAS #	24 Hour Emission Rate (g/s)	24 hr Facility MAX GLC (ug/m^3)	24 Hour POI Criteria (ug/m^3)	Schedule	Limiting Effect	% of Criteria
PM - PARTICULATE MATTER	N/A - M08	4.52E-01	8.59E+01	120	Schedule 3	Visibility	71.6%
HYDROGEN FLUORIDE -GASEOUS-GROWING SEASON GS [1]	7664-39-3	6.41E-03	1.95E-01	0.86	Schedule 3	Vegetation	22.6%
NITROGEN OXIDES (EXPRESSED AS NO_2)	10102-44-0	1.16E+00	3.77E+01	200	Schedule 3	Health	18.9%
Chromium Compounds (Di-,Tri-,metallic)	7440-47-3	7.93E-05	7.89E-03	0.5	Schedule 3	Health	1.6%
HYDROGEN CHLORIDE	7647-01-0	4.01E-03	1.22E-01	20	Schedule 3	Health	0.6%
2,2-dibromo-3-nitrilopropionamide	10222-01-2	6.01E-03	6.07E-01	1	Screening Level	Health	<Screening Level
5-Chloro-2-methyl-2H-isothiazol-3-one	55965-84-9	3.45E-03	4.65E-01	1.35	Screening Level	Health	<Screening Level
5-Chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	1.19E-03	1.60E-01	0.5	Screening Level	Health	<Screening Level
2-Methyl-4-Isothiazolin-3-one	2682-20-4	1.19E-03	1.60E-01	0.5	Screening Level	Health	<Screening Level
MAGNESIUM NITRATE	10377-60-3	4.48E-03	5.69E-01	2	Screening Level	Health	<Screening Level
Dibromoacetonitrile	3252-43-5	1.45E-03	3.43E-01	1.65	Screening Level	Health	<Screening Level
1-Propanol, 3-(trimethoxysilyl)-, methacrylate	2530-85-0	6.41E-04	6.48E-02	0.5	Screening Level	Health	<Screening Level
Diallyl Phthalate	131-17-9	4.77E-03	5.74E-01	5	Screening Level	Health	<Screening Level
Sodium acetate	127-09-3	1.20E-02	1.57E+00	15	Screening Level	Health & Particulate	<Screening Level
Polyethylene glycol	25322-68-3	1.80E-02	1.82E+00	40	Screening Level	Health	<Screening Level
Sodium Bromide	7647-15-6	5.03E-02	5.12E+00	120	Screening Level	Health & Particulate	<Screening Level
BENZOYL PEROXIDE	94-36-0	4.45E-03	8.42E-01	25	Screening Level	Health	<Screening Level
3-(Triethoxysilyl)propylamine	919-30-2	1.95E-02	2.54E+00	80	Screening Level	Health	<Screening Level
Acid Solubilized Fatty Acid Amide (Prop1)	NA	2.79E-02	7.97E+00	8.261	FL/APOIC	NA	<FL/APOIC
Acid Solubilized Fatty Acid Amide (Prop2)	NA	1.24E-02	3.54E+00	3.672	FL/APOIC	NA	<FL/APOIC
Benzenamine, N-[3-(trimethoxysilyl)propyl]-	3068-76-6	6.72E-03	8.75E-01	1.114	FL/APOIC	NA	<FL/APOIC

[1] Assessed against the most stringent criteria for Gaseous Growing Season

Current Emission Summary Table – 30 Day Average (All Other Compounds)

Contaminant	CAS #	30 Day Emission Rate (g/s)	Facility MAX GLC (µg/m³)	30 Day POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria
HYDROGEN FLUORIDE -GASEOUS-GROWING SEASON GS [1]	7664-39-3	6.41E-03	7.59E-02	0.34	Schedule 3	Health	22.3%

[1] assessed against the most stringent criteria for Gaseous Growing Season

Current Emission Summary Table – Annual Average (All Other Compounds)

Contaminant	CAS #	Annual Emission Rate (g/s)	Annual Facility MAX GLC (µg/m³)	Annual POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria
SULPHUR DIOXIDE	7446-09-05	6.15E-01	2.13E+00	10	Schedule 3	Health & Vegetation	21.3%

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1 INTRODUCTION

The purpose of this Emission Summary and Dispersion Modelling Report (ESDMR) is to provide an accurate and representative estimate of emissions from the Owens Corning Composite Materials Canada LP (Owens Corning) facility located in Guelph, Ontario. This document was developed in accordance with s.32 of O. Reg. 419/05 and the guidance in the following Ontario Ministry of Environment, Conservation and Parks (MECP) documents *Procedure for Preparing an Emission Summary and Dispersion Modelling Report* (Guidance Document) dated March 2018, *Air Dispersion Modelling Guideline for Ontario* (Dispersion Modelling Guideline) dated February 2017, and *Guide to Requesting a Site-Specific Standard* dated February 2017.

The objectives of this ESDMR are to:

- Support a renewal application for a site-specific standard for hexavalent chromium under Section 32 of O. Reg. 419/05
- Demonstrate compliance with Section 20 of O. Reg. 419/05 – General Air Pollution

1.1 Site-Specific Standard

O. Reg. 419/05 has provisions to request approval of an alteration to a Schedule 3 standard. The facility currently has an annual site-specific standard of 0.0024 (µg/m^3) for hexavalent chromium which was approved in 2016. The Owens Corning Guelph facility is applying for a site-specific standard renewal for hexavalent chromium emissions. The intention of this report is to communicate current and future emission rate estimates from the sources of hexavalent chromium for the purpose of a Site-specific Standard Renewal Application.

Owens Corning has conducted an assessment of all available pollution control options and established a control strategy for hexavalent chromium to achieve the best technically and economically feasible reductions at this time. This assessment was based upon a jurisdictional review of air pollution requirements, available pollution control methods, and the results outlined in this report.

1.2 Scope of ESDMR

This report includes all activities at this site:

- All raw and intermediate material handling and transfer sources
- All process-related sources, including:
    - Furnace
    - Forehearth
    - Binder preparation and application
    - Continuous Filament Mat (CFM) Process
    - Wet Chopped Strand (WUCS) Process
- All Pollution Control equipment, including:
    - Curing Oven Regenerative Thermal Oxidizer (RTO)
    - NGF RTO (1)

  - Cyclones (2)
  - Filter Box
  - Raw Material Dust Collectors

- All non-process-related sources, including:
  - Cooling towers
  - Comfort heating and cooling
  - Emergency and non-emergency electrical generation

Additionally, this report includes assessment of the proposed reduction activities for hexavalent chromium to support the renewal application for the site-specific standard. All other contaminants are assessed in this report as the current (maximum) operating scenario.

1.3 Revision History

The versions of this ESDMR are listed in the following table.

Version	Date	Description of Change
Revision 13	March 2025	• Removed zinc oxide to update from historical batch change • Updated binder application rates • Updated di tri chromium emission rates using the June 2024 validated source testing • Incorporated multiple hexavalent chromium emission scenarios based on June 2024 validated source testing and proposed Action Plan
Revision 12	June 2024	• Updated di tri and hexavalent chromium emission rates using the February 2024 validated source testing • Updated modelling using the flowrates and temperatures for sources included in the February 2024 validated source testing program

2 FACILITY DESCRIPTION

2.1 General Description

The Owens Corning - Guelph Glass Plant is located at 247 York Road in Guelph, Ontario. The facility produces textile glass yarn and fiberglass for reinforcements for commercial and industrial markets worldwide. This facility is the sole producer of CFM in Canada. Owens Corning - Guelph has been in operation since 1951 and is recognized as the world's leading producer of high quality CFM.

The NAICS code for the Owens Corning Guelph facility is 327214, Glass Manufacturing. All sources at this location are stationary. The adjacent lands have mixed zoning, including industrial, commercial, residential, and parkland. This facility operates 24 hours a day, 7 days a week, 52 weeks a year. The facility has production capacity of approximately 16,000 tonnes of molten glass per year.

Glass fibers are produced by melting raw materials in gas-fired furnaces and transporting the molten glass through forehearth channels to "bushings" where it is mechanically pulled to form the fibers. Subsequently, the fibers are used to make glass yarns, mat and reinforcements.

The raw materials used to manufacture these high-tech glass fibers consist of dry solids in powder and granular form, including clay, sand, limestone, and dolomite.

The main manufacturing operations currently include:

- Raw materials handling and storage
- Glass melting operations
- Production of textile glass
- Production of textile glass products
- Packaging of products

A process flow diagram is provided in Appendix A. The individual process operations are briefly described in the following sections.

Scaled drawings showing air emission sources and the extent of the property line is included in Appendix B.

2.2 Production Rate

This facility has slightly variable operations due to customer demand, however, glass melting and fiber forming activities must operate continuously. The maximum molten glass production rate is 1826 kg/hour (16,000 tonnes/year).

2.3 Current Operations

2.3.1 Raw Materials Storage and Handling

Raw materials, including clay, silica sand and limestone, are received in bulk and stored in silos. These materials are automatically weighed and mixed to form a mixed batch. The mixed batch is then pneumatically conveyed to a storage hopper located above the melting unit (furnace). The transfer of raw materials and mixed batch generates particulate, which is controlled through the use of dust collectors.

2.3.2 Glass Melting & Transfer

The glass melting itself takes place in a natural gas-fired furnace. This furnace (T105) is operated using oxygen/natural gas-fired systems and with supplemental electrical energy (e-boost system).

The batch of mixed raw material is fed into the rear of the furnace and it melts to form a molten homogenous glass. Chemical components in the batch cause gas bubbling in the mixture, and result in particulate and gaseous emissions.

2.3.3 Molten Glass Transfer

The molten glass flows from the melters via channels into the forehearth leading to the fiber forming area. The forehearth areas are also heated with oxygen/ natural gas to maintain the molten state of the glass. All forehearth exhaust gases are directed out a single forehearth stack (Source ID B38).

2.3.4 Oxygen Storage & Generation

The facility currently uses oxygen in the combustion systems for the furnaces, channels, and forehearths. All oxygen is received by truck and stored onsite.

2.3.5 Production of Glass Fibers

The molten glass flows to electrically heated bushings, which contain a large number of small holes through which the glass is drawn.

After the continuous glass fibers are drawn through the bushings they enter one of two forming areas (WUCS or CFM). In both forming channels the glass fibers are cooled before being drawn over a roller applicator, which applies a coating of a water-soluble sizing and/or coupling agent.

2.3.6 Production of Wet Chopped Strand (WUCS)

After the glass fibers are coated with sizing/coupling agent, they are simply chopped directly into boxes for resale.

2.3.7 Production of Continuous Filament Mats (CFM Line)

A continuous filament mat product is manufactured on the CFM line. For the CFM line, glass strands are drawn directly from the CFM forming area and laid down continuously as a mat. The mat is coated with a powdered polyester resin dispersed in water and conveyed through a gas-fired oven, where the resin is cured to bind the fibers into a mat. The oven exhaust is directed through an RTO prior to discharge to the atmosphere. The mat is then cut to length, rolled up and packaged for transport to a customer.

2.4 Site Plans and Area Maps

The mandated plans and map are located in Appendix B. These plans and maps satisfy the requirement in subparagraph 9 of Section 26 of O. Reg. 419/05 (as per subparagraph 1 of Section 33). These include:

- Site plan in UTM coordinates, drawn to scale, showing the locations of all emission sources, buildings (including elevations above grade) and property lines.
- Area map to a distance of 1,000 m.
- Land use zoning maps. The adjacent lands are zoned industrial, commercial, residential, and parkland.

3 INITIAL IDENTIFICATION OF SOURCES AND CONTAMINANTS

A review of all processes and operations at the site was conducted to identify all emission points to the atmosphere as required by subparagraphs 2 to 4 of Section 26 of O. Reg. 419/05. The table below details all sources at the facility with the contaminants expected to be emitted from each.

TABLE 1 Sources and Contaminants Identification

Source Information		Expected Contaminants	Include in Model?	Rationale
Description	General Location	Contaminants	(Y/N)	
Batch House Dust Collectors (Source IDs G40, G45, G65, G79, G78, G81, G84)	Batch House Area	PM, silica	N	No external discharge
Batch House Dust Collectors (Source IDs G61, G63, & G90)	Batch House Area	PM	Y	
		Silica, Sulphuric acid disodium salt	N	7.1.2
T105 Furnace Stacks (Source ID B24 & B25)	Southwest Quadrant	PM, NOx, SO_2, acid gases, di-trivalent chromium, hexavalent chromium	Y	
		CO	N	7.1.2
Furnace Hall General Ventilation (Source IDs B33, B34, C79, & C80)	Southwest Quadrant	di-trivalent chromium, hexavalent chromium	Y	
B Wing Forming Scrap Tunnel Exhausts (Source ID B39, B16)	Southwest Quadrant	PM, VOCs	Y	
		Ethanol, Ammonia, Insignificant VOCs, magnesium chloride	N	7.1.2
T105 Forehearth (Source ID B38)	Southwest Quadrant	NOx, di-trivalent chromium, hexavalent chromium	Y	
		PM	N	7.1.1
Binder Circ. Tank Exhaust (Source ID C60)	South-Central Area	VOCs, magnesium nitrate	Y	
		Ammonia, Ethanol, Insignificant VOCs, magnesium chloride	N	7.1.2
CFM Forming Tunnels (Source ID C100, C101, C72, C99)	Southwest Quadrant	PM, VOCs, sodium bromide	Y	
		Insignificant VOCs	N	7.1.2
CFM Binder Cyclone (Source ID C73)	Northwest Quadrant	PM, benzoyl peroxide	Y	
CFM RTO Oven (Source ID C75)	Northwest Quadrant	NOx, VOCs, benzoyl peroxide, PM, sodium bromide, magnesium nitrate	Y	
		Ammonia, Insignificant VOCs, magnesium chloride	N	7.1.2
Filter Box Louvre Exhaust (Source ID D64)	Northeast Quadrant	PM	Y	
NGF Tire Cord Line #1 RTO (Source ID G13)	NGF Building (near center)	NOx	Y	

Source Information		Expected Contaminants	Include in Model?	Rationale
CFM End-of-Line Checker (electric) Oven Exhaust (Source ID C77)	Northwest Quadrant	PM	N	Table B-3A
QA Muffle Electric Oven Fumehood Exhaust (Source ID F14)	Southwest Quadrant	PM	N	Table B-3A
Cooling Towers (Source ID A06, A58)	South-Central Area	PM	Y	
Natural Gas Combustion – Process Sources (Source ID C114, C115, C119)	Various	NOx	Y	
		Minor products of combustion	N	7.1.1
Natural Gas Combustion – Comfort Heating	Various	NOx	N	Table B-3B
Alloy Shop Finishing Room Exhaust (Source ID D80)	Northeast Quadrant	--	N	7.3
Non-Emergency Natural Gas Generators (Source ID A61 & A62_1/A62_2)	Southwest Quadrant	NOx	Y	

The rationale reference numbers refer to sections of the Guidance Document.

For a complete listing of sources with Source ID numbers, please refer to the Source Inventory Table in Appendix C. The locations of the sources are presented on the site plan in Appendix B.

3.1 Source Inventory

The source inventory tables are provided in Appendix C. These include:

- source ID
- description
- UTM coordinates
- exhaust stack diameter, flow rate, temperature, height above roof, and grade
- type of source

Sources of “uncontaminated” air exhausting into the atmosphere, for example roof exhausts, room vents, and air intakes, are included in the summary table; however, no emission data is provided.

In combination with the Emission Inventory in Appendix D, the source inventory satisfies subparagraph 8 of Section 26 of O. Reg. 419/05.

3.2 Emission Inventory

The Emission Inventory is provided in Appendix D. For all significant sources and contaminants, it presents:

- contaminant name and CAS#
- source ID number and description

- maximum contaminant emission rate
- estimation method
- data quality classification
- percentage of overall facility emissions
- averaging period

In combination with the Source Inventory in Appendix C, the Emission Inventory satisfies subparagraph 8 of Section 26 of O. Reg. 419/05.

4 ASSESSMENT OF THE SIGNIFICANCE OF CONTAMINANTS AND SOURCES

There are several sources and contaminants that are considered to be "emitted in negligible amounts" or "insignificant relative to total emissions." They are described in more detail in the following sections as required by subparagraph 5 of Section 26 of O. Reg. 419/05.

The calculations can be found in Appendix E.

4.1 Natural Gas Combustion

Section 7.1.1 of the MECP Guidance Document specifies that NO_x is the only significant contaminant from natural gas-fired combustion equipment. Therefore, all other products of combustion are negligible.

4.2 Sources that Emit Contaminants in Negligible Amounts

4.2.1 Insignificant Sources Based on Table B-3A

Table B-3A of the Guidance Document lists sources that can be considered to be insignificant because they "emit contaminants in negligible amounts." The following sources at the facility are listed in Table B-3A.

- Fume hoods that are used for quality control and quality assurance purposes:
  - Q/A Muffle (electric) Oven Fume Hood (Source ID F14)
  - CFM End-of-Line Checker (electric) Oven Exhaust

In accordance with Section 8 of O. Reg. 419/05, emission rate calculations and dispersion modelling does not have to be performed for emissions from negligible sources. However, these sources are listed in the Source Inventory in Appendix C for completeness.

4.2.2 Insignificant Sources Based on Table B-3B

Table B-3B of the Guidance Document lists sources that can be considered to be insignificant because they "emit contaminants in negligible amounts." The following sources at the facility are listed on Table B-3B: Comfort Heating Sources (less than 20 MKJ/hour)

Refer to Appendix E for insignificant sources documentation. In accordance with Section 8 of O. Reg. 419/05, emission rate calculations and dispersion modelling does not have to be performed for emissions from negligible sources. However, these sources are listed in the Source Inventory in Appendix C for completeness.

4.3 Sources that are Insignificant Relative to Total Emissions

4.3.1 Roof Exhausts

Roof exhausts remove air from a number of non-production areas including the warehouse. The likelihood of the concentration of particulate, combustion products and volatile organic contaminants being elevated above ambient levels is minimal. According to the rationale presented in Section 7.3 of the guidance document, contaminant emissions from these sources are considered negligible.

4.3.2 Room Vents

Room vents are non-powered louver vents found throughout the plant. Contaminant concentrations in these areas are low and as such would be insignificant with respect to the stack exhaust and natural gas-fired equipment. According to the rationale presented in Section 7.3 of the guidance document, contaminant emissions from these sources are considered negligible.

In accordance with Section 8 of O. Reg. 419/05, dispersion modelling does not have to be performed for emissions of contaminants in negligible amounts. This source is listed in the Source Inventory in Appendix C for completeness.

4.4 Insignificant Contaminants Based Upon Emission Threshold Calculations

Section 7.1.2 of the Guidance Document describes the methodology for identifying negligible emissions using emission thresholds.

The first step is to convert the 1 hour rural dispersion factor from Table B-1, Appendix B for a length of approximately 20 m from a source to a receptor (property line) to the other applicable averaging times.

The conversion was performed using the following equation:

$$C_0 = C_1 \times F$$

Where:

C_0 = the concentration at the averaging period t_0
C_1 = the concentration at the averaging period t_1
F = factor to convert from averaging period t_1 to t_0 = $(t_1/t_0)^n$
n = 0.28

From Table B-1, the rural dispersion factor for a receptor that is up to 20 m from a source is 10,000 µg/m^3 per g/s emission. The converted factors are shown in the table below.

Averaging Time	Dispersion Factor
1 hour	10,000
24 hours	4,100

The second step is to utilize the calculation provided in Section 7.1.2 of the Guidance to evaluate insignificance. The original formula is shown below.

$$\text{Emission Threshold (g/s)} = \frac{0.5 \times \text{MECP POI Limit } (\mu g/m^3)}{\text{Dispersion Factor } (\mu g/m^3 \text{ per g/s})}$$

When the actual facility-wide emission rate is less than the calculated Emission Threshold, the contaminant emission is insignificant as shown below:

$$\text{Actual Emission Rate (g/s)} \textbf{ must be less than } \frac{0.5 \times \text{MECP POI Limit } (\mu g/m^3)}{\text{Dispersion Factor } (\mu g/m^3 \text{ per g/s})}$$

This formula can be manipulated to demonstrate insignificance as follows:

$$[\text{Actual Emission Rate (g/s)} * \text{DF } (\mu g/m^3 \text{ per g/s})] \textbf{ must be less than } [\text{MECP POI Limit } (\mu g/m^3) * 0.5]$$

or

$$[\text{Actual Emission Rate (g/s)} * \text{DF } (\mu g/m^3 \text{ per g/s}) * 2] \textbf{ must be less than } \text{MECP POI Limit } (\mu g/m^3)$$

The left side of this mathematical statement has been labelled “Screening Concentration” as follows:

$$\text{Screening Concentration } (ug/m^3) = \text{Actual Emission Rate (g/s)} * \text{DF } (\mu g/m^3 \text{ per g/s}) * 2$$

Montrose has calculated **Screening Concentrations** for all contaminants and **compared directly to the MECP POI Limit** in order to assess significance. When the Screening Concentration (ug/m^3) is less than the POI limit, the contaminant is defined as insignificant in accordance with Section 7.1.2. The insignificant contaminants are listed in Appendix E.

5 OPERATING CONDITIONS AND DATA QUALITY

The operating conditions for each contaminant are outlined at the beginning of each section. The methodology used to develop the emission estimates is discussed in the following sections. The discussion includes a statement concerning data quality and estimation techniques for each process and associated source(s). This section satisfies subparagraphs 6 and 7 of Section 26 of O. Reg. 419/05.

Several terms and acronyms are used repeatedly throughout this section. Definitions are provided below.

Term	Definition
Conversion Factor	In most cases, emission factors and process throughput are provided in units that require conversion to get to g/s. The conversion factor is used to convert the units to the desired output.
Flexibility Factor	A factor used when the content of raw material may vary.
Uncertainty Factor	A factor used to account for possible changes in production rate when source testing measurements were made.
Data Quality	Highest Above Average Average Marginal
Estimation Technique	EF = Emission Factor EC = Engineering Calculations VST = Validated Source Test MB = Mass Balance

Two operating conditions (current and future) for hexavalent chromium are presented in this ESDM Report. In the case of hexavalent chromium, the current operating condition is the same as the maximum operating condition and therefore only two scenarios have been provided.

The maximum operating condition has been presented for all other compounds emitted from the facility.

5.1 Transitional Operating Conditions (TOC)

O. Reg. 419/05 was modified effective July 1, 2018 to expand the requirements for operating conditions that should be assessed in the ESDMR. The new requirements in Section 10 of O. Reg. 419/05 focus on considering emissions of contaminants during transitional operating conditions (TOC) that may result in the highest concentration of a contaminant at a point of impingement.

Operating conditions to be considered when assessing compliance under paragraph 1 of subsection 10 (1) currently include:

- Scenarios that assume operating conditions that reflect the maximum design capacity of the facility
- Scenarios that assume planned start-up operating conditions of a facility or part of a facility
- Scenarios that assume planned shutdown operating conditions of a facility of part of a facility
- Any other scenario that occurs when the facility is operating normally

Several potential start-up and shutdown situations have been identified and considered. Details are provided in Appendix F.

6 HEXAVALENT CHROMIUM

6.1 Site-specific Standard Considerations

An ESDMR for a Section 32 request must contain the following information for the contaminant that is the subject of the request (hexavalent chromium):

- An assessment of the POI concentrations at both of the operating conditions described in subsection 10 (1) of O. Reg. 419/05 paragraphs 1 and 2.

  p1 A scenario that assumes operating conditions for the facility that would result, for the relevant contaminant, in the highest concentration of the contaminant at a point of impingement that the facility is capable of

  p2 A scenario that uses actual operating data for the facility for the occasion when the highest concentration of the contaminant at a point of impingement resulted during:
    - the year preceding the year in which the model is being used
    - the year in which the model is being used, if the facility did not operate at any time during the preceding year
- An assessment of the POI concentrations at the currently approved operating condition if this is different than the above.

The scenario that results in the highest POI concentration for this facility is also the scenario that reflects the previous year (2024) and the currently approved operating condition of a maximum production rate of 16,000 tonnes per year.

6.2 Process Overview

The furnace and forehearth structures that contain and transport molten glass are lined with various types of refractory brick. Chromium-containing refractory is universally used by the glass manufacturing industry as the material to construct the channels that contain molten glass due to its superior corrosion resistance which significantly reduces waste and provides acceptable operational efficiency. This refractory is a source of di- and tri-valent chromium which is partially converted to the hexavalent form in the furnace and forehearth prior to emission.

6.3 Process Emission Sources

The process sources consist of a furnace and a forehearth. The facility operates a single glass melting furnace (T105) with two exhaust stacks (Source ID B24 and B25). The forehearth is an enclosed channel structure for transporting the molten glass from the furnace to the fiber forming process. Emissions from the forehearth are exhausted through a single stack (Source ID B38). Both the furnace and forehearth are heated using natural gas and oxygen (oxy/gas firing) with the furnace also having supplemental electrical energy (e-boost).

6.4 General Ventilation Emission Sources

The general ventilation consists of the following sources:

- Source ID B33 (above the furnace)
- Source ID B34 (near the WUCS forehearth to the west)
- Sources C79 & C80 (over the CFM forehearth)

These general ventilation exhausts are not generation points but a location where fugitive emissions from the furnace and forehearth structures are exhausted to atmosphere. General ventilation is needed for the area due to extreme temperatures in the furnace and forehearth and the need to exhaust heat to protect workers and prevent damage to the roof deck due to overheating.

These exhaust fans are variable speed and temperature controlled. The operation and speed of each fan are seasonally dependent with summer requiring the operation of all four fans simultaneously. Conversely in the colder months, in some cases only a single fan (B33) will be required to maintain appropriate inside temperatures.

If none of the general ventilation fans are operating, all fugitive emissions are expected to be drawn into the furnace and forehearth stacks at the shroud due to heat differential and venturi effects. However, when any given ventilation fan is operating, it has the potential to draw in air from the process area and thereby exhaust a portion of the hexavalent chromium that would have otherwise gone out of the process stacks.

The CFM forehearth is isolated in a narrow hallway with air intakes at the entrance to the CFM channel and the ventilation fans at the end of the channels as seen in Figure 1. The proximity of these two sources to each other supports that the emission rates from C79 and C80 are expected to be equivalent.

FIGURE 1 Ventilation Fans Relative to Processes

6.5 Combined Assessment of Modelled and Monitored Results (CAMM)

As outlined in the “Guide to Requesting a Site-Specific Standard” dated February 2017, a Plan for a Combined Modelling/Monitoring (CAMM) Results Assessment should be submitted prior to completing an ESDMR as part of a Section 32 request.

The purpose of a CAMM Plan is to obtain emission estimates with the highest data quality. These emission estimates are then incorporated into a refined ESDM Report. However, CAMM programs are intended for (and more ideally suited for) facilities with fugitive emissions that cannot accurately be measured.

All sources at this facility can be measured accurately using source testing; therefore, a CAMM program is not beneficial or necessary for the site-specific standard application. This is consistent with the original site-specific standard application submitted in 2015. Additionally, the MECP reviewed and approved the pre-test plans for the validated source testing programs conducted in 2024.

6.6 Current (Average) Emission Scenario

6.6.1 Furnace & Forehearth

In February 2024 and June 2024, source testing was performed on all known sources of hexavalent chromium. During the June source testing, the following operating conditions (compared to February) are worth noting:

- Increased fuel usage to furnace in June
- Increase in ambient temperatures in June
- Increased ventilation exhaust required in June to protect the roof from heat damage
- Increased glass pull rate from 1,314 to 1,713 kg/hour

The maximum emissions scenario for this ESDMR is based on the June 2024 stack testing data which had the highest average emission rates from the two stack testing programs.

The current average emission rates for the three process stacks were estimated as the mean of the six emission rates measured per stack during the June testing campaign. These emission rates are of the highest data quality as they are based on validated source testing.

Calculations are outlined in Appendix H and the validated source testing report is located in Appendix R.

6.6.2 General Ventilation

During the June 2024 stack testing campaign, triplicate samples were collected from three of the four general ventilation sources (Source ID: B33, B34, and C79). Emission rates were calculated as the mean of the three samples. Due to parity with C79, the emission rate from C80 was assumed to be the same as C79. While the general ventilation sources do not all operate continuously throughout the year, all four fans were operating during the June 2024 source testing campaign, which is expected to represent the maximum emissions and POI concentrations.

Annualizing the emission rates from each fan presented challenges due to the variable nature of the fan operation. Assuming continuous emissions from these fans throughout the year is considered a reasonable approach as the distribution between the four fans may vary; however, the overall emissions from the process are expected to be relatively constant.

The general ventilation fans are exhaust points to the atmosphere however, they do not influence the generation of hexavalent chromium from the process. These emission rates are of the highest data quality as they are based on validated source testing.

Calculations are outlined in Appendix H and the validated source testing report is in Appendix R.

6.7 Current (Average) Emissions Scenario with Uncertainty

All datasets collected during source testing contain natural variability. The data collected during the June 2024 testing showed some variability in the emission rates across the number of samples collected. To account for variability in measured emission rates, a one-tailed t-test was used to estimate the uncertainty on the mean of the measured emission rates in accordance with the *Alberta Air Monitoring Directive (AMD) Chapter 5* and generally accepted practices. This provides an estimate for the range in which the mean of future measurements would be expected, assuming that variations in hexavalent chromium emission rates are normally distributed. Due to the small sample size, a t-distribution is considered more appropriate instead of a z-distribution to estimate uncertainty because the t-distribution accounts for the additional uncertainty in the estimate of the standard deviation from a small sample size.

The current site-specific standard of 0.0024 µg/m^3 approved by the MECP in 2016 was developed using this same approach for incorporating measurement uncertainty, setting a precedent for this as acceptable methodology.

Uncertainty was calculated using a confidence interval of 95%. The 95% upper confidence limit for the mean of the measured emission rates was selected for modelling to account for variation in the sample mean from the true mean. This provides a statistically representative emission rate for modelling that creates confidence that the sample mean from the next source testing campaign (under identical conditions) is highly likely to be less than or equal to the modelled emission rates.

These emission rates are considered to be of the highest data quality as they are directly based on validated source testing. The incorporation of uncertainty provides a level of conservatism which is appropriate when setting standards where future source testing will be the mechanism for determining compliance.

Calculations including the documentation of uncertainty are outlined in Appendix H.

6.8 Future Emissions Scenario

The future operating condition was defined by the outcomes of the Technology Benchmarking assessment and is referred to as the Preferred Option.

6.8.1 Technology Benchmarking

Technology benchmarking is a key component of the Site-Specific Standard Application. The purpose of the Technology Benchmarking Report (TBR) is to identify all possible pollution control options, develop pollution control strategies (by source) and determine a default or preferred pollution control combination for the facility. The feasibility of all pollution control options must be assessed and all feasible options ranked to determine the most effective option for the facility.

The following tasks were completed as part of the technology benchmarking:

- Identified and quantified all sources of hexavalent chromium emissions
- Identified all possible pollution control options in the following categories:
    - Material Substitution
    - Process Change
    - Add-on Controls
    - Dispersion improvements (optional)
- Assessed the technical feasibility of each option and combination of options for each source including ranking of POI reductions
- Evaluated and ranked the technically feasible pollution control combinations for the facility

Each option was reviewed for technical feasibility. For technically feasible options, emission calculations were completed, followed by ranking based on the expected reduction efficiency. Technically feasible control strategies (including material substitutions, process changes, add-on control and optionally dispersion improvements) for each source were developed and ranked as shown in Figure 2 below.

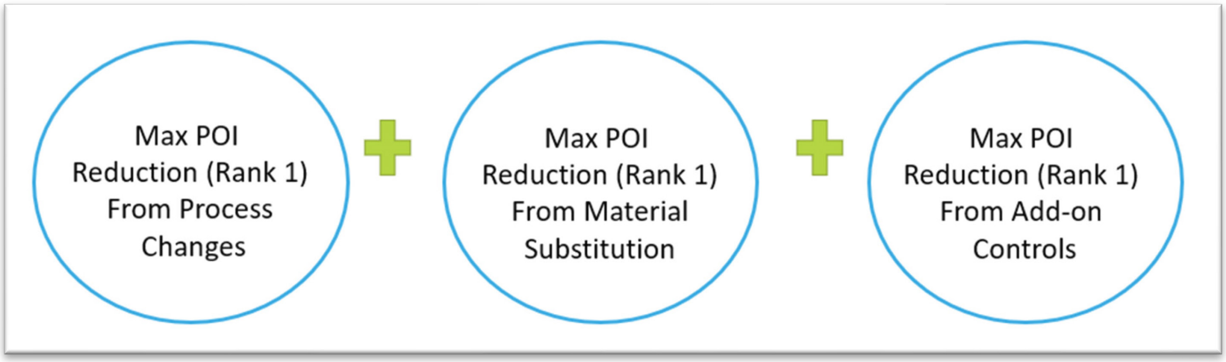


FIGURE 2 Default Technically Feasible Pollution Control Strategy by Source

Finally, combinations of these source strategies are assessed and ranked according to the POI reduction achieved, creating pollution control combinations. Figure 3 below provides an overview of how the strategies by source are used to create pollution control combinations.

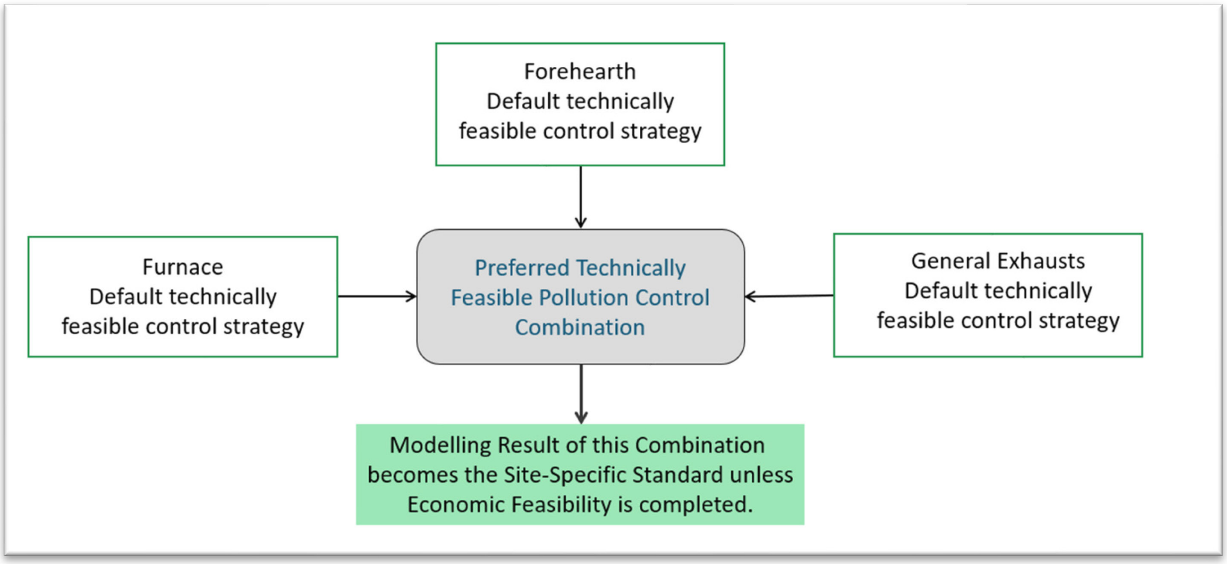


FIGURE 3 Pollution Control Combination Development

The combination that achieves the best POI reduction becomes the default pollution control combination. In the absence of an economic feasibility assessment, the default pollution control combination is the Preferred Pollution Control Combination which determines the Action Plan for the facility.

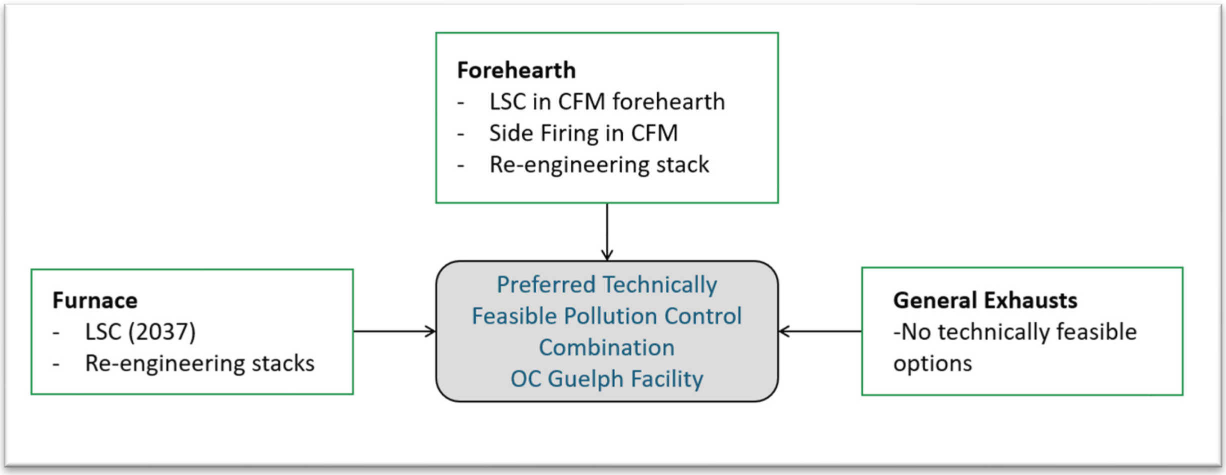


FIGURE 4 OC Guelph Preferred Technically Feasible Pollution Control Combination

Additional details are provided in the TBR and Appendix O.

6.8.2 Future Scenario Emission Rates

The future emissions scenario is developed by applying emission reduction estimates to the current emissions scenario (with uncertainty).

Re-engineering the stacks does not directly impact emission rates and therefore is not included in this section.

The substitution of low sublimation chromium (LSC) refractory for the side rails is technically feasible for the WUCS and CFM forehearth as well as the furnace. However, based on rebuild schedules for these assets, this material substitution is included for the CFM forehearth only prior to the end of 2036.

A trial was initiated in 2013 with the installation of LSC for the side rail refractory in the CFM forehearth. However, no discernable reduction in hexavalent chromium emissions (at the stack) could be assigned specifically to this material substitution. The LSC refractory remains in service in the CFM forehearth.

Other limited R&D data did not indicate a statistically significant difference between the combustion space hexavalent chromium concentrations for the typical chromic oxide and LSC refractory.

Despite the absence of data, OC Guelph intends to install LSC refractory in the forehearth side rails on the basis that it is likely considered the best available technology. Due to the lack of performance data, a reduction in hexavalent chromium emissions has not been quantified for this action.

The future emissions scenario includes the implementation of a horizontal burner configuration for the forehearths. This re-design involves repositioning the current “top fired” burners to horizontal “side fired” positioning. This re-design will also include the replacement of the existing burners with smaller, more frequently spaced burners to reduce peak surface temperatures. Thermodynamic modelling of the re-design predicts a meaningful reduction in exhaust gas velocity at the freeboard face. R&D performed by Owens Corning and documented in several other publications indicates that a relationship exists between the temperature and velocity at the freeboard and hexavalent chromium emission generation. Based on rebuild schedules for these assets, this process change is included for the CFM forehearth only prior to the end of 2036.

The emission reduction estimate for this modification is provided below for the CFM forehearth:

$$CFM\ Forehearth\ Reduction\ efficiency\ (\%) =$$

$$\frac{\big(Portion\ of\ Forehearth\ that\ is\ CFM\ (\%)\big) \times (Side\ Firing\ Reduction\ Efficiency\ estimate\ (\%))}{Uncertainty\ Factor}$$

$$CFM\ Reduction\ efficiency\ (\%) = \frac{\big(54\ (\%)\big) \times (25(\%))}{2}$$

An uncertainty factor of 2 has been applied to this estimate as this is an emerging design change for the industry. This emission reduction is an engineering estimate with a high degree of uncertainty.

7 PARTICULATE MATTER

7.1 Operating Condition for Maximum POI

The maximum operating condition for particulate matter (PM) is the scenario where all significant sources of PM are operating simultaneously at their individual maximum rates of production/throughput. All calculations were based on a maximum 24-hour average operating condition.

The sources of PM at this facility include:

- Material Handling, Mixing and Transfer Dust collectors (Source IDs G61, G63, and G90)
- Furnace Exhaust Stacks (Source IDs B24 and B25)
- CFM Binder Cyclone (Source ID C73)
- CFM Curing Oven (Source ID C75)
- Forming Sources (Source IDs B39, B16, C72, C99, C100, and C101)
- Cooling Towers (Source IDs A06 and A58)
- Scrap Processing (Source ID D64)

7.2 Material Handling, Mixing and Transfer

Raw materials, mainly in powder or granular form, such as clay, silica sand and limestone are received in bulk and stored in silos. These materials are automatically weighed and discharged into a mixer. The mixed batch is then pneumatically conveyed to a storage hopper located above the melting furnace.

The major emissions from raw materials handling are fugitive dust and particles generated at each of the material transfer points. At this facility, fabric filter dust collectors control emissions from these points with a removal efficiency of 99.9%.

Particulate emissions rates are calculated based on transfer rate, filter efficiency and emission factors from AP-42 Chapter 11.13, Table 11.13-1 for unloading and conveying. All dust collectors are assumed to be always operating simultaneously. The general equation is shown below:

$$ER, \frac{g}{s} = \left(Transfer\ Rate, \frac{kg}{24hr}\right) \times\ (1 - Efficiency) \times \left(Emission\ Factor, \frac{g}{kg}\right) \times (Conversion\ Factors)$$

An example calculation is provided below for particulate emissions from offloading to the salt cake silo, Source ID G63:

$$ER, \frac{g}{s} = \left(Transfer\ Rate, \frac{kg}{24\ hr}\right) \times (1 - Efficiency) \times \left(Emission\ Factor, \frac{g}{kg}\right) \times \left(\frac{1\ \text{min}}{60\ \text{sec}}\right) \times \left(\frac{1\ hr}{60\ \text{min}}\right)$$

$$ER, \frac{g}{s} = \left(1,400\ \frac{kg}{24\ hr}\right) \times (1 - 0.999) \times \left(\frac{1.5\ g\ PM}{kg}\right) \times \left(\frac{1\ \text{min}}{60\ \text{sec}}\right) \times \left(\frac{1\ hr}{60\ \text{min}}\right)$$

$$ER, \frac{g}{s} = 2.43 \times 10^{-5}$$

The emission rate estimates for the dust collectors are considered an engineering calculation because they are based on both efficiency and AP42 emission factors with a rating of B. The data quality is above average.

7.3 Glass Melting

The glass melting takes place in a natural gas-fired furnace. The batch of mixed raw material is fed into the rear of the furnace and melts to form a molten homogeneous glass. The emissions from the glass melting process include PM entrained in the furnace flue gas.

The PM from glass melting discharges through the dual T105 furnace stacks (Source IDs B24 and B25).

The emission factor used was developed from source testing. Source testing for the T105 furnace was conducted in 1996 (project # 97222).

The general methodology for estimating PM from glass melting is shown in the equation below: The emissions are equally divided between the two T105 furnace stacks.

$$ER, \frac{g}{s} = \left(Emission\ Rate, \frac{g\,PM}{s}\right) \times (Flexibility\ Factor)$$

An example calculation is provided for Source B24:

$$ER, \frac{g}{s} = \left(0.033\ \frac{g\,PM}{s}\right) \times (1.25)/(2)$$

$$ER, \frac{g}{s} = 0.021$$

The particulate emissions from the furnaces are estimated using engineering calculations based upon source testing. These emission rate estimates are of marginal data quality, but conservative because a flexibility factor was applied.

7.4 Scrap Processing

Air from the edge trimming process in the CFM line is directed to a cyclone that discharges inside the building. The solids removed from the airstream in the cyclone are directed to a compactor. A pollution reduction device (PRD) and a filter box are used to reduce any particulate emissions from this process (Source ID D64).

The particulate emission rate is calculated based on transfer rate (compactor throughput), control device efficiencies and emission factors from AP-42 Chapter 11.13, Table 11.13-1 for unloading and conveying. The PM emissions rate calculation methodology is:

$$ER, \frac{g}{s} = \left(Glass\ Loading\ Rate, \frac{kg}{hr}\right) \times (1 - PRD\,Eff.) \times (1 - Filter\,Box\,Eff.) \times \left(Emission\ Factor, \frac{g}{kg}\right) \times \left(\frac{1\,hr}{3{,}600\,s}\right) \times (Uncertainty\ Factor)$$

An example calculation is provided for the D64 particulate emission rate:

$$ER, \frac{g}{s} = \left(62.8\ \frac{kg}{hr}\right) \times (1 - 0.90) \times (1 - 0.60)\ \times \left(\frac{1.5\ gPM}{kg\ loading}\right) \times \left(\frac{1\ hr}{3{,}600\ s}\right) \times 2$$

$$ER, \frac{g}{s} = 0.0021$$

Supporting data for the emission factor and loading rate are located in Appendix G.

The emission rate estimates for the scrap processing (through the filter box louver) are considered an engineering calculation because they are based on both efficiency and AP42 emission factors with a rating of B. In this case the AP42 emission factor was applied to a slightly modified application and the data quality has been modified to average and conservative.

7.5 Cooling Towers

Cooling towers (Source IDs A06 and A58) remove excess heat from process water by trickling the heated water over “fins” in the towers. The emissions from this process are heat and water vapour (which are not considered contaminants), and particulate.

The PM emission rate is calculated based the total liquid drift, tower recirculation rate and the concentration of dissolved solids. The emissions are primarily PM_{10}, however for this application the PM_{10} is reported as total PM and is modelled as such. All cooling towers are equipped with drift eliminators. The AP42 emission factor from Chapter 13, Table 13.4-1 was used in the calculation.

$$ER, \frac{g}{s} = \left(\text{Recirculation}\ Rate,\ \frac{gal}{\text{min}}\right) \times (\%\ Drift)\ \times (Conversion\ \ Factors) \\ \times (Dissolved\ \ Solids\ \ Fraction)$$

The following assumptions are used to calculate emissions from the cooling towers at this facility.

- Recirculation rate for each tower = 5450 L/min
- Dissolved solids concentration = 1200 ppm
- Percent Drift = 0.002 %

$$ER, \frac{g}{s} = \left(5450\ \frac{L}{\text{min}}\right) \times \left(\frac{0.00002\ L\ Drift}{L\ Circulating}\right) \times \left(\frac{1200\ mg}{L}\right) \times \left(\frac{1\ g}{1{,}000\ mg}\right) \times \left(\frac{1\ \text{min}}{60\ s}\right)$$

$$ER, \frac{g}{s} = 0.002$$

All supporting calculations and data are in Appendix I.

The emission estimates for particulate from the cooling towers is based upon AP42 emission factors with a rating of “C.” Therefore, these estimates are of average data quality.

7.6 CFM Binder Cyclone

During the CFM process the mat and chain are flooded to impregnate the mat with the binder consisting of a powdered polyester resin dispersed in a water based solution. Air is drawn through the mat to remove the excess binder. This air stream is passed through a cyclone that recovers the binder solids and liquids for reuse. The treated exhaust air is discharged to atmosphere through the CFM Binder Cyclone stack (Source ID C73).

For the purposes of estimating particulate emissions from the cyclone, engineering calculations are used. It is assumed that the particles and droplets will be relatively large with a diameter greater than 50 microns. At this size range the cyclone efficiency is approximately 97%. The particulate emission rate calculation is shown below:

The particulate emission rate calculation is shown below:

$$ER\,, \frac{g}{s} = \left(Inlet\ Loading,\ \frac{grains}{ft^3}\right) \times (1 - \text{Removal}\ Efficiency) \times \left(Exhaust\ Flow\ Rate,\ \frac{ft^3}{\text{min}}\right) \times (Conversion\ Factors)$$

$$ER\,, \frac{g}{s} = \left(1\ \frac{grain}{ft^3}\right) \times (1 - 0.97) \times \left(2.1\ \frac{m^3}{s}\right) \times \left(\frac{0.0648\ grams}{grain}\right) \times \left(\frac{35.3ft^3}{m^3}\right)$$

$$ER\,, \frac{g}{s} = 0.144$$

Supporting data for the emission factor and loading rate are located in Appendix G.

Emissions of particulate from the CFM Binder Cyclone are estimated using an engineering calculation. The data quality is considered average and conservative.

7.7 CFM Curing Oven

Glass fibers are cured in a curing oven before the cooling stage. The emissions from the curing oven are directed to a natural gas-fired RTO to reduce VOC emissions (Source IDs C75).

The emissions of PM from Source C75 are based on source testing that was conducted in 2005 at the inlet to the RTO. Section 7.1.1 of the MECP Guidance Document specifies that NOx is the only significant contaminant from natural gas-fired combustion equipment. Therefore, it was assumed that combustion in the RTO does not contribute to the emissions of PM. An uncertainty factor of 25% was applied to the emissions of PM from the RTO to account for the potentially lower glass fiber curing rate during stack testing in 2005.

The particulate emission rate calculation is shown below:

$$ER\ \frac{g}{s} = \left(Tested\ Emission\ Rate,\ \frac{kg}{hr}\right) \times (Conversion\ Factors) \times (Uncertainty\ Factor)$$

$$ER\ \frac{g}{s} = \left(0.2\ \frac{kg}{hr}\right) \times \left(\frac{1{,}000\ g}{1\ kg}\right) \times \left(\frac{1\ hr}{3{,}600\ s}\right) \times (1.25)$$

$$ER\ \frac{g}{s} = 0.069$$

Emissions of particulate from the CFM RTO Exhaust are estimated using un-validated source testing with an uncertainty factor applied to it. The data quality is considered marginal but conservative.

Additional data is provided in Appendix G.

7.8 Forming Sources

Emissions of PM created in the CFM and WUCS Forming lines are based on textile forming emission factors obtained from US EPA AP42 Chapter 11.13, Table 11.13-1. Before being emitted to the atmosphere, the emissions from the two forming lines pass through a filter with an estimated particulate removal efficiency of 25%.

PM emissions from CFM line sources C72, C99, C100, C101, and WUCS line sources B39 and B16 were estimated using the AP42 emission factor, filter removal efficiency and glass production rate as shown below (for Source C72). The emissions were divided equally between all the stacks in the respective forming line.

$$ER\,\frac{g}{s} = \left(Emission\ \ Factor,\ \frac{kg}{tonne\ glass\ produced}\right) \times \left(Glass\ Pull\ Rate,\ \frac{tonne}{hr}\right) \times (Conversion\ \ Factors) \times (100\ -\ Filter\ Efficiency, \%)/4$$

$$ER\,\frac{g}{s} = \left(0.5\ \frac{kg}{tonne}\right) \times \left(1.38\ \frac{tonne}{hr}\right) \times \left(\frac{1{,}000\ g}{1\ kg}\right) \times \left(\frac{1\ hr}{3{,}600\ s}\right) \times (100\ -\ 25, \%)/4$$

$$ER\,\frac{g}{s} = 0.036$$

Emissions of particulate from the forming lines are estimated using emission factors with a rating of B. The data quality is therefore considered above average

Additional data is provided in Appendix G.

8 DI-TRIVALENT CHROMIUM

8.1 Operating Condition for Maximum POI

Similar to hexavalent chromium, emissions of di/trivalent chromium are present at the facility. The maximum operating condition for di/trivalent chromium is the scenario where all significant sources are operating simultaneously at their individual maximum rates. All calculations were based on a maximum 24-hour average operating condition.

The sources of di-trivalent chromium at this facility include:

- Furnace Exhaust Stacks (Source IDs B24 and B25)
- Forehearth Exhaust Stack (Source ID B38)
- Furnace Hall General Ventilation (Source IDs B33, B34, C79, and C80)

8.1.1 Furnace and Forehearth

Emissions of di- and trivalent forms of chromium have been estimated from the furnace and forehearth stacks. The most recent emission rate estimates are based on source measurements collected in June 2024. The difference between the measured emission rates for total chromium and hexavalent chromium was used to represent di and trivalent forms.

The calculation methodology is outlined in the formula presented below:

$$ER = \text{Total chromium average} - \text{Hexavalent chromium average}$$

All supporting calculations and data are located in Appendix J.

The emission rates for di- and trivalent chromium were estimated based on validated source testing for hexavalent chromium. The data quality of the emissions estimates is considered average due to the method used to measured total chromium.

8.1.2 General Ventilation

During the June 2024 stack testing campaign, triplicate samples were collected from three of the four general ventilation sources (Source IDs: B33, B34, and C79) and analyzed for both total chromium and hexavalent chromium. The emission rates were calculated by subtracting the mean hexavalent chromium emission rate from the mean total chromium emission rate. Due to parity with C79, the emission rate from C80 was assumed to be the same as C79.

While the general ventilation sources do not all operate continuously throughout the year, all four fans were operating during the June 2024 source testing campaign, which is expected to represent the maximum.

Annualizing the emission rates from each fan presented challenges due to the variable nature of the fan operation. However, the emissions from the general ventilation fans are produced in the furnace and forehearth and are simply exhausted from the general ventilation fans. Assuming continuous emissions from these fans throughout the year is considered a reasonable approach as the distribution between the fans may vary however the overall emissions from the process are expected to be relatively constant.

The data quality of the emissions estimates is considered average due to the method used to measured total chromium. All supporting calculations and data are located in Appendix J.

9 SPECIATED PM EMISSIONS FROM MATERIAL HANDLING

9.1 Operating Condition for Maximum POI

Silica and sulphuric acid disodium salt, which are contained in some of the raw materials being handled are emitted along with PM. Therefore, the maximum operating scenario is established in the same manner as particulate – where all material handling sources are operating simultaneously at their individual maximum rates of production/throughput. The silos handling raw material with speciated PM content (Source IDs G63 and G90) were included in the worst-case emission scenario. All calculations were based on a maximum 24 hour average operating condition.

9.2 Material Handling, Mixing and Transfer

The emission rates for silica are calculated in a method identical to particulate emissions rates - based on transfer rate, filter efficiency and emission factors from AP-42 Chapter 11.13, Table 11.13-1 for unloading and conveying. In addition, the non-PM content of the raw material is considered to be the same as that of PM, except for silica, which is based on the silica content in the raw material.

All supporting calculations and data are located in Appendix I. An example calculation for silica emissions from G90 is presented below:

$$ER, \frac{g}{s} = \left(Transfer\ Rate, \frac{kg}{24\ hr}\right) \times (1 - Efficiency) \times Conversion\ \ Factors\ \times\ \%\ Silica$$

$$ER, \frac{g}{s} = \left(4{,}763\ \frac{kg}{24\ hr}\right) \times (1 - 0.999) \times \left(\frac{1.5\ g\ PM}{kg}\right) \times \left(\frac{1\ \text{min}}{60\ \text{sec}}\right) \times \left(\frac{1\ hr}{60\ \text{min}}\right) \times (62\%)$$

$$ER, \frac{g}{s} = 0.000051$$

The emission rate estimates for the dust collectors are considered an engineering calculation because they are based on both efficiency and AP42 emission factors with a rating of B. The data quality is considered to be above average.

10 NITROGEN OXIDES

The maximum operating condition for nitrogen oxides (NO_x) is the scenario where all significant sources of NO_x are operating simultaneously at their individual maximum rates of production/throughput. All calculations were based on a maximum one hour average operating condition.

The sources of NO_x at this facility include:

- T105 Furnace Exhaust Stacks (Source IDs B24 and B25)
- Forehearth burners (Source ID B38)
- Thermal Oxidizers (Source IDs G13 and C75)
- Natural Gas-Fired Process Heaters (Source IDs C114, C115, and C119)
- Non-Emergency Generators (Source IDs A61 and A62)

10.1 Glass Melting Furnace and Forehearth Burners

The T105 furnace and all forehearth channels use oxygen instead of air for combustion to reduce NO_x emissions.

The current NOx emission estimates are based upon source testing conducted in November 2018. The source testing results have been modified using an uncertainty factor of 1.25 to account for limited test data and potential fluctuations in NO_x emissions. The forehearth emission rate has been scaled up by an additional 4.3% to account for the increased forehearth burner capacity added during the 2022 furnace rebuild. The implementation of e-boost is likely to reduce NOx emissions from the furnace. However, emission estimates have not been reduced at this time. The following methodology has been used to calculate the NO_x emission rate:

$$ER\ for\ B24, \frac{g}{s} = (Source\ Testing\ \mathrm{Result}) \times (Uncertainty\ factor)$$

$$ER\ for\ B24, \frac{g}{s} = \left(0.14 \frac{g}{s}\right) \times (1.25)$$

$$ER\ for\ B24, \frac{g}{s} = 0.18$$

All supporting calculations and data are located in Appendix K.

The NO_x emissions estimates for the furnace and forehearth are based on non-validated source testing and are considered to be of below average data quality.

10.2 Thermal Oxidizers and Other Natural Gas-Fired Process Heaters

The facility uses a natural gas-fired RTO to reduce VOC emissions from the curing oven (Source ID C75). The facility also has a number of natural gas-fired process heaters. As per MECP guidance, only NO_x emissions were calculated for these sources. The NO_x emission estimate from the natural gas-fired sources is based upon the equipment heat input rating and AP42 emission factors for small uncontrolled boilers.

In addition to the sources operated by Owens Corning, NO_x emissions are also generated from an RTO (Source ID G13) operated by NGF Canada and located within the Owens Corning property line. The NO_x emissions from the Source G13 is based on name plate heat input of 12 MMBtu/hour obtained from the NGF Canada CofA Amendment Application dated October 2006. This application was approved by CofA # 5214-6XTSFD, January 31, 2007.

An example calculation for NO_x emissions from C75 (including the RTO burner and the upstream oven burners) is presented below:

$$ER, \frac{g}{s} = \left(Heat\ Input, \frac{MMBTU}{hr}\right) \times \left(Emission\ Factor, \frac{lb\ _{NOx}}{10^6\ ft^3}\right) \times (Conversion\ Factors)$$

$$ER, \frac{g}{s} = \left(31\ \frac{MMBTU}{hr}\right) \times \left(100\ \frac{lb\ _{NOx}}{10^6\ ft^3}\right) \times \left(1{,}020\ \frac{10\ ^6 ft^3}{MMBTU}\right) \times \left(0.126\ \frac{g/s}{lb/hr}\right)$$

$$ER, \frac{g}{s} = 0.383$$

All supporting calculations and data are located in Appendix K.

10.3 Non-Emergency Natural Gas Generators

There are two natural gas-fired generators at the Owens Corning facility which will be used to generate electricity for non-emergency purposes. The Generac SG350 generator with a rating of 636 hp will exhaust to the atmosphere through source A61 and the Generac SG500 generator rated at 777 hp will exhaust to the atmosphere through two stacks A62_1 and A62_2 (one for each bank of cylinders). Both the generators have been included in the worst-case emissions scenario.

Emissions of nitrogen oxides (NOx) were calculated using manufacturer supplied emission factors as shown below (for Source A61).

$$ER\,\frac{g}{s} = \left(Emission\,Factor,\ \frac{g}{hp-hr}\right) \times (Conversion\ \ Factors) \times (Rated\,Horsepower, hp)$$

$$ER\,\frac{g}{s} = \left(0.14,\ \frac{g}{hp-hr}\right) \times \left(\frac{1\,hr}{3{,}600\,s}\right) \times (636, hp)$$

$$ER, \frac{g}{s} = 0.025$$

The emissions from the non-emergency generators were determined to comply with the Ontario Emission Limits for non-emergency generators. These sources were tested in January 2023 at 100% load. Emission rates during testing were determined to be less than those provided in the manufacturer specifications. The more conservative manufacturer specifications continue to be used in this ESDM Report. This assessment can be found in Appendix K.

10.4 Assessment of NO_x Data Quality

All NO_x emission estimates (except for the furnace and forehearth) are based upon AP42 or manufacturers emission factors. The data quality is considered to be above average, based upon the emission factor rating of "B." The data quality of NO_x emissions from the furnace and forehearth are considered to be below average.

11 SULPHUR DIOXIDE

Sulphur dioxide (SO_2) emissions from the furnace occur due to the presence of sulphur bearing species in the mixed batch. The only significant source of SO_2 at this facility is the T105 furnace (Source IDs B24 and B25).

The maximum operating condition for SO_2 is the scenario where the T105 furnace is operating at maximum capacity. All calculations were based on a maximum one hour average operating condition and divided between the two furnace stacks. The sulphur dioxide emissions from the batch (for Source ID B24) were calculated using the following equation:

$$ER_{SO2} = \left(Furnace\ \ Pull\,Rate,\ \frac{kg}{hr}\right) \times \sum[(\%\ \ Each\ \ RM\ in\ Batch) \times (\%\ \ of\ S,\ as\,SO_3, in\ \ each\ \ RM)] \times \left(\frac{MW\ SO_2}{MW\ SO_3}\right) \times (Conversion\ \ Factors) \times \left(\frac{100}{\%\ Furnace\ \ Yield}\right) \times (Flexibility\ \ Factor)\ /\ 2$$

Where: RM = raw material.

An example calculation of sulphur dioxide emissions from the batch used in the T105 furnace is provided below:

$$ER_{SO2} = \left(1826\ \frac{kg}{hr}\right) \times \begin{bmatrix} (\%\,RM_1\ \times\ RM_1\ \%\,SO_3) + (\%\,RM_2\ \times RM_2\ \%\,SO_3) \\ +(\%\,RM_3\ \times RM_3\ \%\,SO_3) + (\%\,RM_4 \times\ RM_4\ \%\,SO_3) \\ +(\%\,RM_5\ \times RM_5\ \%\,SO_3) + (\%\,RM_6\ \times\ \ RM_6\ \%\,SO_3) \end{bmatrix} \times \left(\frac{64.06\ g/gmol}{80.06\ g/gmol}\right)\ \times \left(\frac{1\ hr}{3{,}600\ s}\right)\ \times\ \left(\frac{1\ kg}{1{,}000\ g}\right) \times \left(\frac{100}{95.59}\right) \times (1.25))\ /\ 2$$

$$ER_{SO2} = 0.3075\ \ \frac{g}{s}$$

The emission rate for SO_2 from the furnace was estimated using a mass balance with 100% of sulphur in the batch raw materials being converted to SO_2 and emitted to atmosphere. In addition, a flexibility factor of 1.25 was applied to account for fluctuations in the composition of the batch raw materials. Therefore, the emission estimate for SO_2 is of the highest data quality and very conservative.

No additional information is provided in the appendices as they involve confidential data related to the glass formulation.

12 CARBON MONOXIDE

Carbon monoxide (CO) is emitted in from the glass melting process.

The maximum operating condition for CO is the scenario where the T105 furnace is operating at maximum capacity. All calculations were based on a maximum half hour average operating condition. The only significant source of CO at this facility is the T105 furnace (Source IDs B24 and B25).

The emission rate estimates are based upon furnace 107 source testing from 1998 without any adjustment for reduced production capacity in the new T105 furnace and equally divided between the two furnace stacks. The general formula for the calculation is presented below:

$$ER,\ \frac{g}{s}\ = \left(1998\ \text{Furnace}\ 107\,Emission\ \ Rate,\ \frac{g}{s}\right) \times (Flexibility\ \ Factor)\ /\ 2$$

$$ER,\ \frac{g}{s}\ = \left(0.029,\ \frac{g}{s}\right) \times (2)\ /\ 2$$

$$ER, \frac{g}{s}\ = 0.029$$

The emission rate used for the 107 furnace was the measured emission rate multiplied by an uncertainty factor of 2.

All supporting calculations and data are located in Appendix K.

The CO emissions from the furnaces are estimated using engineering calculations (based upon source testing). These emission rate estimates are considered to be of marginal data quality, but conservative because an uncertainty factor was applied and no adjustments have been made for a smaller capacity furnace.

13 VOLATILE ORGANIC COMPOUNDS

The emissions from the preparation, application and curing of binder and size materials include volatile organic compounds (VOCs).

The maximum operating condition for these components is the scenario where all significant sources of VOCs are operating simultaneously at their individual maximum rates of production/throughput. All calculations are based on maximum realistic 1 hour and 24 hour averages.

Binder emission discharge through the following sources identified on the source inventory:

- Binder Recirculation Tank (Source ID C60)
- Main Forming Scrap Tunnel Exhaust - WUCS (Source IDs B39 and B16)
- CFM Line – (Source IDs C72, C73, and C99 through C101)
- CFM Line Oven/RTO – (Source ID C75)

13.1 Binder Application Rates

Application rates for each binder material were developed using monthly 2018 data from the facility. Data provided was the amount of specific binders mixed per month and the associated kg of glass melted for that product line. The maximum ratio of binder/glass melted for each product line was used to calculate the binder application rates. The maximum application rate was then increased by 10% for additional conservatism and variability.

13.2 WUCS Binder VOC Emissions

Several binders are used in the Wet Use Chopped Strand (WUCS) product line. The WUCS process line is at ambient temperature when the binder is applied to the formed glass strands. This product line does not pass through any curing ovens and there is no processing at elevated temperatures after the binder is applied.

Generally, 10% of the binder emissions are expected to exhaust from the binder mixing tank (Source ID C60), with the remaining 90% allocated to the WUCS forming exhaust stacks (Source IDs B39 and B16). A mass balance with 100% loss to atmosphere is assumed for most WUCS binder ingredients. In a few cases, the material properties were reviewed to determine that emission to the atmosphere would not occur.

All supporting calculations, assumptions, and data are located in Appendix L.

13.3 CFM Binder VOC Emission Estimates

Three different binders are applied at various stages of the CFM forming process. Binder 440 is applied first, prior to the forming tunnel and therefore has the potential to emit during the mixing, forming, and curing stages. Binder T250X5 is applied after the forming tunnel and has the potential to emit during the mixing and curing stages only. A solid binder (E240) is suspended in water with the T250X5 liquid binder and remains in suspension until reacting in the curing oven. The curing oven is equipped with an RTO system for the destruction of VOCs.

The calculation of the contaminant emission rates is based upon the maximum percentage of any contaminant in the various binders used. This maximum percentage is used in combination with the application rate (g binder/kg glass pull) and glass pull rate (kg glass/hr). The following equation represents the methodology used to develop the emission rates used for all VOC binder losses.

$$ER,\ \frac{g\ contaminant}{s} = (Max\ Fraction\ of\ Component) \times \left(Max\ Appln\ Rate,\ \frac{g\ binder}{kg\ glass\ pull}\right) \times$$
$$Max\ Glass\ Pull\ Rate\ for\ product\ line,\ \frac{kg\ Glass}{hr} \times \%\ Loss \times Conversion\ Factors$$

The glass strands are cooled to ambient temperature before any binders are applied in the forming area. Several of the binder ingredients have very low vapour pressures and will not emit to atmosphere during the application progress, but may emit during curing. Percentage losses at each stage of processing are adjusted based on vapour pressure, chemical reactions and other physical properties. The curing oven RTO is expected to have a minimum destruction efficiency of 97%.

All supporting calculations and data are located in Appendix L.

13.4 Binder Chemical Reactions

Silanes are used in the binder materials at this facility. Silanes have ethoxy and methoxy groups that are liberated once mixed with water. These ethoxy and methoxy groups react with the water to form methanol and ethanol. Calculations were conducted on a molar basis to calculate the maximum amount of ethanol and methanol generated assuming full conversion of all ethoxy and methoxy groups. All methanol and ethanol that could be generated as a result of these reactions were added to the emissions from the binder materials.

Magnesium nitrate is present in some of the binders. It may be possible for the magnesium nitrate to form ammonia under certain conditions. Potential emissions of ammonia (based on 100% mass balance conversion) have been estimated to ensure conservatism.

The E240 binder contains a thermally activated catalyst that reacts with the polyesters (in other binders) to promote the crosslinking required for the product properties. This catalyst gets consumed in the reaction with any remaining becoming part of the product. Emission calculations conservatively estimate 5% of the catalyst remains unreacted in the curing oven. Additionally, particulate emitted at the CFM Binder Cyclone will contain proportional amounts of the catalyst.

Supporting calculations are located in Appendix L.

13.5 Assessment of Data Quality

There are several levels of conservatism incorporated into the calculations. The emissions are based on the maximum fraction of any given contaminant, and in most cases very little binder is attributed to the final product or the process water stream.

The calculation methodology is an engineering calculation which is based upon the assumption of 100% VOC losses for components that are likely to emit to atmosphere. The emission estimates are considered to be of average data quality and conservative.

14 ACID GASES

The emissions from the glass melting process include acid gases from the raw materials entrained in the furnace flue gas. Based on the composition of the batch materials used, the acid gases anticipated to be present in significant quantities are hydrogen chloride (HCl) and hydrogen fluoride (HF). The only significant source of HCl and HF at this facility is the T105 furnace (Source IDs B24 and B25).

The maximum operating condition for acid gases is the scenario where the T105 furnace is operating at maximum capacity. All calculations are based on a maximum one hour average operating condition.

The emission rate estimates are based upon an emission factor developed from furnace 107 source testing in 1998. The emissions are equally divided between the two stacks.

The general formula for the calculation is presented below:

$$ER,\ \frac{g}{s} = \left(105\ Pull\ Rate,\ \frac{kg}{hr}\right) \times \left(1998\ \ furnace\ 107\ Emission\ \ Factor,\ \frac{g\ HCL}{kg\ glass\ pull}\right) \times\ (Conversion\ \ Factor) \times (Flexibility\ \ Factor)\ /\ 2$$

An example calculation for hydrogen chloride (HCl) from the T105 furnace stack B24 is presented below:

$$ER_{HCl} = \left(1826\ \frac{kg}{hr}\right) \times \left(0.0063\ \frac{g\ HCl}{kg\ glass\ pull}\right) \times \left(\frac{1\ hr}{3{,}600\ s}\right) \times (1.25)\ /\ 2$$

$$ER,\ \frac{g}{s} = 0.002$$

All supporting calculations and data are located in Appendix I.

The emission rate for acid gases from the furnace were estimated using furnace 107 source testing performed in 1998, and adjusted for the maximum glass pull rate. In addition, a flexibility factor of 25% was applied to account for fluctuations in the composition of the batch raw materials. Therefore, the emission estimates are of average data quality and conservative.

15 DISPERSION MODELLING

This section provides a description of how the modelling was conducted as required by subparagraphs 10 to 13 of Section 26 of O. Reg. 419/05. Modelling was conducted using the US EPA AERMOD dispersion model Version 22112. The modelling interface employed was Lakes AERMOD View which incorporates AERMAP Version 18081. The methodologies used in this study are discussed in the following sections.

For this modelling exercise, all sources that emitted contaminants in significant amounts were modelled. Due to the large number of contaminants, the modelling was conducted in a staged approach.

In Stage 1, a conservative approach to modelling was applied by using a dispersion factor for each source, multiplying it by the emission rate of each contaminant from that source and summing the product for each contaminant. The dispersion factor was generated by modelling each source at an emission rate of 1 g/s. In general, any contaminant 50% or more of a MECP Standard using this very conservative approach was assessed in the Stage 2 modelling.

Stage 2 modelling consisted of assigning the worst-case emission for each significant contaminant to the appropriate source and then modelling using AERMOD.

Stage 2 modelling was conducted for the following contaminants:

- Particulate Matter
- Nitrogen Oxides (Expressed as NO_2)
- Acid Solubilized Fatty Acid Amides
- Hexavalent Chromium

The Stage 1 and Stage 2 documentation and modelling files are located in Appendix P and Q, respectively.

The results are anticipated to provide a reasonable estimate of the facility's impact on the surrounding area under local meteorological conditions. The following sections describe how the models were set up and run.

15.1 Source and Emissions Data

The source parameters and contaminant emission estimates used in the half-hour, 1 hour, 24 hour and annual dispersion modelling scenarios are listed in Appendix C and Appendix D. The methods used to calculate the emissions have been described in previous sections of this report.

15.2 Topography

The Owens Corning Guelph facility is adjacent to park areas and a river approximately 240 m east of the facility. Digital terrain data was obtained from the MECP for the region surrounding the facility (DEM file 040P). This data was used to generate base elevations for sources, buildings and receptors in the model.

15.3 Land Use

The Owens Corning facility is situated at 247 York Road in Guelph, Ontario. The adjacent lands have mixed zoning including industrial, commercial, residential and parkland. Neighbouring facilities are primarily involved in chemical distribution, packaging and welding. The nearest sensitive receptors are dwellings adjacent to the west property line, however all sensitive receptors surrounding the facility were considered in the modelling, including new residences to the north.

The AERMOD model requires specification of urban or rural meteorological algorithms. The urban algorithm is based upon the influence of a ‘heat island’ produced typically by a heavily populated area. Based on analysis of the area as previously discussed with the MECP, the surrounding land use is considered rural for the purposes of dispersion modelling based on the predominance of low density residential areas, open fields and green space the within the 3-km radius.

15.4 Meteorology

The AERMOD model requires a meteorological data set consisting of hourly wind speed and direction, Pasquill stability class, and mixing heights. It is recommended that 5 years of meteorological data be used.

Modelling was conducted using a site-specific meteorological dataset processed using AERMET Version 22112. The facility has a Section 13.1 approval for this meteorological data set representing years 2016-2020.

15.5 Building and Source Dimensions

Montrose extracted the source and building dimensions and coordinates using a site plan which included:

- The facility property line
- Location of buildings and structures on the property
- Source locations and parameters

Source coordinates and dimensions are in included in Appendix C.

15.6 Building Downwash

The effect of buildings on dispersion was considered by using the U.S. EPA BPIPPRM program to calculate the wind direction specific building downwash values to be used as an input to the AERMOD models.

15.7 Receptor Grid

The AERMOD model requires the user to select the points (receptors) at which ground level concentrations are to be calculated. The receptor grid was defined in accordance with the MECP guidance as follows:

- a fenceline grid with 10 m spacing
- a grid with 20 m spacing extending 200 m out from the sources
- a grid with 50 m spacing from 200 m to 500 m
- a grid with 100 m spacing from 500 m to 1,000 m

- a grid with 200 m spacing from 1,000 m to 2,000 m
- a grid with 500 m spacing from 2,000 m to 5,000 m

The facility is located in an area with a number of sensitive receptors to the north, west and east of the facility. In addition to residential areas, there is a community center and a school nearby to the north. The nearest sensitive receptors are dwellings adjacent to the west property line of the facility. Sensitive receptors are defined in O.Reg.419/05 Section 30(8) as:

- Dwellings
- Educational facilities
- Health care facilities
- A senior citizens' residence or long-term care facilities
- Childcare facilities

Parkland and recreational facilities are not considered sensitive receptors for the purposes of evaluating averaging times for Upper Risk Threshold comparisons.

The modelling included assessment of concentrations at elevated locations representing open windows at multi-story buildings.

15.8 Annual Modelling Results

For conservatism and as preferred by the Ministry, the annual modelling uses the highest value predicted from the 5 year runs. Therefore, the maximum predicted concentration will be reported from the associated year of meteorological data. For the purposes of documentation and presentation of concentration contour plots, only the year with the maximum concentration is presented.

TABLE 2 AERMOD Dispersion Modelling Input Summary Table

Section of Reg.	Section Title	Description Of How The Approved Dispersion Model Was Used
6	Approved Air Dispersion Model	AERMOD Version 22112 was used for all modelling.
8	Negligible Sources	Negligible and insignificant sources outlined in Section 4 of this report have not been included in the models.
9	Same Structure Contamination	The facility is the only tenant in the building; therefore same structure contamination does not apply to this site.
10	Operating Conditions	Operating conditions that generate the maximum POI concentrations are outlined in the Emission Estimate Sections of this report for each contaminant (See sections 5 to 14).
11	Source of Contaminant Emission Rates	The methods used to calculate the emission rates are provided in the corresponding Emission Estimate sections, along with a comment regarding the accuracy of the methods (See sections 5 to 14 of this report).
12	Combined Effect of Assumptions for Operating Conditions and Emission Rates	The operating conditions were estimated in accordance with Section 10(1)1 and Section 11(1)1 of O. Reg. 419/05 and are therefore considered to result in the highest concentration at POI that the facility is capable of.
13	Meteorological Conditions	Site-specific meteorological data processed with AERMET Version 22112 provided by the MECP.

Section of Reg.	Section Title	Description Of How The Approved Dispersion Model Was Used
14	Area of Modelling Coverage	The receptor grid for this modelling extends to 5000 m from the facility.
15	Stack height for Certain New Sources of Contaminant	All stacks are less than the height allowable under Section 15 of Reg 419 and building impacts on point sources were considered by running BPIP.
16	Terrain Data	Digital terrain data was obtained from MECP terrain DEM 040P.
17	Averaging Periods	The averaging periods for the air dispersion model were consistent with the standards for each contaminant - either 30-minute, 1 hour, 24 hour, 30 day or annual averaging periods.

15.9 Source Contributions to Current POI Concentration

The tables in this section have been prepared in accordance with Section 3.3 of the *Guide to Requesting a Site-specific Standard*, dated February 2017.

These tables outline the source contributions of the current emissions (with uncertainty) at the maximum POI location, as well as at the three (3) most impacted sensitive receptors, which in this case are dwellings. The maximum POI location is along the southeast fenceline.

TABLE 3 24 Hour Hexavalent Chromium Modelling Results by Source

			Contribution to Point of Impingement Concentrations			
Source (Group)	Emission Rate (g/s)	Percent of Total Emissions (%)	Point of Maximum Concentration (Statistical High) (ng/m^3)	Receptor 1 (ng/m^3)	Receptor 2 (ng/m^3)	Receptor 3 (ng/m^3)
All	1.37E-04	100%	5.67	3.97	3.86	3.86
Forehearth	8.98E-05	66%	3.45	2.75	2.75	2.67
Furnace[1]	3.11E-05	23%	0.05	0.63	0.50	0.61
General Ventilation[2]	1.61E-05	12%	2.16	0.59	0.61	0.57
Date of Maximum			1/4/2017	5/25/2017	5/2/2018	5/25/2017

[1] Source group of furnace exhausts (Source IDs B24 & B25)

[2] Source group of general exhausts (Source IDs B33, B34, C79 and C80)

The 24 hour limit (URT) for hexavalent chromium is 70 ng/m^3. All 24 hour modelling predictions are less than 9% of the URT.

TABLE 4 Annual Hexavalent Chromium Modelling Results by Source

			Contribution to Point of Impingement Concentrations			
Source (Group)	Emission Rate	Percent of Total Emissions	Point of Maximum Concentration	Receptor 1	Receptor 2	Receptor 3
	(g/s)	(%)	(ng/m^3)	(ng/m^3)	(ng/m^3)	(ng/m^3)
All	1.37E-04	100%	1.33	0.49	0.47	0.46
Forehearth	8.98E-05	66%	0.64	0.33	0.32	0.30
Furnace[1]	3.11E-05	23%	0.06	0.07	0.07	0.07
General Ventilation[2]	1.61E-05	12%	0.63	0.09	0.08	0.08
Date and Time of Maximum (year)[3]			2017	2018	2018	2018

[1]Source group of furnace exhausts (Source IDs B24 and B25)

[2]Source group of general exhausts (Source IDs B33, B34, C79 and C80)

[3]The Schedule 3 standard for hexavalent chromium is an annual standard therefore a year is provided rather than the date and time

15.10 Exceedance Frequency - Current Annual Modelling

The average and median POI concentrations provide additional context to the POI concentration and assist with understanding the potential impact on nearby receptors. The following table outlines this data for the current case (with uncertainty) at the maximum POI location and the three most impacted sensitive receptors for the annual averaging period.

Since hexavalent chromium has an annual standard, the frequency refers to the percentage of the 5 years of modelling that are above the standard.

TABLE 5 Frequency, Average, and Median Annual Concentrations

All Sources	Units	Maximum Receptor	Receptor 1	Receptor 2	Receptor 3
Frequency above Schedule 3 Annual Standard [1]	(%)	100%	100%	100%	100%
Average Concentration over 5 years	(ng/m^3)	1.277	0.431	0.418	0.407
Median Concentration over 5 years	(ng/m^3)	1.279	0.430	0.413	0.409

[1] % of time exceedance occurs at the receptor. Since hexavalent chromium has an annual standard, the frequency refers to the % of modelled years above the standard.

There are no exceedances of the 24-hour URT at any locations and all 24 hour modelled concentrations are less than 9% of the URT.

The default pollution control combination was developed according to the POI concentration from the AERMOD assessment. The location of the maximum concentration, as well as the most impacted sensitive receptors, were assessed for each option. The following table summarizes the current average scenarios and future default pollution control combination scenario at the most impacted sensitive receptors.

TABLE 6 Comparison to Standard and Frequency of Exceedances

Ranking	Overall % of Sch 3 Standard at the Maximum POI Location	% of Sch 3 Standard at the Most Impacted Sensitive Receptor	POI Exceedance Frequency[2]
Current (Mean)	756%	293 % (at 95 Toronto St)	100% (at 95 Toronto St)
Current Request (with uncertainty)	952%	348 % (at 95 Toronto St)	100% (at 95 Toronto St)
Best (Default) Technically Feasible PCC[1]	489%	165 % (at 83/79 Toronto St)	100% (at 83/79 Toronto St)

[1] PCC is Pollution Control Combination

[2] % of time exceedance occurs at the receptor. Since hexavalent chromium has an annual standard, the frequency refers to the % of modelled years above the standard.

Additional details are in included in Appendix O.

16 EMISSION SUMMARY TABLES

The Emission Summary Table is provided below as required by subparagraph 14 of Section 26 of O. Reg. 419/05.

The data presented includes:

- Contaminant name
- CAS number
- Total emission rate for each contaminant (aggregate for facility) in g/s
- Aggregate POI concentration predicted by AERMOD
- POI limit with appropriate averaging time(s)
- Limiting Effect
- Percentage of Criteria; percentage ratio of the aggregate POI concentration estimate to the POI criteria

TABLE 7 Emission Summary Table - Hexavalent Chromium

Contaminant	Averaging Time	Emission Rate (g/s)	Location of Point of Impingement (POI)	Maximum Modelled Concentration (ng/m^3)	MECP POI Criteria (ng/m^3)	Schedule	Limiting Effect	% of Criteria
Hexavalent Chromium (Current Average)	24-hr	1.16E-04	All Receptors	4.67	70	URT	Health	6.7%
			Sensitive receptor	3.36	70	URT	Health	4.8%
	Annual		All Receptors	1.06	2.4	SSS	Health	44.1%
			Sensitive receptor	0.41	2.4	SSS	Health	17.1%
Hexavalent Chromium (Current with Uncertainty)	24-hr	1.37E-04	All Receptors	5.67	70	URT	Health	8.1%
			Sensitive receptor	3.97	70	URT	Health	5.7%
	Annual		All Receptors	1.33[1]	2.4	SSS	Health	55.5%
			Sensitive receptor	0.49	2.4	SSS	Health	20.3%
Hexavalent Chromium (After Action Plan)	24-hr	1.31E-04	All Receptors	2.61	70	URT	Health	3.7%
			Sensitive receptor	2.16	70	URT	Health	3.1%
	Annual		All Receptors	0.68	1.33[2]	Proposed SSS	Health	51.4%
			Sensitive receptor	0.23	1.33[2]	Proposed SSS	Health	17.3%

[1] Proposed SSS concentration

[2] Owens Corning is applying for this value as the site-specific standard for hexavalent chromium

TABLE 8 Current Emission Summary Table – 1hr Average (All Other Compounds)

Contaminant	CAS #	1 Hour Emission Rate (g/s)	1 hr Facility MAX GLC (ug/m^3)	1 Hour POI Criteria (ug/m^3)	Schedule	Limiting Effect	% of Criteria
SULPHUR DIOXIDE	7446-09-05	6.15E-01	3.78E+01	100	Schedule 3	Health & Vegetation	37.8%
NITROGEN OXIDES (EXPRESSED AS NO$_2$)	10102-44-0	1.16E+00	6.61E+01	400	Schedule 3	Health	16.5%

TABLE 9 Current Emission Summary Table – 24hr Average (All Other Compounds)

Contaminant	CAS #	24 Hour Emission Rate (g/s)	24 hr Facility MAX GLC (ug/m^3)	24 Hour POI Criteria (ug/m^3)	Schedule	Limiting Effect	% of Criteria
PM - PARTICULATE MATTER	N/A - M08	4.52E-01	8.59E+01	120	Schedule 3	Visibility	71.6%
HYDROGEN FLUORIDE -GASEOUS-GROWING SEASON GS [1]	7664-39-3	6.41E-03	1.95E-01	0.86	Schedule 3	Vegetation	22.6%
NITROGEN OXIDES (EXPRESSED AS NO_2)	10102-44-0	1.16E+00	3.77E+01	200	Schedule 3	Health	18.9%
Chromium Compounds (Di-,Tri-,metallic)	7440-47-3	7.93E-05	7.89E-03	0.5	Schedule 3	Health	1.6%
HYDROGEN CHLORIDE	7647-01-0	4.01E-03	1.22E-01	20	Schedule 3	Health	0.6%
2,2-dibromo-3-nitrilopropionamide	10222-01-2	6.01E-03	6.07E-01	1	Screening Level	Health	<Screening Level
5-Chloro-2-methyl-2H-isothiazol-3-one	55965-84-9	3.45E-03	4.65E-01	1.35	Screening Level	Health	<Screening Level
5-Chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	1.19E-03	1.60E-01	0.5	Screening Level	Health	<Screening Level
2-Methyl-4-Isothiazolin-3-one	2682-20-4	1.19E-03	1.60E-01	0.5	Screening Level	Health	<Screening Level
MAGNESIUM NITRATE	10377-60-3	4.48E-03	5.69E-01	2	Screening Level	Health	<Screening Level
Dibromoacetonitrile	3252-43-5	1.45E-03	3.43E-01	1.65	Screening Level	Health	<Screening Level
1-Propanol, 3-(trimethoxysilyl)-, methacrylate	2530-85-0	6.41E-04	6.48E-02	0.5	Screening Level	Health	<Screening Level
Diallyl Phthalate	131-17-9	4.77E-03	5.74E-01	5	Screening Level	Health	<Screening Level
Sodium acetate	127-09-3	1.20E-02	1.57E+00	15	Screening Level	Health & Particulate	<Screening Level
Polyethylene glycol	25322-68-3	1.80E-02	1.82E+00	40	Screening Level	Health	<Screening Level
Sodium Bromide	7647-15-6	5.03E-02	5.12E+00	120	Screening Level	Health & Particulate	<Screening Level
BENZOYL PEROXIDE	94-36-0	4.45E-03	8.42E-01	25	Screening Level	Health	<Screening Level
3-(Triethoxysilyl)propylamine	919-30-2	1.95E-02	2.54E+00	80	Screening Level	Health	<Screening Level
Acid Solubilized Fatty Acid Amide (Prop1)	0	2.79E-02	7.97E+00	8.261	FL/APOIC	NA	<FL/APOIC
Acid Solubilized Fatty Acid Amide (Prop2)	0	1.24E-02	3.54E+00	3.672	FL/APOIC	NA	<FL/APOIC
Benzenamine, N-[3-(trimethoxysilyl)propyl]-	3068-76-6	6.72E-03	8.75E-01	1.114	FL/APOIC	NA	<FL/APOIC

[1] Assessed against the most stringent criteria for Gaseous Growing Season

TABLE 10 Current Emission Summary Table –30 Day Average (All Other Compounds)

Contaminant	CAS #	30 Day Emission Rate (g/s)	Facility MAX GLC (µg/m³)	30 Day POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria
HYDROGEN FLUORIDE -GASEOUS-GROWING SEASON GS [1]	7664-39-3	6.41E-03	7.59E-02	0.34	Schedule 3	Health	22.3%

[1] Assessed against the most stringent criteria for Gaseous Growing Season

TABLE 11 Current Emission Summary Table – Annual Average (All Other Compounds)

Contaminant	CAS #	Annual Emission Rate (g/s)	Annual Facility MAX GLC (µg/m³)	Annual POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria
SULPHUR DIOXIDE	7446-09-05	6.15E-01	2.13E+00	10	Schedule 3	Health & Vegetation	21.3%

17 CONCLUSIONS

Table 7 summarizes the output from the AERMOD modelling to predict the maximum ground level concentration for hexavalent chromium emissions related to the preferred technical feasible pollution control combination at the Owens Corning Guelph facility. The data provided in this report supports the application for an alteration of a Schedule 3 standard under Section 32 of Ontario Regulation 419/05: Air Pollution – Local Air Quality (O. Reg. 419/05).

The Owens Corning Guelph facility is requesting a 10-year site-specific air standard for hexavalent chromium of 1.33 ng/m^3 (annual average) at any offsite location. Modelling predicts this would result in a maximum annual average concentration of 0.49 ng/m^3 at any sensitive receptor.

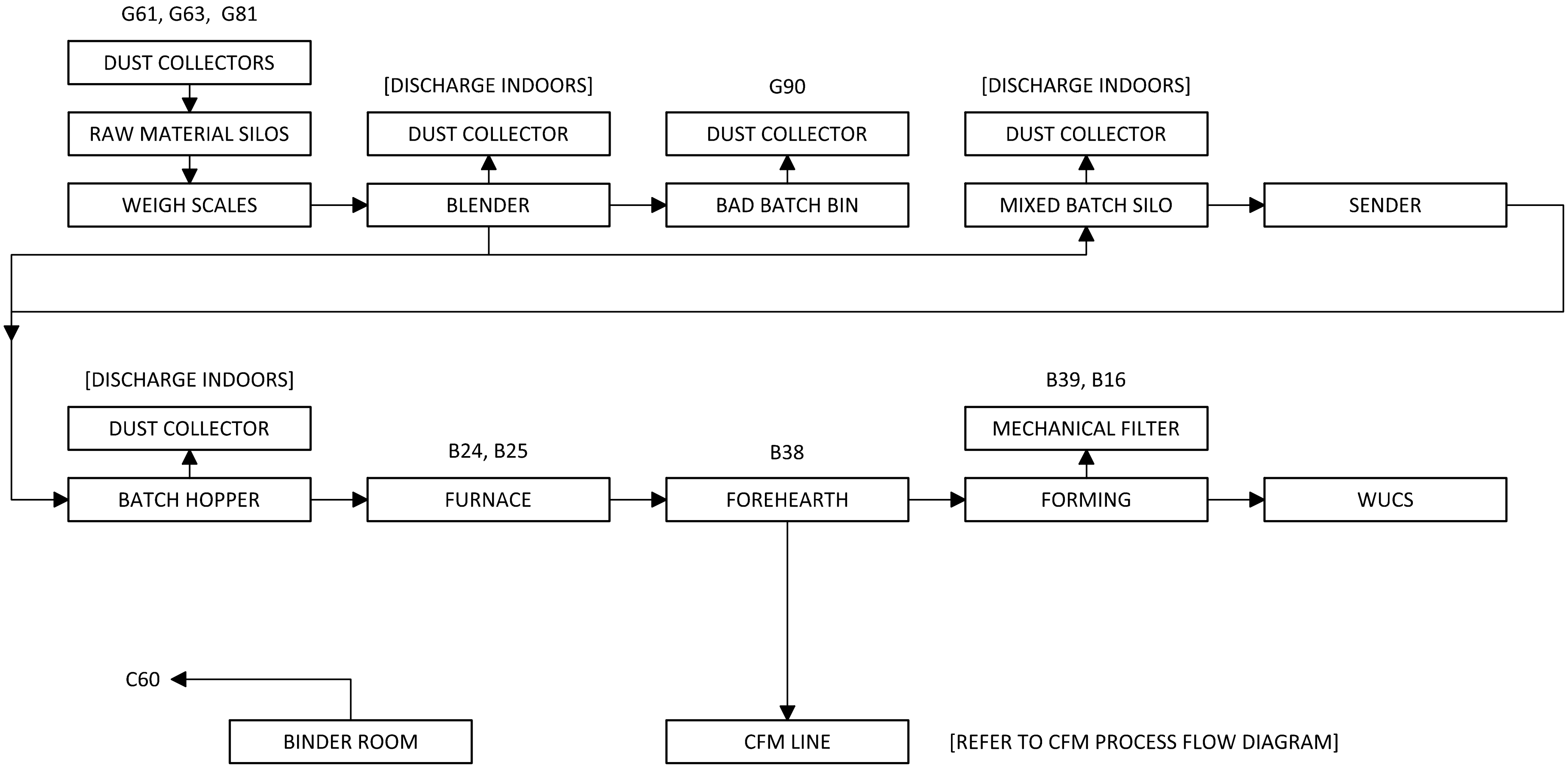
Table 8 through Table 11 summarize the output from the modelling to predict the maximum ground level concentrations for all other significant emissions from the Owens Corning Guelph facility. The results indicate that all other contaminants at the facility comply with the O. Reg. 419/05 Schedule 3 standards and guidelines at the maximum (current) operating scenario.

18 REFERENCES

The following references were used in preparation of this document:

MECP	Guideline for Air Dispersion Modelling in Ontario, Version 3.0 MECP, February 2017
MECP	Procedure for Preparing an ESDM Report, Version 4.1 MECP, March 2018
MECP	Air Contaminants Benchmarks List. Version 3, April 2023
MECP	Guide to Requesting a Site-Specific Standard (GRSSS), Version 2.0, February 2017
MECP	Technical Bulletin - O.Reg. 419/05 Methodology for Using "Assessment Values" for Contaminants with Annual Air Standards MECP, February 2017
MECP	Guideline for the Implementation of Air Standards in Ontario (GIASO) Version 3.0, February 2017
EPA	USEPA AP-42: Section 1.4 – Natural Gas Combustion (July 1998) Section 3.3 – Gasoline and Diesel Industrial Engines (October 1996) Section 11.13 – Glass Fiber Manufacturing (1985) Section 13.4 – Wet Cooling Towers (1995)
LEHDER	Source Testing Program Reports – multiple 1995-2013 Projects 96127 and 99429
Montrose	Approach for Source Testing Program (validated) for Generators January 2023 Project 22022668
Montrose	Evaluation of Hexavalent Chromium Emissions from Selected Sources, Owens Corning Guelph Glass Plant – February 2024 May 2024 Project 24032615
Montrose	Evaluation of Hexavalent Chromium Emissions from Selected Sources, Owens Corning Guelph Glass Plant – June 2024 August 2024 Project 24032615
Owens Corning	Information provided by Owens Corning related to all aspects of the Site-Specific Standard project and ECA post-rebuild

APPENDIX A
Process Flow Diagrams

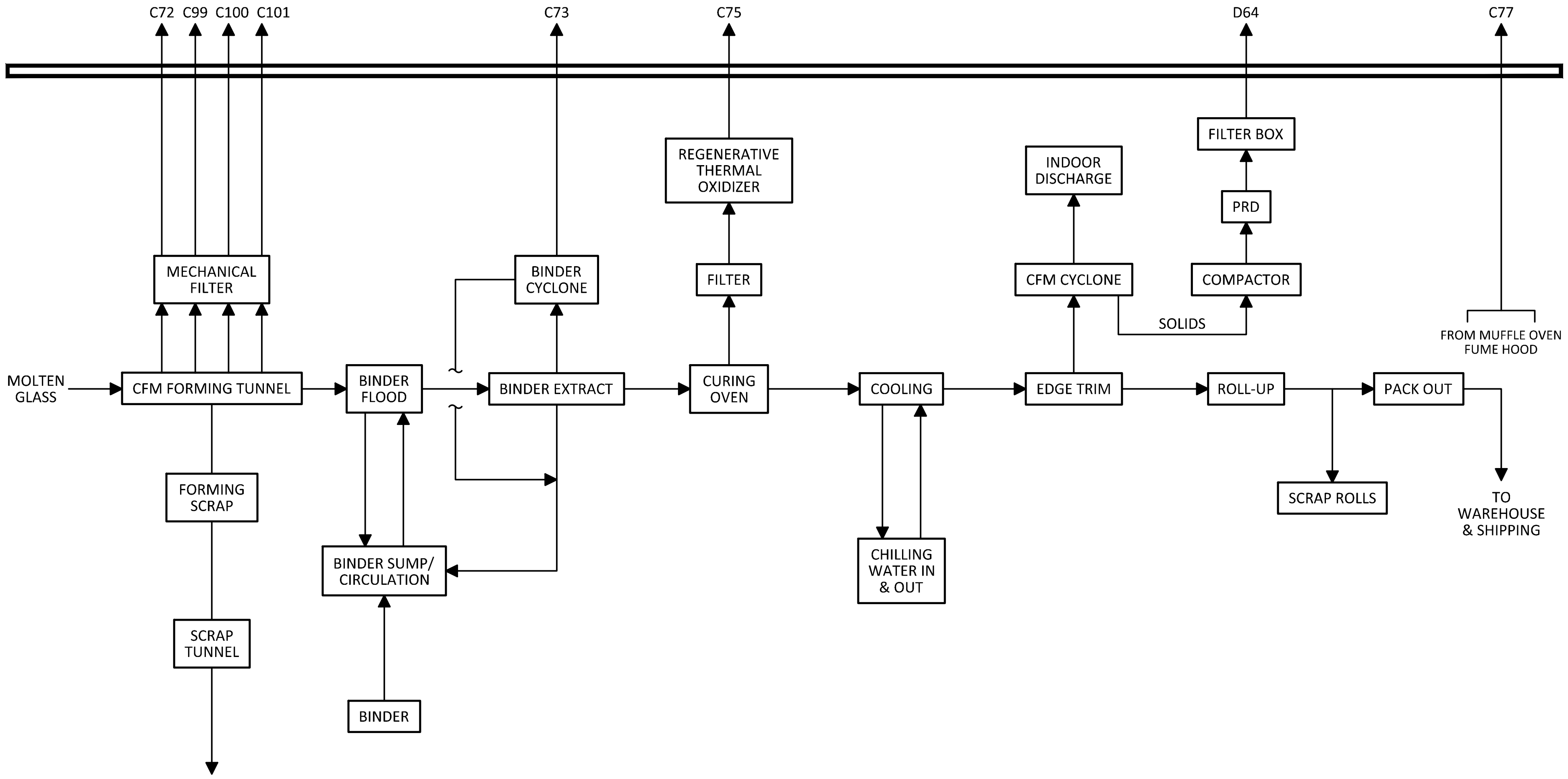


Owens Corning Composite Materials Canada LP
Guelph Glass Plant

Raw Material, Melting & Forming
Process Flow Diagram

Date:	Project:	Submitter:	Reviewer:
March 2025	41296	D. Agar	P. McInnis

Appendix
A1



MONTROSE
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Owens Corning Composite Materials Canada LP
Guelph Glass Plant

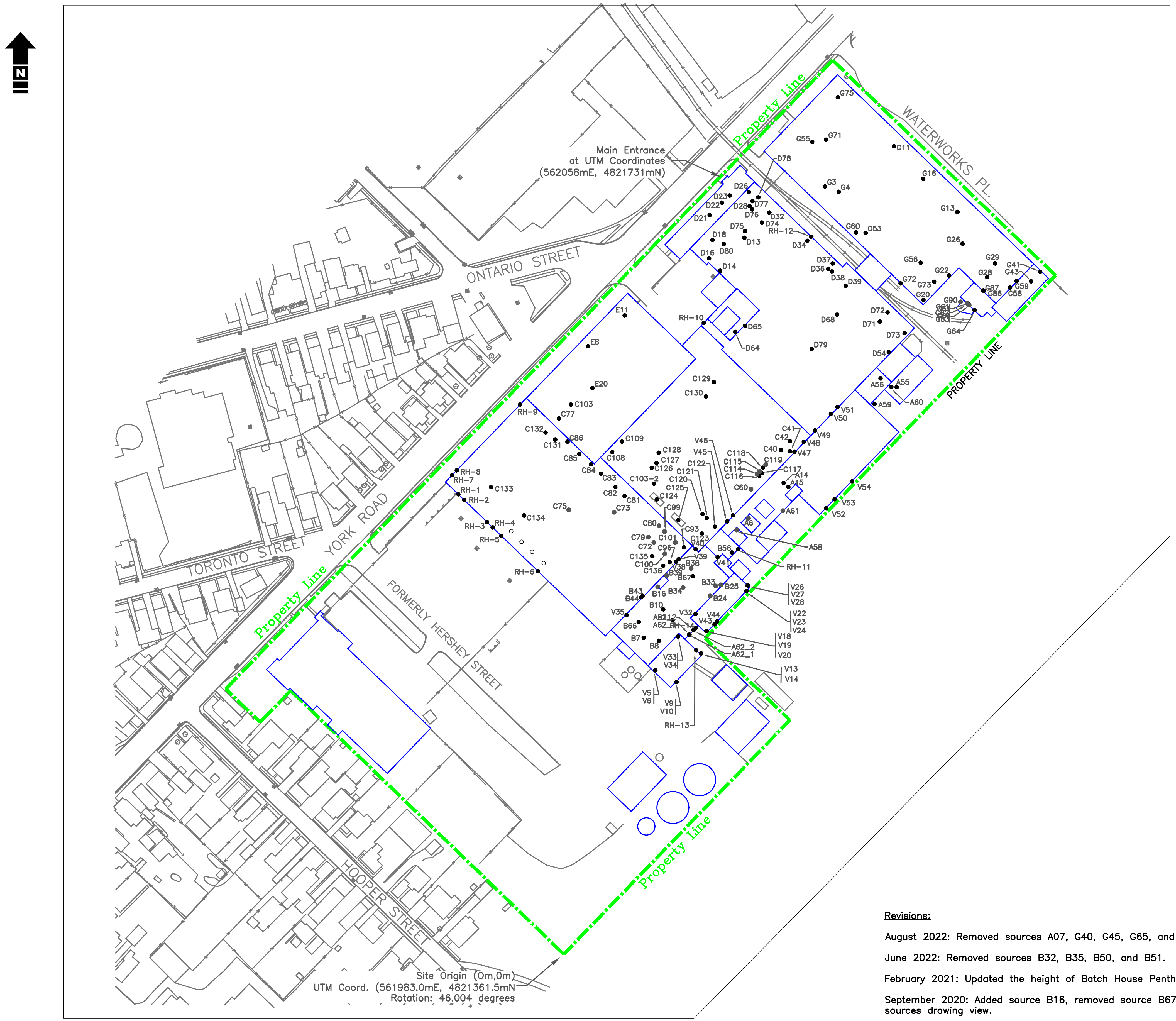
CFM Process Flow Diagram

Date:	Project:	Submitter:	Reviewer:
March 2025	41296	D. Agar	P. McInnis

Appendix
A2

APPENDIX B
Site Drawings

Plot 1:1 = Tabloid (L)



Legend

● Emissions Source

1:2000 metres

20 0 20 40

Reference:

MONTROSE ENVIRONMENTAL

Owens Corning Composite Materials Canada LP
Guelph Glass Plant

Site Plan and Emission Source Inventory

Date:	Project:	Submitter:	Reviewer:
March 2025	41296	D. Agar	P. McInnis

Drawing No.
B-144244P

Revisions:

August 2022: Removed sources A07, G40, G45, G65, and G81.

June 2022: Removed sources B32, B35, B50, and B51.

February 2021: Updated the height of Batch House Penthouse building.

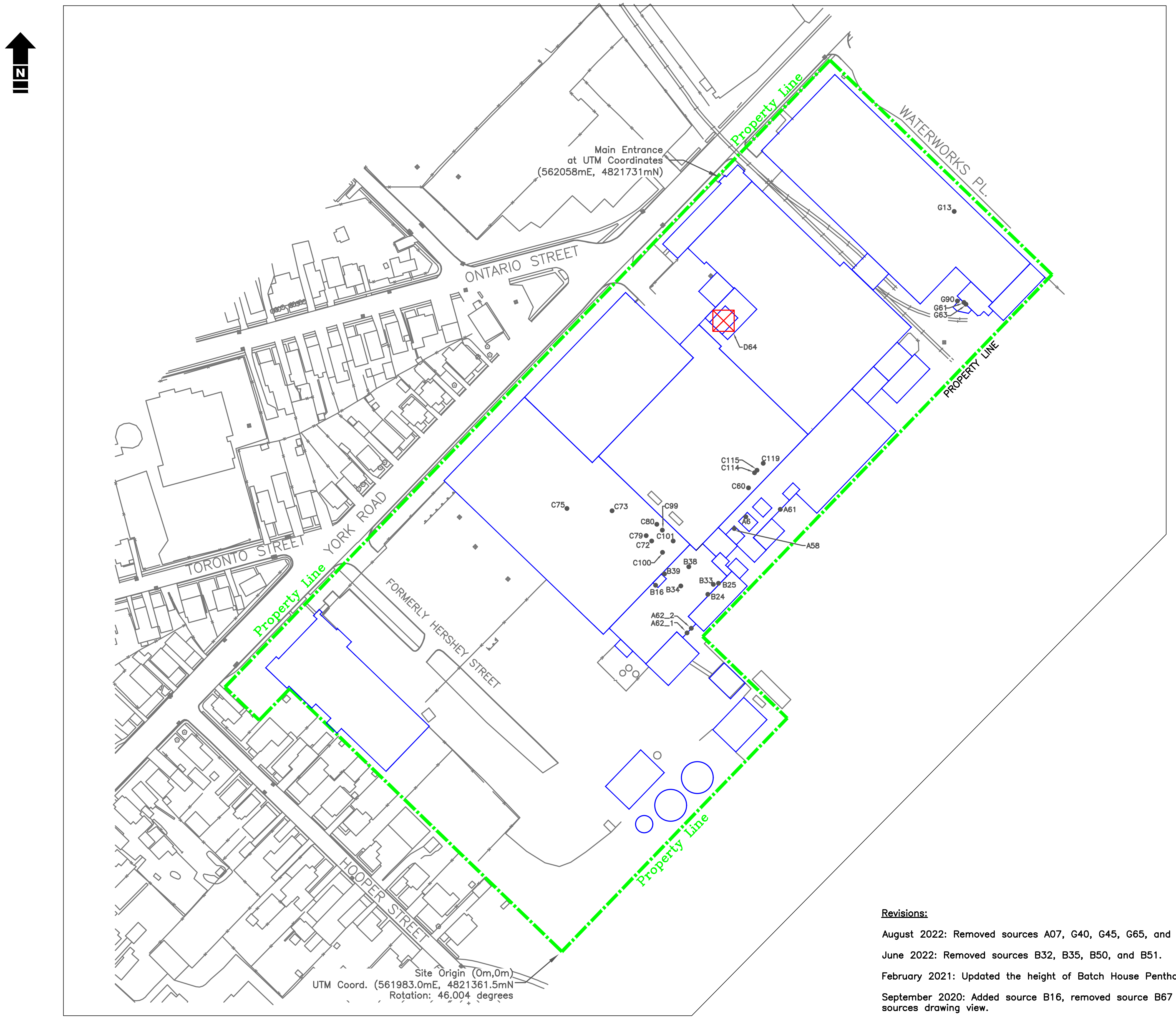
September 2020: Added source B16, removed source B67 from modelled sources drawing view.

October 2019: Removed source G23, B35 and B51. Added sources B33, A62_1, A62_2 and volume source D64. Moved source G13.

F:\Drafting Department\MontroseEnvironmental\41296\Drafting\41296-SP.dwg - SP-ESI - March 6, 2025 10:55:19 AM - Gary Evenson

Plot 1:1 = Tabloid (L)

F:\Drafting Department\MontroseEnvironmental\41296\Drafting\41296-SP.dwg - SP-SMS - March 6, 2025 10:55:19 AM - Gary Evenson



Legend

● Emissions Source (In Service)

☒ Volume Source

1:2000 metres

20 0 20 40

Revisions:

August 2022: Removed sources A07, G40, G45, G65, and G81.

June 2022: Removed sources B32, B35, B50, and B51.

February 2021: Updated the height of Batch House Penthouse building.

September 2020: Added source B16, removed source B67 from modelled sources drawing view.

October 2019: Removed source G23, B35 and B51. Added sources B33, A62_1, A62_2 and volume source D64. Moved source G13.

Reference:

MONTROSE
ENVIRONMENTAL

Owens Corning Composite Materials Canada LP
Guelph Glass Plant

Site Plan Showing Modeled Sources

Date:	Project:	Submitter:	Reviewer:
March 2025	41296	D. Agar	P. McInnis

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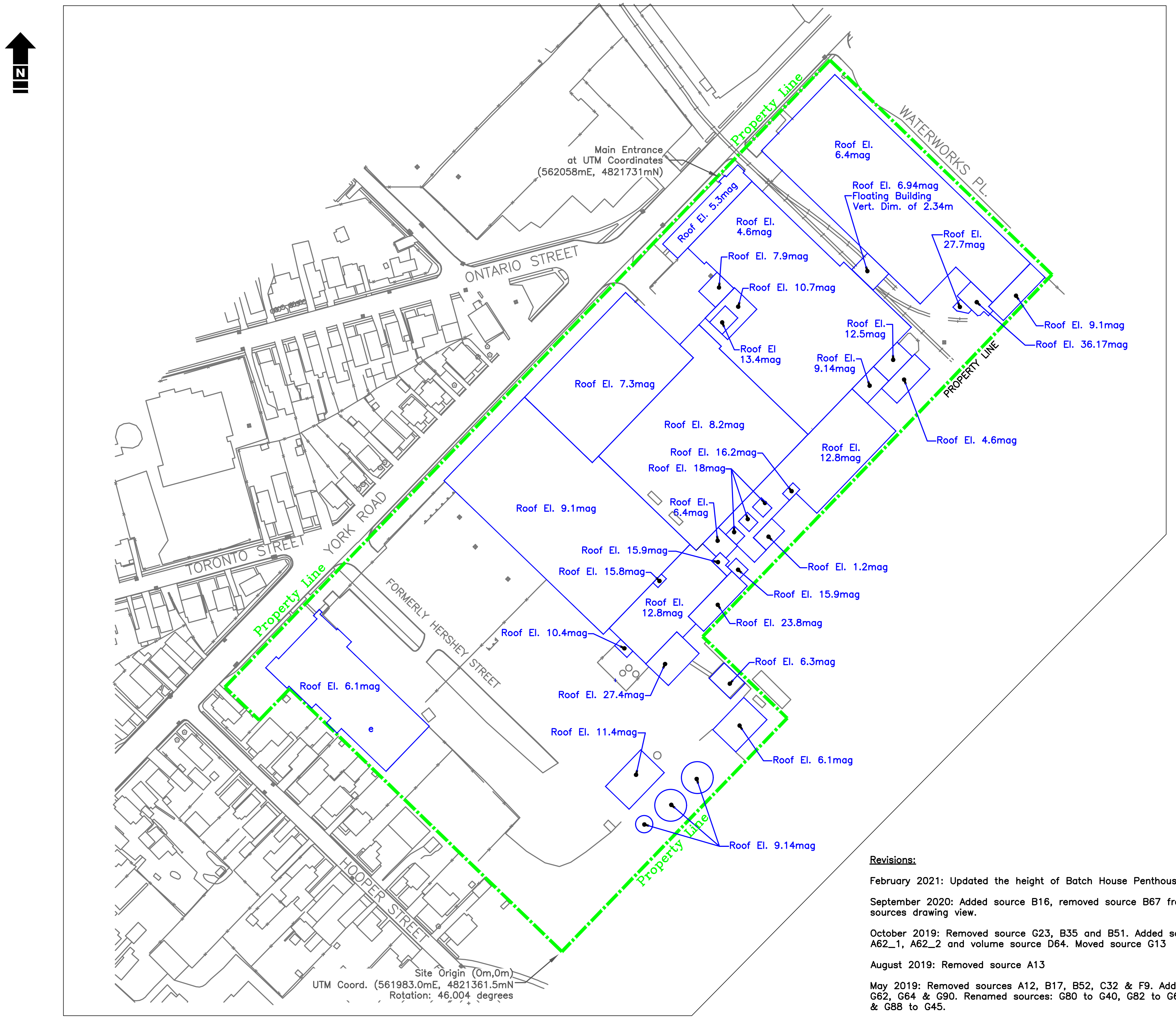
Drawing No.
B-144244Q



1:2000 metres
20 0 20 40

Revisions:

February 2021: Updated the height of Batch House Penthouse building.

September 2020: Added source B16, removed source B67 from modelled sources drawing view.

October 2019: Removed source G23, B35 and B51. Added sources B33, A62_1, A62_2 and volume source D64. Moved source G13

August 2019: Removed source A13

May 2019: Removed sources A12, B17, B52, C32 & F9. Added sources G62, G64 & G90. Renamed sources: G80 to G40, G82 to G65, G89 to G61 & G88 to G45.

April 2019: Corrected Street Names and changed source ID B65 to B11
October 2018: General drawing update from roof survey conducted by LEHDER on Oct.1, 2018 (Project 180077).

Reference:

MONTROSE
ENVIRONMENTAL

Owens Corning Composite Materials Canada LP
Guelph Glass Plant

Site Plan with Property Line and Roof Elevations

Date: March 2025	Project: 41296	Submitter: D. Agar	Reviewer: P. McInnis

Drawing No.
B-144244N

APPENDIX C
Source Inventory

Site Name: Owen's Corning Composite Materials Canada LP

Site Location: Guelph, Ontario

Source Inventory Table - Current Hexavalent Chromium

Source ID	Description	UTM Easting	UTM Northing	Volumetric Flowrate (m^3/s)	Stack Dimensions (_x_m)	Temp. (C)	Height Above Roof (m)	Height Above Grade (m)	Source Type
B24	105 Furnace Stack (West)	562052.6	4821531.7	1.55	0.33 x	288	11.3	35.1	Process Exhaust
B25	105 Furnace Stack (East)	562057.7	4821536.9	1.43	0.33 x	283	11.3	35.1	Process Exhaust
B33	General Ventilation above T107 Furnace	562055.2	4821536.4	18.40	1.41 x	42	5.2	18.0	General Ventilation
B34	General Exhaust Above T107A F/H	562039.7	4821535.7	17.63	1.41 x	42	5.2	18.0	General Ventilation
B38	105 Forehearth Stack	562043.5	4821544.8	3.632	0.75 x	118	15.2	28.0	Process Exhaust
C79	General Exhaust West CFM F/H	562023.2	4821559.6	17.25	1.41 x	42	2.4	11.5	General Ventilation
C80	General Exhaust East CFM F/H	562028.3	4821565.0	14.76	1.41 x	42	2.4	11.5	General Ventilation

Site Name: Owen's Corning Composite Materials Canada LP

Site Location: Guelph, Ontario

Source Inventory Table - Future Hexavalent Chromium

Source ID	Description	UTM Easting	UTM Northing	Volumetric Flowrate (m^3/s)	Stack Dimensions (_x_m)	Temp. (C)	Height Above Roof (m)	Height Above Grade (m)	Source Type
B24	105 Furnace Stack (West)	562052.6	4821531.7	5.13	0.33 x	72	11.3	35.1	Process Exhaust
B25	105 Furnace Stack (East)	562057.7	4821536.9	5.13	0.33 x	72	11.3	35.1	Process Exhaust
B33	General Ventilation above T107 Furnace	562055.2	4821536.4	18.40	1.41 x	42	5.2	18.0	General Ventilation
B34	General Exhaust Above T107A F/H	562039.7	4821535.7	17.63	1.41 x	42	5.2	18.0	General Ventilation
B38	105 Forehearth Stack	562043.5	4821544.8	11.00	0.75 x	51	19.2	32.0	Process Exhaust
C79	General Exhaust West CFM F/H	562023.2	4821559.6	17.25	1.41 x	42	2.4	11.5	General Ventilation
C80	General Exhaust East CFM F/H	562028.3	4821565.0	14.76	1.41 x	42	2.4	11.5	General Ventilation

Site Name: Owen's Corning Composite Materials Canada LP

Site Location: Guelph, Ontario

Source Summary Table A – Source Inventory Table

Source ID	Description	UTM Easting	UTM Northing	Volumetric Flowrate (m^3/s)	Stack Dimensions (_x_m)	Temp. (C)	Height Above Roof (m)	Height Above Grade (m)	Source Type
A06	Cooling Tower #1	562070.7	4821568.6	70.750	2.97 x	25	5.5	18.3	Wet Cooling Tower
A58	Cooling Tower #4	562065.1	4821562.9	70.750	2.97 x	25	5.5	18.3	Wet Cooling Tower
A61	NG Generator #1 Exhaust	562087.1	4821572.1	0.821	0.20 x	366	3.5	16.3	Combustion - Electrical Generation
A62_1	Generac SG500 Natural Gas Generator Exhaust 1	562042.6	4821513.3	0.553	0.15 x	414	2.4	15.2	Combustion - Electrical Generation
A62_2	Generac SG500 Natural Gas Generator Exhaust 2	562044.7	4821515.4	0.553	0.15 x	414	2.4	15.2	Combustion - Electrical Generation
B16	107B Forming Scrap Tunnel Exhaust	562027.7	4821535.9	16.500	1.22 x	27	4.7	17.5	Process Exhaust
B24	105 Furnace Stack (West)	562052.6	4821531.7	1.547	0.33 x	288	11.3	35.1	Process Exhaust
B25	105 Furnace Stack (East)	562057.7	4821536.9	1.434	0.33 x	283	11.3	35.1	Process Exhaust
B33	General Ventilation above T107 Furnace	562055.2	4821536.4	18.400	1.41 x	42	5.2	18.0	General Ventilation
B34	General Exhaust Above T107A F/H	562039.7	4821535.7	17.600	1.41 x	42	5.2	18.0	General Ventilation
B38	105 Forehearth Stack	562043.5	4821544.8	3.632	0.75 x	118	15.2	28.0	Process Exhaust

Source ID	Description	UTM Easting	UTM Northing	Volumetric Flowrate (m^3/s)	Stack Dimensions (_x_m)	Temp. (C)	Height Above Roof (m)	Height Above Grade (m)	Source Type
B39	107A Forming Scrap Tunnel Exhaust	562031.9	4821541.4	14.000	0.91 x	27	5.0	17.8	Process Exhaust
C100	CFM Forming Tunnel (South-West)	562031.0	4821551.6	2.360	0.55 x	25	5.3	14.4	Process Exhaust
C101	CFM Forming Tunnel (South-East)	562036.1	4821557.0	2.360	0.55 x	25	5.3	14.4	Process Exhaust
C114	DI Boilers	562074.8	4821589.6	0.004	0.15 x	100	0.5	8.7	Process Exhaust
C115	DI Boilers	562076.0	4821590.8	0.004	0.15 x	100	0.5	8.7	Process Exhaust
C119	Binder Heater	562079.0	4821594.0	0.002	0.10 x	100	1.1	9.3	Process Exhaust
C60	Binder Circ. Tank Exhaust	562072.0	4821582.4	0.980	0.51 x	28	14.6	22.8	Process Exhaust
C72	CFM Forming Tunnel (North-West)	562025.8	4821557.0	2.360	0.55 x	25	5.3	14.4	Process Exhaust
C73	CFM Binder Cyclone	562006.9	4821571.4	2.100	0.50 x	21	4.0	13.1	Process Exhaust
C75	CFM RTO - Oven	561985.4	4821572.6	11.000	0.60 x	245	5.5	14.6	Process Exhaust
C79	General Exhaust West CFM F/H	562023.2	4821559.6	17.200	1.41 x	42	2.4	11.5	General Ventilation
C80	General Exhaust East CFM F/H	562028.3	4821565.0	14.800	1.41 x	42	2.4	11.5	General Ventilation
C99	CFM Forming Tunnel (North - East)	562030.9	4821562.3	2.360	0.55 x	25	5.3	14.4	Miscellaneous (lunch room, plumbing vents, etc.)
D64	Filter Box Louvre Exhaust	562060.0	4821662.4			20	1.0	12.1	Process Exhaust
G13	NGF Tire Cord Line #1 RTO	562170.0	4821714.0	12.000	0.83 x	585	11.6	18.0	Process Exhaust
G61	D/C Exhaust - Soda Ash Silo (Bin 18)	562174.6	4821670.7	0.240	0.14 x	15		21.6	Process Exhaust
G63	D/C Exhaust - Salt Cake Silo (Bin 20)	562175.6	4821669.8	0.240	0.14 x	15		21.6	Process Exhaust

Source ID	Description	UTM Easting	UTM Northing	Volumetric Flowrate (m^3/s)	Stack Dimensions (_x_m)	Temp. (C)	Height Above Roof (m)	Height Above Grade (m)	Source Type
G90	D/C Exhaust - Bad Batch Bin	562171.5	4821671.4	0.490	0.20 x	15		5.8	Process Exhaust

APPENDIX D
Emission Inventories

Site Name: Owen's Corning Composite Materials Canada LP

Site Location: Guelph, Ontario

Averaging Period: Annual, 24 hour

Source Summary Table B – Emission Inventory Table – Current with Uncertainty

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
205	CHROMIUM (VI) COMPOUNDS	18540-29-9						
			B24	105 Furnace Stack (West)	1.169E-05	V-ST	Highest	8.53
			B25	105 Furnace Stack (East)	1.946E-05	V-ST	Highest	14.20
			B33	General Ventilation above T107 Furnace	6.457E-06	V-ST	Highest	4.71
			B34	General Exhaust Above T107A F/H	4.686E-06	V-ST	Highest	3.42
			B38	105 Forehearth Stack	8.982E-05	V-ST	Highest	65.55
			C79	General Exhaust West CFM F/H	2.460E-06	V-ST	Highest	1.79
			C80	General Exhaust East CFM F/H	2.460E-06	V-ST	Highest	1.79
				Scenario Total:	1.370E-04			100

Estimation Techniques: MB- Mass Balance Calculation, EF- Emission Factor Calculation, V-ST- Validated Source Testing, EC- Engineering Calculation

Confidential Commercially Sensitive Information

Site Name: Owen's Corning Composite Materials Canada LP

Site Location: Guelph, Ontario

Averaging Period: Annual, 24 hour

Source Summary Table B – Emission Inventory Table – Current Mean

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
205	CHROMIUM (VI) COMPOUNDS	18540-29-9						
			B24	105 Furnace Stack (West)	8.866E-06	V-ST	Highest	7.65
			B25	105 Furnace Stack (East)	1.495E-05	V-ST	Highest	12.91
			B33	General Ventilation above T107 Furnace	3.061E-06	V-ST	Highest	2.64
			B34	General Exhaust Above T107A F/H	4.106E-06	V-ST	Highest	3.54
			B38	105 Forehearth Stack	8.075E-05	V-ST	Highest	69.69
			C79	General Exhaust West CFM F/H	2.068E-06	V-ST	Highest	1.78
			C80	General Exhaust East CFM F/H	2.068E-06	V-ST	Highest	1.78
				Scenario Total:	1.159E-04			100

Scenario Name: 24035387_Annual_R0

Estimation Techniques: MB- Mass Balance Calculation, EF- Emission Factor Calculation, V-ST- Validated Source Testing, EC- Engineering Calculation

Confidential Commercially Sensitive Information

Site Name: Owen's Corning Composite Materials Canada LP

Site Location: Guelph, Ontario

Averaging Period: Annual, 24 hour

Source Summary Table B – Emission Inventory Table – Future

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
205	CHROMIUM (VI) COMPOUNDS	18540-29-9						
			B24	105 Furnace Stack (West)	1.169E-05	V-ST	Highest	8.92
			B25	105 Furnace Stack (East)	1.946E-05	V-ST	Highest	14.86
			B33	General Ventilation above T107 Furnace	6.457E-06	V-ST	Highest	4.93
			B34	General Exhaust Above T107A F/H	4.686E-06	V-ST	Highest	3.58
			B38	105 Forehearth Stack	8.376E-05	EC	Average	63.95
			C79	General Exhaust West CFM F/H	2.460E-06	V-ST	Highest	1.88
			C80	General Exhaust East CFM F/H	2.460E-06	V-ST	Highest	1.88
				Scenario Total:	1.310E-04			100

Estimation Techniques: MB- Mass Balance Calculation, EF- Emission Factor Calculation, V-ST- Validated Source Testing, EC- Engineering Calculation

Site Name: Owen's Corning Composite Materials Canada LP

Site Location: Guelph, Ontario

Averaging Period: 30 Minute

Source Summary Table B – Emission Inventory Table

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
7	CARBON MONOXIDE	630-08-0						
			B24	105 Furnace Stack (West)	2.900E-02	EC	Marginal	50.00
			B25	105 Furnace Stack (East)	2.900E-02	EC	Marginal	50.00
				Scenario Total:	5.800E-02			100

Estimation Techniques: MB- Mass Balance Calculation, EF- Emission Factor Calculation, V-ST- Validated Source Testing, EC- Engineering Calculation

Site Name: Owen's Guelph Composite Materials Canada LP

Site Location: Guelph, Ontario

Averaging Period: 1 Hour

Source Summary Table B – Emission Inventory Table

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
316	ETHANOL (ETHYL ALCOHOL)	64-17-5						
			B16	107B Forming Scrap Tunnel Exhaust	5.468E-03	EC	Average	45.00
			B39	107A Forming Scrap Tunnel Exhaust	5.468E-03	EC	Average	45.00
			C60	Binder Circ. Tank Exhaust	1.215E-03	EC	Average	10.00
				Scenario Total:	1.215E-02			100
4	NITROGEN OXIDES (EXPRESSED AS NO2)	10102-44-0						
			A61	NG Generator #1 Exhaust	2.473E-02	EF	Above-Avg	2.13
			A62_1	Generac SG500 Natural Gas Generator Exhaust 1	7.554E-03	EF	Above-Avg	0.65
			A62_2	Generac SG500 Natural Gas Generator Exhaust 2	7.554E-03	EF	Above-Avg	0.65
			B24	105 Furnace Stack (West)	1.769E-01	EC	Marginal	15.27
			B25	105 Furnace Stack (East)	9.528E-02	EC	Marginal	8.22

Estimation Techniques: MB- Mass Balance Calculation, EF- Emission Factor Calculation, V-ST- Validated Source Testing, EC- Engineering Calculation

Confidential Commercially Sensitive Information

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
			B38	105 Forehearth Stack	2.956E-01	EF	Above-Avg	25.51
			C114	DI Boilers	6.176E-03	EF	Above-Avg	0.53
			C115	DI Boilers	6.176E-03	EF	Above-Avg	0.53
			C119	Binder Heater	7.412E-03	EF	Above-Avg	0.64
			C75	CFM RTO - Oven	3.829E-01	EF	Above-Avg	33.05
			G13	NGF Tire Cord Line #1 RTO	1.482E-01	EF	Above-Avg	12.79
				Scenario Total:	1.159E+00			100
5	SULPHUR DIOXIDE	7446-09-5						
			B24	105 Furnace Stack (West)	3.073E-01	MB	Highest	50.00
			B25	105 Furnace Stack (East)	3.073E-01	MB	Highest	50.00
				Scenario Total:	6.147E-01			100

Estimation Techniques: MB- Mass Balance Calculation, EF- Emission Factor Calculation, V-ST- Validated Source Testing, EC- Engineering Calculation

Site Name: Owen's Corning Composite Materials Canada LP

Site Location: Guelph, Ontario

Averaging Period: 24 Hour

Source Summary Table B – Emission Inventory Table

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
1698	1-Propanol, 3-(trimethoxysilyl)-, methacrylate	2530-85-0						
			C75	CFM RTO - Oven	6.414E-04	EC	Average	100.00
				Scenario Total:	6.414E-04			100
3555	2,2-dibromo-3-nitrilopropionamide	10222-01-2						
			C75	CFM RTO - Oven	6.014E-03	EC	Average	100.00
				Scenario Total:	6.014E-03			100
1933	2-Methyl-4-Isothiazolin-3-one	2682-20-4						
			B16	107B Forming Scrap Tunnel Exhaust	5.165E-04	EC	Average	43.30
			B39	107A Forming Scrap Tunnel	5.165E-04	EC	Average	43.30

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
				Exhaust				
			C60	Binder Circ. Tank Exhaust	1.502E-04	EC	Average	12.59
			C75	CFM RTO - Oven	9.562E-06	EC	Average	0.80
				Scenario Total:	1.193E-03			100
1706	3-(Triethoxysilyl)propylamine	919-30-2						
			B16	107B Forming Scrap Tunnel Exhaust	8.758E-03	EC	Average	45.00
			B39	107A Forming Scrap Tunnel Exhaust	8.758E-03	EC	Average	45.00
			C60	Binder Circ. Tank Exhaust	1.946E-03	EC	Average	10.00
				Scenario Total:	1.946E-02			100
7553	5-Chloro-2-methyl-2H-isothiazol-3-one	55965-84-9						
			B16	107B Forming Scrap Tunnel Exhaust	1.485E-03	EC	Average	43.05
			B39	107A Forming Scrap Tunnel Exhaust	1.485E-03	EC	Average	43.05
			C60	Binder Circ. Tank Exhaust	4.482E-04	EC	Average	12.99
			C75	CFM RTO - Oven	3.187E-05	EC	Average	0.92
				Scenario Total:	3.451E-03			100
1708	5-Chloro-2-methyl-4-isothiazolin-3-one	26172-55-4						

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
			B16	107B Forming Scrap Tunnel Exhaust	5.165E-04	EC	Average	43.30
			B39	107A Forming Scrap Tunnel Exhaust	5.165E-04	EC	Average	43.30
			C60	Binder Circ. Tank Exhaust	1.502E-04	EC	Average	12.59
			C75	CFM RTO - Oven	9.562E-06	EC	Average	0.80
				Scenario Total:	1.193E-03			100
318	ACETIC ACID	64-19-7						
			B16	107B Forming Scrap Tunnel Exhaust	9.657E-03	EC	Average	5.26
			B39	107A Forming Scrap Tunnel Exhaust	9.657E-03	EC	Average	5.26
			C100	CFM Forming Tunnel (South-West)	3.199E-02	EC	Average	17.42
			C101	CFM Forming Tunnel (South-East)	3.199E-02	EC	Average	17.42
			C60	Binder Circ. Tank Exhaust	3.207E-02	EC	Average	17.47
			C72	CFM Forming Tunnel (North-West)	3.199E-02	EC	Average	17.42
			C75	CFM RTO - Oven	4.241E-03	EC	Average	2.31
			C99	CFM Forming Tunnel (North - East)	3.199E-02	EC	Average	17.42
				Scenario Total:	1.836E-01			100
7917	Acid Solubilized Fatty Acid Amide (Prop1)							

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
			C100	CFM Forming Tunnel (South-West)	5.694E-03	EC	Average	20.42
			C101	CFM Forming Tunnel (South-East)	5.694E-03	EC	Average	20.42
			C60	Binder Circ. Tank Exhaust	4.555E-03	EC	Average	16.34
			C72	CFM Forming Tunnel (North-West)	5.694E-03	EC	Average	20.42
			C75	CFM RTO - Oven	5.466E-04	EC	Average	1.96
			C99	CFM Forming Tunnel (North - East)	5.694E-03	EC	Average	20.42
				Scenario Total:	2.788E-02			100
7918	Acid Solubilized Fatty Acid Amide (Prop2)							
			C100	CFM Forming Tunnel (South-West)	2.531E-03	EC	Average	20.42
			C101	CFM Forming Tunnel (South-East)	2.531E-03	EC	Average	20.42
			C60	Binder Circ. Tank Exhaust	2.025E-03	EC	Average	16.34
			C72	CFM Forming Tunnel (North-West)	2.531E-03	EC	Average	20.42
			C75	CFM RTO - Oven	2.429E-04	EC	Average	1.96
			C99	CFM Forming Tunnel (North - East)	2.531E-03	EC	Average	20.42
				Scenario Total:	1.239E-02			100
426	AMMONIA	7664-41-7						

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
			B16	107B Forming Scrap Tunnel Exhaust	1.706E-04	EC	Average	33.15
			B39	107A Forming Scrap Tunnel Exhaust	1.706E-04	EC	Average	33.15
			C60	Binder Circ. Tank Exhaust	5.146E-05	EC	Average	10.00
			C75	CFM RTO - Oven	1.220E-04	EC	Average	23.71
				Scenario Total:	5.146E-04			100
7543	Benzenamine, N-[3-(trimethoxysilyl)propyl]-	3068-76-6						
			B16	107B Forming Scrap Tunnel Exhaust	3.023E-03	EC	Average	45.00
			B39	107A Forming Scrap Tunnel Exhaust	3.023E-03	EC	Average	45.00
			C60	Binder Circ. Tank Exhaust	6.717E-04	EC	Average	10.00
				Scenario Total:	6.717E-03			100
512	BENZOYL PEROXIDE	94-36-0						
			C73	CFM Binder Cyclone	2.617E-03	EC	Average	58.75
			C75	CFM RTO - Oven	1.838E-03	EC	Average	41.25
				Scenario Total:	4.455E-03			100
205	CHROMIUM (VI) COMPOUNDS	18540-29-9						

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
			B24	105 Furnace Stack (West)	1.169E-05	EC	Average	8.53
			B25	105 Furnace Stack (East)	1.946E-05	EC	Average	14.20
			B33	General Ventilation above T107 Furnace	6.457E-06	EC	Average	4.71
			B34	General Exhaust Above T107A F/H	4.686E-06	EC	Average	3.42
			B38	105 Forehearth Stack	8.982E-05	V-ST	Highest	65.55
			C79	General Exhaust West CFM F/H	2.460E-06	EC	Average	1.79
			C80	General Exhaust East CFM F/H	2.460E-06	EC	Average	1.79
				Scenario Total:	1.370E-04			100
368	Chromium Compounds (Di-,Tri-,metallic)	7440-47-3						
			B24	105 Furnace Stack (West)	1.530E-05	EC	Average	19.29
			B25	105 Furnace Stack (East)	2.553E-05	EC	Average	32.18
			B33	General Ventilation above T107 Furnace	3.664E-06	EC	Average	4.62
			B34	General Exhaust Above T107A F/H	1.994E-05	EC	Average	25.14
			B38	105 Forehearth Stack	9.199E-06	EC	Average	11.60
			C79	General Exhaust West CFM F/H	2.842E-06	EC	Average	3.58
			C80	General Exhaust East CFM F/H	2.842E-06	EC	Average	3.58
				Scenario Total:	7.932E-05			100
3230	Diallyl Phthalate	131-17-9						
			C60	Binder Circ. Tank Exhaust	5.473E-04	EC	Average	11.48
			C75	CFM RTO - Oven	4.222E-03	EC	Average	88.52

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
				Scenario Total:	4.770E-03			100
3554	Dibromoacetonitrile	3252-43-5						
			C100	CFM Forming Tunnel (South-West)	7.189E-06	EC	Average	0.50
			C101	CFM Forming Tunnel (South-East)	7.189E-06	EC	Average	0.50
			C60	Binder Circ. Tank Exhaust	1.117E-03	EC	Average	77.22
			C72	CFM Forming Tunnel (North-West)	7.189E-06	EC	Average	0.50
			C75	CFM RTO - Oven	3.007E-04	EC	Average	20.79
			C99	CFM Forming Tunnel (North - East)	7.189E-06	EC	Average	0.50
				Scenario Total:	1.446E-03			100
60	ETHYLENE GLYCOL	107-21-1						
			B16	107B Forming Scrap Tunnel Exhaust	5.153E-02	EC	Average	45.00
			B39	107A Forming Scrap Tunnel Exhaust	5.153E-02	EC	Average	45.00
			C60	Binder Circ. Tank Exhaust	1.145E-02	EC	Average	10.00
				Scenario Total:	1.145E-01			100
421	HYDROGEN CHLORIDE	7647-01-0						
			B24	105 Furnace Stack (West)	2.005E-03	EC	Average	50.00
			B25	105 Furnace Stack (East)	2.005E-03	EC	Average	50.00

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
				Scenario Total:	4.009E-03			100
423	HYDROGEN FLUORIDE - GASEOUS-GROWING SEASON GS	7664-39-3						
			B24	105 Furnace Stack (West)	3.207E-03	EC	Average	50.00
			B25	105 Furnace Stack (East)	3.207E-03	EC	Average	50.00
				Scenario Total:	6.415E-03			100
330	ISO-PROPANOL	67-63-0						
			B16	107B Forming Scrap Tunnel Exhaust	5.153E-02	EC	Average	45.00
			B39	107A Forming Scrap Tunnel Exhaust	5.153E-02	EC	Average	45.00
			C60	Binder Circ. Tank Exhaust	1.145E-02	EC	Average	10.00
				Scenario Total:	1.145E-01			100
1978	Magnesium chloride	7786-30-3						
			B16	107B Forming Scrap Tunnel Exhaust	4.456E-04	EC	Average	33.15
			B39	107A Forming Scrap Tunnel Exhaust	4.456E-04	EC	Average	33.15
			C60	Binder Circ. Tank Exhaust	1.344E-04	EC	Average	10.00
			C75	CFM RTO - Oven	3.187E-04	EC	Average	23.71
				Scenario Total:	1.344E-03			100

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
1367	MAGNESIUM NITRATE	10377-60-3						
			B16	107B Forming Scrap Tunnel Exhaust	1.485E-03	EC	Average	33.15
			B39	107A Forming Scrap Tunnel Exhaust	1.485E-03	EC	Average	33.15
			C60	Binder Circ. Tank Exhaust	4.482E-04	EC	Average	10.00
			C75	CFM RTO - Oven	1.062E-03	EC	Average	23.71
				Scenario Total:	4.482E-03			100
329	METHANOL (METHYL ALCOHOL, WOOD ALCOHOL)	67-56-1						
			B16	107B Forming Scrap Tunnel Exhaust	1.101E-03	EC	Average	0.81
			B39	107A Forming Scrap Tunnel Exhaust	1.101E-03	EC	Average	0.81
			C100	CFM Forming Tunnel (South-West)	2.479E-02	EC	Average	18.22
			C101	CFM Forming Tunnel (South-East)	2.479E-02	EC	Average	18.22
			C60	Binder Circ. Tank Exhaust	2.971E-02	EC	Average	21.84
			C72	CFM Forming Tunnel (North-West)	2.479E-02	EC	Average	18.22
			C75	CFM RTO - Oven	4.981E-03	EC	Average	3.66
			C99	CFM Forming Tunnel (North - East)	2.479E-02	EC	Average	18.22
				Scenario Total:	1.361E-01			100

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
4	NITROGEN OXIDES (EXPRESSED AS NO2)	10102-44-0						
			A61	NG Generator #1 Exhaust	2.473E-02	EF	Above-Avg	2.13
			A62_1	Generac SG500 Natural Gas Generator Exhaust 1	7.554E-03	EF	Above-Avg	0.65
			A62_2	Generac SG500 Natural Gas Generator Exhaust 2	7.554E-03	EF	Above-Avg	0.65
			B24	105 Furnace Stack (West)	1.769E-01	EC	Marginal	15.27
			B25	105 Furnace Stack (East)	9.528E-02	EC	Marginal	8.22
			B38	105 Forehearth Stack	2.956E-01	EF	Above-Avg	25.51
			C114	DI Boilers	6.176E-03	EF	Above-Avg	0.53
			C115	DI Boilers	6.176E-03	EF	Above-Avg	0.53
			C119	Binder Heater	7.412E-03	EF	Above-Avg	0.64
			C75	CFM RTO - Oven	3.829E-01	EF	Above-Avg	33.05
			G13	NGF Tire Cord Line #1 RTO	1.482E-01	EF	Above-Avg	12.79
				Scenario Total:	1.159E+00			100
1	PM - PARTICULATE MATTER	N/A - M08						
			A06	Cooling Tower #1	2.180E-03	EF	Average	0.48
			A58	Cooling Tower #4	2.180E-03	EF	Average	0.48
			B16	107B Forming Scrap Tunnel Exhaust	2.313E-02	EF	Above-Avg	5.12
			B24	105 Furnace Stack (West)	2.063E-02	EC	Marginal	4.56
			B25	105 Furnace Stack (East)	2.063E-02	EC	Marginal	4.56
			B39	107A Forming Scrap Tunnel Exhaust	2.313E-02	EF	Above-Avg	5.12
			C100	CFM Forming Tunnel (South-	3.602E-02	EF	Above-Avg	7.97

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
				West)				
			C101	CFM Forming Tunnel (South-East)	3.602E-02	EF	Above-Avg	7.97
			C72	CFM Forming Tunnel (North-West)	3.602E-02	EF	Above-Avg	7.97
			C73	CFM Binder Cyclone	1.441E-01	EC	Average	31.87
			C75	CFM RTO - Oven	6.944E-02	EC	Marginal	15.36
			C99	CFM Forming Tunnel (North - East)	3.602E-02	EF	Above-Avg	7.97
			D64	Filter Box Louvre Exhaust	2.093E-03	EC	Average	0.46
			G61	D/C Exhaust - Soda Ash Silo (Bin 18)	4.340E-04	EC	Above-Avg	0.10
			G63	D/C Exhaust - Salt Cake Silo (Bin 20)	2.431E-05	EC	Above-Avg	0.01
			G90	D/C Exhaust - Bad Batch Bin	8.270E-05	EC	Above-Avg	0.02
				Scenario Total:	4.521E-01			100
1808	Polyethylene glycol	25322-68-3						
			C75	CFM RTO - Oven	1.804E-02	EC	Average	100.00
				Scenario Total:	1.804E-02			100
190	SILICA-RESPIRABLE (<10um DIAMETER), QUARTZ	14808-60-7						
			G90	D/C Exhaust - Bad Batch Bin	5.127E-05	EC	Above-Avg	100.00
				Scenario Total:	5.127E-05			100

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
2159	Sodium acetate	127-09-3						
			B16	107B Forming Scrap Tunnel Exhaust	5.422E-03	EC	Average	45.00
			B39	107A Forming Scrap Tunnel Exhaust	5.422E-03	EC	Average	45.00
			C60	Binder Circ. Tank Exhaust	1.205E-03	EC	Average	10.00
				Scenario Total:	1.205E-02			100
3556	Sodium Bromide	7647-15-6						
			C100	CFM Forming Tunnel (South-West)	3.595E-05	EC	Average	0.07
			C101	CFM Forming Tunnel (South-East)	3.595E-05	EC	Average	0.07
			C72	CFM Forming Tunnel (North-West)	3.595E-05	EC	Average	0.07
			C75	CFM RTO - Oven	5.011E-02	EC	Average	99.71
			C99	CFM Forming Tunnel (North - East)	3.595E-05	EC	Average	0.07
				Scenario Total:	5.026E-02			100
2393	Sulfuric acid disodium salt	7757-82-6						
			G63	D/C Exhaust - Salt Cake Silo (Bin 20)	2.431E-05	EC	Above-Avg	100.00
				Scenario Total:	2.431E-05			100

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
5	SULPHUR DIOXIDE	7446-09-5						
			B24	105 Furnace Stack (West)	3.073E-01	MB	Highest	50.00
			B25	105 Furnace Stack (East)	3.073E-01	MB	Highest	50.00
				Scenario Total:	6.147E-01			100
3383	Vinyltrimethoxysilane	2768-02-7						
			C60	Binder Circ. Tank Exhaust	3.417E-03	EC	Average	76.92
			C75	CFM RTO - Oven	1.025E-03	EC	Average	23.08
				Scenario Total:	4.442E-03			100

Site Name: Owen's Corning Composite Materials Canada LP

Site Location: Guelph, Ontario

Averaging Period: Annual

Source Summary Table B – Emission Inventory Table

Contam. ID	Contaminant Name	CAS#	Source ID	Source Description	Emission Rate (g/s)	Estimation Technique	Data Quality	% of Facility Emissions
205	CHROMIUM (VI) COMPOUNDS	18540-29-9						
			B24	105 Furnace Stack (West)	1.169E-05	V-ST	Highest	8.53
			B25	105 Furnace Stack (East)	1.946E-05	V-ST	Highest	14.20
			B33	General Ventilation above T107 Furnace	6.457E-06	V-ST	Highest	4.71
			B34	General Exhaust Above T107A F/H	4.686E-06	V-ST	Highest	3.42
			B38	105 Forehearth Stack	8.982E-05	V-ST	Highest	65.55
			C79	General Exhaust West CFM F/H	2.460E-06	V-ST	Highest	1.79
			C80	General Exhaust East CFM F/H	2.460E-06	V-ST	Highest	1.79
				Scenario Total:	1.370E-04			100
5	SULPHUR DIOXIDE	7446-09-5						
			B24	105 Furnace Stack (West)	3.073E-01	MB	Highest	50.00
			B25	105 Furnace Stack (East)	3.073E-01	MB	Highest	50.00
				Scenario Total:	6.147E-01			100

Estimation Techniques: MB- Mass Balance Calculation, EF- Emission Factor Calculation, V-ST- Validated Source Testing, EC- Engineering Calculation

Confidential Commercially Sensitive Information

APPENDIX E
Insignificant Sources Documentation

Natural Gas Fired Equipment - Comfort Heating

Natural Gas Fired Equipment < 100MMBTU/hr

Source ID	Description	Roof Zone	Model Source ID	Maximum Input Heat Capacity		Conversion Factor		Maximum Input Heat Capacity (MMBTU/hr)	Emission Rate (g/s) [2]
				Maximum Heat Input	Units	Conversion Factor	Units		
A56	HVAC Unit, Eng. Office			0.28	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.275	0.003
B56	Eye Wash Water Heater Exhaust			0.78	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.780	0.010
C108	Natural Gas Heater Exhaust			0.13	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.125	0.002
C109	Natural Gas Heater Exhaust			0.08	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.080	0.001
D21	HVAC Unit for Office			0.20	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.203	0.003
D22	HVAC Unit for Office			0.13	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.125	0.002
D65	High-Efficiency Furnace - compactor room			0.14	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.140	0.002
D68	Roving Gas Heater Exhaust #1			0.40	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.400	0.005
D78	Natural Gas Heater Exhaust			0.12	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.120	0.001
E08	Nat.Gas Heater Exhaust			0.09	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.090	0.001
G03	Nat.Gas Space Heater Exhaust			0.11	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.110	0.001
G04	Nat.Gas Space Heater Exhaust			0.40	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.400	0.005
G26	Nat.Gas Space Heater Exhaust			0.30	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.300	0.004
G28	Nat.Gas Space Heater Exhaust			0.25	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.250	0.003
G29	Nat.Gas Space Heater Exhaust			0.25	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.250	0.003
G53	Nat.Gas Space Heater Exhaust			0.11	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.110	0.001
G55	Roof Mounted Heat/Cool Unit			0.24	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.240	0.003
G56	Nat.Gas Space Heater Exhaust			0.25	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.250	0.003
G58	Nat.Gas Space Heater Exhaust			0.25	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.250	0.003
G59	Nat.Gas Space Heater Exhaust			0.20	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.200	0.002
G60	Roof Mounted Heat/Cool Unit			0.12	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.120	0.001
G72	Gas Space Heater	NGF		0.00	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.000	0.000
G75	Natural Gas Heater Exhaust	NGF		0.00	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.000	0.000
RH2	Radient Heater			0.20	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.200	0.002
RH4	Radient Heater			0.20	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.200	0.002
RH6	Radient Heater			0.20	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.200	0.002
RH8	Radient Heater			0.20	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.200	0.002
RH9	Radient Heater			0.35	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.350	0.004
RH10	Radient Heater			0.15	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.150	0.002
RH11	Radient Heater			0.04	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.040	0.000
RH12	Radient Heater			0.04	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.040	0.000
RH13	Radient Heater			0.20	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.200	0.002
RH14	Radient Heater			0.30	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.300	0.004
				7.3	MMBTU/hr		**Total - Comfort Heating**	7.30	0.090

NOx Emission Factor	
Source	AP 42 1.4-5 Table 1.4-1
Date	Jul-98
Rating	B
Emission Factor (lb/10^6scf)	100

Heat Value [1]	
Heat Value (10^6scf/MMBTU)	1/1020

Conversion Factors	
Conversion Factor (g/s)/(lb/hr)	0.1260

Conversion Factors to MMBTU/hr	
From	**Factor**
BTU/hr	1.00E-06
MMBTU/hr	1
kj/s	3.41E-03
--	
MJ/hr	9.48E-04
Boiler horsepower	3.35E-02

Example Calculations

1. Maximum Input Heat Capacity (MMBTU/hr) for Source A56

= Maximum Heat Input x Conversion Factor
= 0MMBTU/hr x 1(MMBTU/hr) / (MMBTU/hr)
= 0.275MMBTU/hr

2. Emission Rate (g/s)[2] for Source A56

= Maximum Input Heat Capacity (MMBTU/hr) x Heat Value (106scf/MMBTU) x Emission Factor (lb/106scf) x Conversion Factor (g/s)/(lb/hr)
= 0.275MMBTU/hr x 0.00098 106scf/MMBTU x 100lb/106scf x 0.126(g/s)/(lb/hr)
= 0.003g/s

Notes

[1] Natural gas heat value of 1020 MMBTU/10^6scf obtained from AP-42, refer to Reference 1.
[2] Assumed to operate 24 hours per day
[3] Boiler horsepower is different from electric hp. Boiler hp x 33,472 = BTU/HR

References

1. U.S. Environmental Protection Agency. *AP 42, Fifth Edition, Volume I, Chapter 1: External Combustion Sources, Section 1.4: Natural Gas Combustion, Final Section, Table 1.4-1. Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion*. U.S. Environmental Protection Agency, July, 1998. Page 1.4-5. <http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf>

Wax Fume Emissions From Source D80

Max weight of wax used in an hour = 225 g
Annual wax used = 9300 g
Table B1 24hr DF = 4100 µg/m3 per g/s
Table B1 Annual DF = 787.4 µg/m3 per g/s

Wax covered bushings are treated in the oven approximately 50 times a year (28 + 20) or about once a week

Worst case emission factor (formaldehyde) = 3 µg/g
Worst case 1hr emission rate (formaldehyde) = 1.88E-07 g/s
If max of one bushing is treated in 24 hrs
Worst case 24hr emission rate (formaldehyde) = 7.81E-09 g/s
24 hr POI Concentration = 3.20E-05 µg/m³
24hr POI formaldehyde limit = 65 µg/m³
24 hr threshold concentration = 6.41E-05 µg/m³
Is threshold concentration < POI limit? Yes

Worst case emission factor (benzene) = 0.4 µg/g
Worst case annual emission rate (benzene) = 1.18E-10 g/s
Annual POI Concentration = 9.29E-08 µg/m³
Annual benzene limit = 0.45 µg/m³
Annual threshold concentration = 1.86E-07
Is threshold concentration < POI limit? Yes

Notes:
[1] Wax usage rates provided by OC Guelph
[2] Emission factors obtained from Emissions of Air Pollutants From Scented Candles Burning in a Test Chamber, Atmospheric Environment (55), 2012.

Example Calculation

24 hr Emissions of Formaldehyde =
Weight of wax used in 1hr (g) x Emission Factor (µg/g wax) x conversion factors
225 g x 3 µg/g x 1 g/1000000 µg x 1 hr/3600 s x 1/24 hrs
0.000000008 g/s

-----Original Message-----
From: Shaw, Duncan
Sent: Wednesday, April 17, 2019 10:51 AM
To: Nixon, Robert D. <Robert.D.Nixon@owenscorning.com>
Subject: Wax

18 sheets = 340g
12 sheets for a FF = 225g --> ~28X/year
8 sheets for a CFM = 150g --> ~20X/year

M. Derudi et al. / Atmospheric Environment 55 (2012) 257–262 259

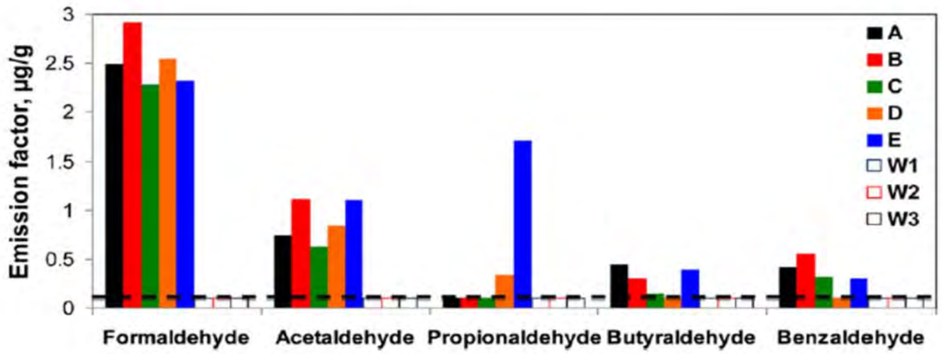


Fig. 2. Aldehydes emission factors for the investigated scented candles (filled bars) and pure paraffin candles (empty bars). Dashed line represents the quantification limit.

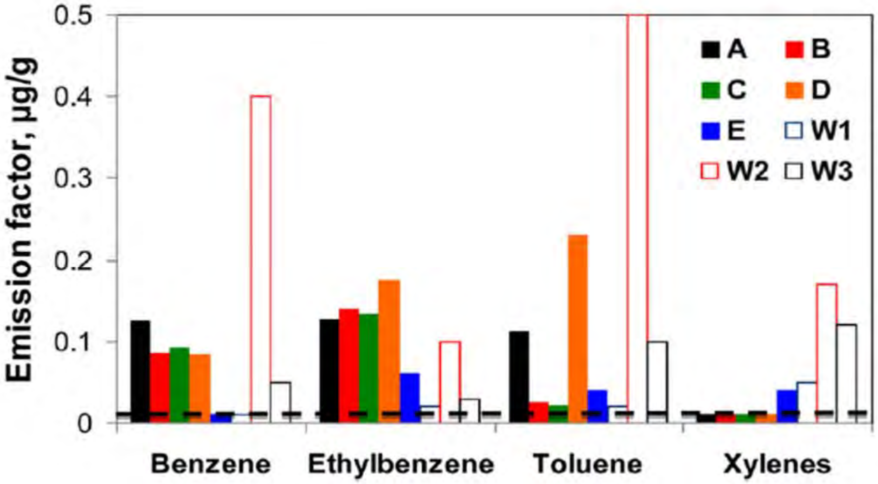


Fig. 3. BTEX emission factors for the investigated scented candles (filled bars) and pure paraffin candles (empty bars). Dashed line represents the quantification limit.

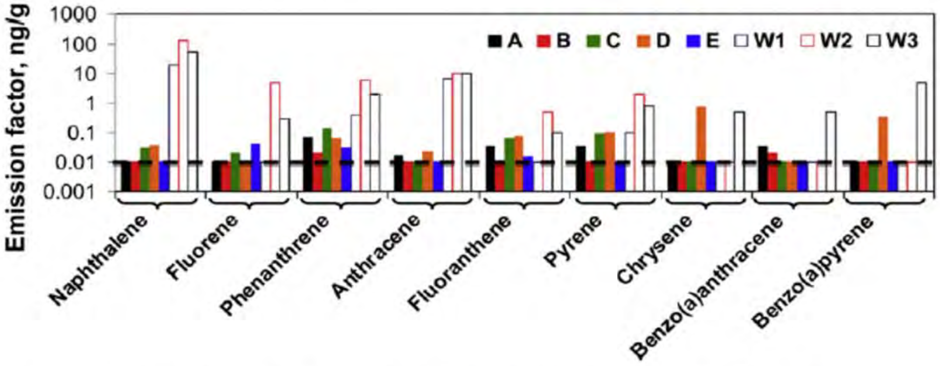


Fig. 4. PAHs emission factors for the investigated scented candles (filled bars) and pure paraffin candles (empty bars). Dashed line represents the quantification limit.

Source Id	Insignificant Emission Threshold
30 min Dispersion Factor µg/m³ / g/s	12000

30 min Screening POI

Ingredient ID	Contaminant	CAS #	30 min Emission Rate (g/s)	Emission Threshold Concentration [Site Wide ER * B-1 DF * 2]	30 min POI Criteria (µg/m³)	Schedule	Limiting Effect	Significant?
7	CARBON MONOXIDE	630-08-0	5.80E-02	1.39E+03	6000	Schedule 3	Health	Insignificant (Emission Threshold)

Source Id	Insignificant Emission Threshold
1-hr Dispersion Factor µg/m³ / g/s	10000

1 hour Screening POI

Ingredient ID	Contaminant	CAS #	1 Hour Emission Rate (g/s)	Emission Threshold Concentration [Site Wide ER * B-1 DF * 2]	1 Hour POI Criteria (µg/m³)	Schedule	Limiting Effect	Significant?
316	ETHANOL (ETHYL ALCOHOL)	64-17-5	1.22E-02	2.43E+02	19000	Guideline	Odour	Insignificant (Emission Threshold)

Source Id	Insignificant Emission Threshold
24-hr Dispersion Factor µg/m³ / g/s	4100

24 hour Screening POI

Ingredient ID	Contaminant	CAS #	24 Hour Emission Rate (g/s)	Emission Threshold Concentration [Site Wide ER * B-1 DF * 2]	24 Hour POI Criteria (µg/m³)	Schedule	Limiting Effect	Significant?
2393	Sulfuric acid disodium salt	7757-82-6	2.43E-05	1.99E-01	15	Screening Level	Health & Particulate	Insignificant (Emission Threshold)
1978	Magnesium chloride	7786-30-3	1.34E-03	1.10E+01	20	Screening Level	Health	Insignificant (Emission Threshold)
329	METHANOL (METHYL ALCOHOL, WOOD ALCOHOL)	67-56-1	1.36E-01	1.12E+03	4000	Schedule 3	Health	Insignificant (Emission Threshold)
318	ACETIC ACID	64-19-7	1.84E-01	1.51E+03	2500	Guideline	Odour	Insignificant (Emission Threshold)
330	ISO-PROPANOL	67-63-0	1.15E-01	9.39E+02	7300	Schedule 3	Health	Insignificant (Emission Threshold)
60	ETHYLENE GLYCOL	107-21-1	1.15E-01	9.39E+02	12700	Guideline	Health	Insignificant (Emission Threshold)
426	AMMONIA	7664-41-7	5.15E-04	4.22E+00	100	Schedule 3	Health	Insignificant (Emission Threshold)
3383	Vinyltrimethoxysilane	2768-02-07	4.44E-03	3.64E+01	50	Screening Level	Health	Insignificant (Emission Threshold)
190	SILICA-RESPIRABLE (<10um DIAMETER), QUARTZ	14808-60-7	5.13E-05	4.20E-01	5	Guideline	Health	Insignificant (Emission Threshold)

APPENDIX F
Transitional Operating Conditions

Transitional Operating Conditions

O.Reg. 419/05 was modified effective July 1, 2018 to expand the requirements for operating conditions that should be assessed in the Emission Summary and Dispersion Modelling Report. The new requirements in Section 10 of O. Reg. 419/05 focus on considering emissions of contaminants during transitional operating conditions (TOC) that may result in the highest concentration of a contaminant at a point of impingement.

Operating conditions to be considered when assessing compliance under paragraph 1 of subsection 10 (1) currently include:

- Scenarios that assume operating conditions that reflect the maximum design capacity of the facility;
- Scenarios that assume planned start-up operating conditions of a facility or part of a facility;
- Scenarios that assume planned shut-down operating conditions of a facility of part of a facility; and
- Any other scenario that occurs when the facility is operating normally.

Several potential start-up and/or shutdown situations have been identified and considered.

Transitional Condition	Description of Activities
Furnace /Front End Start Up	Approximately once every 10 years, the glass melting furnace is retrofitted with new refractory and technology. The start-up of a new furnace takes approximately 14-17 days to complete. The empty furnace is heated very slowly using a temporary air/gas (NG) combustion system until it reaches a set temperature. At the set temperature, the system transitions to the normal oxygen/gas (NG) combustion system. Heat input rates (natural gas consumption) are initially low and ramp up to normal maximum heat inputs required to operate the furnace and forehearth. Raw materials are added to the furnace when the temperature nears the normal operating temperature. The furnace is empty during the majority of the start-up process and therefore the normal melting reactions that generate emissions do not occur. Natural gas combustion rates during the start-up process are not expected to exceed the maximum rates already considered in the normal worst case operating scenario documented in the ESDMR. All exhausts continue to discharge to atmosphere through the

Transitional Condition	Description of Activities
	same stacks as during typical operations. The CFM production line will not be operating during the ramp down. Emissions of NOx were calculated for natural gas (air/gas) combustion only and compared to the emissions of NOx during normal furnace and forehearth operation. The emissions during normal operations represent the highest NOx condition and therefore the worst case scenario is not impacted by this transitional operating condition.
Furnace / Front End Shut Down	The furnace is only shutdown approximately once every10 years for replacement. The ramp down is initiated by turning off the combustion systems that maintain the glass in a molten state and no further raw materials are added to the furnace. After partial cooling is complete, room air is ducted into the furnace in several locations to enhance cooling. The molten glass is allowed to solidify inside the furnace and is mechanically separated from the furnace structure prior to disposal. The CFM production line will not be operating during the ramp down. Emissions of combustion products will be zero during the ramp down period. Normal melting reactions will reduce to zero as the glass solidifies, so the normal worst case operating conditions would not be exceeded by this transitional operating condition.
Equipment Maintenance for CFM Line	The CFM production line is periodically shut down to perform cleaning and maintenance of the equipment. During the shutdown, the molten glass pull from the furnace is redirected resulting in scrap material. Equipment is shut down sequentially after the remaining CFM product passes through the end of the process. The RTO remains operational until all sources of emission are shut down, at which time it is then shut down. After maintenance is complete, the RTO is restarted and heated

Transitional Condition	Description of Activities
	back up to the required temperatures stipulated in the site's ECA prior to restarting the CFM production line equipment. Although scrap material is generated during the process, emissions to atmosphere will be reduced as the various components of the process are shutdown compared to the normal worst case operating scenario.
Dust Collector Maintenance	Multiple dust collectors at the facility require regular maintenance. The dust collectors normally operate for short intervals as part of raw material unloading and transfer. Material transfers do not occur during maintenance or changing of dust collector bags and therefore emissions during maintenance do not exceed the normal worst case operating scenario.

APPENDIX G
Emission Factors & Major Capacity Measures

Guelph Emission Inventory
Emission Factors

	Natural Gas Combustion	**Process Measure**	**Units**	**Factor**	**Source**	**Rating**	**Uncertainty Factor**	**from MMBTU/hr to g/s**	**from m3/s to g/s**	**to kg/10^{6} m3**
4	OGEN OXIDES (EXPRESSED AS	Gas m3/s	lb/10^{6} scf	100	AP 42 1.4.1	B	1	1.24E-04	0.016	16
1	PM - PARTICULATE MATTER	MMBtu/hr	lb/10^{6} scf	7.6	AP 42 1.4.2	D	1	1.24E-04		

Cont ID	**T105 Glass melting**	**Process Measure**	**units**	**Emission Factor**	**Data Source (LEHDER project #)**	**Adjustment**	**Uncertainty Factor**	**CF**	**References**	Notes
1	PM - PARTICULATE MATTER		g/s	0.033	96127		1.25	1	[4]	
7	CARBON MONOXIDE		g/s	0.029	99429		2		[1]	
421	HYDROGEN CHLORIDE	pull rate	g/kg	0.0063	99429		1.25	0.00028	[1]	
423	HYDROGEN FLUORIDE -GASEO	pull rate	g/kg	0.0101	99429		1.25	0.00028	[1]	

	Dust Collectors	**Process Measure**	**units**	**Factor**	**Data Source**	**Data Quality Rating**	**Uncertainty Factor**	**to kg**	**Control Efficiency**	**Silica Content**	**References**
1	PM - PARTICULATE MATTER	Transfer Rate kg/m	g/kg	1.5	AP42 Chap 11-13	B	1.25	0.001	99.9%	100%	[5]
190	SILICA-RESPIRABLE (<10um DIA	Transfer Rate kg/m	g/kg	1.5	AP42 Chap 11-13	B	1.25	0.001	99.9%	62%	[3], [5]

	CFM Cyclone Exhaust (C73)	**Process Measure**	**units**	**Factor**	**Data Source**	**Data Quality Rating**	**Uncertainty Factor**	**to g/s**	**References**
1	PM - PARTICULATE MATTER	air flow m3/s	grains/ft3	0.03	Eng. Calc			2.287	[2]

	PRD and Filter Box System	**Rate**	**Units**	**Source/Comments**
	Efficiency of PRD	90%		Appln to amend 8-2250-92-006. Appln Attach #1 Oct 5, 1994
	Efficiency of Filter Box	60%		Appln to amend 8-2250-92-006. Appln Attach #1 Oct 5, 1994

	CFM RTO (C75)		**Source/Comments**
	VOC Destruction Efficiency	97%	Note (3/29/2018): The RTO capacity of 31 MMBTU/hr is because the RTO burner itself has a nameplate of 1.0 MMBTU/hr and the other 30 MMBTU/hr is from the burners in the oven (which is the process stream sent to the RTO).

Cont ID	**CFM RTO (C75)**	**Inlet Loading Rate**	**units**	**uncertainty factor**	**Data Source**
1	PM - PARTICULATE MATTER	0.2	kg/hr	1.25	Source Testing - Determination of Particulate Loading (RTO Inlet), LEHDER, Feb. 2005

Cont ID	**Forming Stacks (C72, C99, C100, C101, B39, B16)**	**Process Measure**	**units**	**Emission Factor**	**Data Source**	**Data Quality Rating**
1	PM - PARTICULATE MATTER	pull rate	kg/tonne	0.5	AP42 Chap 11-13, Table 11.13-1	B

Cont ID	**Forming Stacks (C72, C99, C100, C101, B39, B16)**	**Removal Efficiency**	**units**		**Data Source**
	Mechanical Filter	25%	%		Superior Fibers - Manufacturer (pending information)

References	
[1]	This stack testing result was for 107 furnace. For conservatism, the same # was used for 105 furnace.
[2]	This value is based upon an inlet loading to the cyclone of 1 grain/ft3 and an assumed efficiency of 97% given that the particles are likely >50um.
[3]	ASTM D578-00 - Glass Fiber Strands (62% silica in finished glass)
[4]	Source Testing report - OC Guelph, project 96127, April 1996.
[5]	General Industry Standard for dust collectors.

Source ID	Material	Medium	Number Unloads in 24hr	Kg unloaded in 24hr	Transfer Rate kg/min	% Silica in Raw Material
G63	Salt Cake / Sodium Sulfate	Bag	1	1,400	600	
G61	Soda Ash			25,000		
G90	Bad Batch Transfer DC Exhaust		intermittent		250	62%

Source ID	operation	operating capacity (kg/hr)	Process measure	
B24/B25	T105 Furnace	1826	molten glass pull	ECA Limit
	CFM Line - max glass pull	1383	molten glass pull	CFM Line capacity +10kg/hr
	WUCS line - max glass pull	444	molten glass pull	WUCSs line capacity +10kg/hr

Source ID	WUCS Forming Operations	operating capacity (kg/hr)	Process Measure	Comments
B39	**107A Forming Scrap Tunnel Exhaust**	**444**	**Combined Glass Pull**	emissions divided evenly between the 2 exhaust stacks.
B16	**107B Forming Scrap Tunnel Exhaust**			

Source ID	CFM Operations		units	process measure
C73	**CFM Binder Cyclone**	**2.10**	**m3/s**	**exhaust flow rate**

Source ID	Cooling Towers	Circulation Rate	units	% drift	solids (ppm)	References
A06	Cooling Tower #1	1440	usgpm	0.002%	1200	[1], [2]
A58	Cooling Tower #4	1440	usgpm	0.002%	1200	[1], [2]

	Edge trim compactor	Rate	Units	uncertainty factor	References
D64	Mass Loading of scrap into compactor	62.8	kg/hr	2	[3]

Source ID	MAX Binder Application Rate	uncertainty Factor	Rate	units	References
CFM	440	1.1	0.53	kg mixed binder / kg glass pull	Calculated in Binder.xlsx
CFM	T250	1.1	0.12	kg mixed binder / kg glass pull	Calculated in Binder.xlsx
WUCS	691A	1.1	0.34	kg mixed binder / kg glass pull	Calculated in Binder.xlsx
WUCS	777C	1.1	0.23	kg mixed binder / kg glass pull	Calculated in Binder.xlsx
WUCS	9501	1.1	0.23	kg mixed binder / kg glass pull	Calculated in Binder.xlsx
WUCS	9503C	1.1	0.23	kg mixed binder / kg glass pull	Calculated in Binder.xlsx
CFM	E240 (solid)	1.1	0.07	kg solid E240 / kg glass pull	Calculated in Binder.xlsx

Source ID	Generators	hp	Max daily operating hours	Comments
A62	Natural Gas Generator#2	777	24	for non-emergency use
A61	Natural Gas Generator#1	636	24	for non-emergency use

	References	
	[1]	email from M.Vanderlaan November 2015
	[2]	verbal information provided by manufacturer to M.Vanderlaan Nov 2015
	[3]	email from R.Nixon November 30, 2015
	[4]	email from M.Vanderlaan March 8 2018 confirms G48 is out of service and that G45 is associated with silo #17

APPENDIX H
Hexavalent Chromium Emission Calculations

June 2024 Source Testing Data

Date	Source	Source Name	Test #	Hexavalent Chromium Concentration	Hexavalent Chromium Mass Rate	Total Chromium Concentration	Total Chromium Mass Rate	Di/Tri Chromium Concentration	Di/Tri Chromium Mass Rate	Stack Temperature	Actual Effluent Flow Rate	Oxygen Concentration
				µg/R.m3	µg/s	µg/R.m3	µg/s	µg/R.m3	µg/s	C	A.m3/s	% vol
6/18/2024	B38	Forehearth	Run #1	31.26	82.96	33.57	89.11	2.32	6.15	118.96	3.79	21.30
6/18/2024	B38	Forehearth	Run #2	24.85	65.32	29.47	77.47	4.62	12.15	120.83	3.78	21.50
6/18/2024	B38	Forehearth	Run #3	38.00	95.28	42.18	105.74	4.17	10.46	127.93	3.67	21.20
6/19/2024	B38	Forehearth	Run #4	30.32	84.49	33.68	93.85	3.36	9.36	118.42	3.97	21.20
6/19/2024	B38	Forehearth	Run #5	32.45	86.19	36.18	96.09	3.73	9.90	119.20	3.80	21.30
6/19/2024	B38	Forehearth	Run #6	27.47	70.26	30.28	77.44	2.81	7.18	126.93	3.63	21.20
6/18/2024	B25	East Furnace Stack	Run #1	25.74	17.93	48.57	33.83	22.82	15.90	285.71	1.49	20.20
6/18/2024	B25	East Furnace Stack	Run #2	7.35	5.34	18.33	13.33	10.99	7.99	285.82	1.47	20.30
6/18/2024	B25	East Furnace Stack	Run #3	22.98	16.50	27.54	19.78	4.56	3.27	289.76	1.52	20.00
6/19/2024	B25	East Furnace Stack	Run #5	23.34	16.34	43.62	30.54	20.28	14.20	286.63	1.51	20.10
6/19/2024	B25	East Furnace Stack	Run #6	18.14	12.47	160.45	110.25	142.31	97.79	283.35	1.48	20.30
6/19/2024	B25	East Furnace Stack	Run #7	32.55	21.14	54.14	35.17	21.59	14.02	291.63	1.43	20.10
6/18/2024	B24	West Furnace Stack	Run #1	17.59	12.67	21.71	15.64	4.12	2.97	295.14	1.56	20.20
6/18/2024	B24	West Furnace Stack	Run #2	5.55	4.08	22.35	16.43	16.80	12.35	293.78	1.57	20.30
6/18/2024	B24	West Furnace Stack	Run #3	16.18	11.76	41.15	29.92	24.97	18.16	293.56	1.58	20.00
6/19/2024	B24	West Furnace Stack	Run #5	7.36	5.46	13.52	10.04	6.16	4.58	291.58	1.60	20.10
6/19/2024	B24	West Furnace Stack	Run #6	13.88	10.05	47.61	34.47	33.73	24.42	287.90	1.57	20.20
6/19/2024	B24	West Furnace Stack	Run #7	12.75	9.16	53.58	38.49	40.83	29.33	292.57	1.55	20.10
6/18/2024	C79	General Exhaust West CFM F/H	Run #1	0.12	2.34	0.24	4.63	0.12	2.29	56.67	21.54	20.90
6/19/2024	C79	General Exhaust West CFM F/H	Run #2	0.10	1.93	0.22	4.24	0.12	2.30	57.06	21.54	20.90
6/20/2024	C79	General Exhaust West CFM F/H	Run #3	0.10	1.93	0.31	5.87	0.21	3.93	56.50	21.54	20.90
6/18/2024	B33	General Ventilation above T107 Furnace	Run #1	0.28	5.38	0.48	9.18	0.20	3.80	53.33	21.54	20.90
6/19/2024	B33	General Ventilation above T107 Furnace	Run #2	0.09	1.77	0.26	5.00	0.17	3.23	55.00	21.54	20.90
6/20/2024	B33	General Ventilation above T107 Furnace	Run #3	0.11	2.03	0.31	6.00	0.21	3.96	54.44	21.54	20.90
6/18/2024	B34	General Exhaust Above T107A F/H	Run #1	0.21	4.15	0.53	10.37	0.32	6.22	47.22	21.54	20.90
6/19/2024	B34	General Exhaust Above T107A F/H	Run #2	0.22	3.74	0.46	7.79	0.24	4.05	49.28	18.80	20.90
6/20/2024	B34	General Exhaust Above T107A F/H	Run #3	0.23	4.43	2.75	53.99	2.53	49.57	47.22	21.54	20.90

Current Hexavalent Chromium Emission Rates

24 hour Emission Rates

Source ID	Emission Rate [g/s]	Comments
B24	8.87E-06	Based on June 2024 Source testing.
B25	1.50E-05	Based on June 2024 Source testing.
B38	8.08E-05	Based on June 2024 Source testing.
B33	3.06E-06	Based on June 2024 Source testing.
B34	4.11E-06	Based on June 2024 Source testing.
C79	2.07E-06	Based on June 2024 Source testing.
C80	2.07E-06	Based on June 2024 Source testing of C79 as C80 was not tested.
Total	1.16E-04	

Annualized Emission Rates

Source ID	Emission Rate [g/s]	Comments
B24	8.87E-06	Based on June 2024 Source testing.
B25	1.50E-05	Based on June 2024 Source testing.
B38	8.08E-05	Based on June 2024 Source testing.
B33	3.06E-06	Based on June 2024 Source testing.
B34	4.11E-06	Based on June 2024 Source testing.
C79	2.07E-06	Based on June 2024 Source testing.
C80	2.07E-06	Based on June 2024 Source testing of C79 as C80 was not tested.
Total	1.16E-04	

Notes:
Mean values only, without uncertainty

Selected Confidence Interval (One Tailed)

95%

June data only

ER incorporating uncertainty.

Source	Sample Mean (ug/s)	n	Degrees of freedom	Standard Deviation of Sample	Standard deviation of Sample Mean	Test Statistic T Value (1 Tailed)	Upper confidence Limit (ug/s)
B38	80.75	6	5	11.0	4.5	2.015	89.82
B25	14.95	6	5	5.5	2.2	2.015	19.46
B24	8.87	6	5	3.4	1.4	2.015	11.69
C79	2.07	3	2	0.2	0.1	2.920	2.46
B33	3.06	3	2	2.0	1.2	2.920	6.46
B34	4.11	3	2	0.3	0.2	2.920	4.69

Worst Case Hexavalent Chromium Emission Rates

24 hour Emission Rates

Source ID	Emission Rate [g/s]	Comments
B24	1.17E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
B25	1.95E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
B38	8.98E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
B33	6.46E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
B34	4.69E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
C79	2.46E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
C80	2.46E-06	Based on June 2024 Source testing of C79 as C80 was not tested. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
Total	1.37E-04	

Annualized Emission Rates

Source ID	Emission Rate [g/s]	Comments
B24	1.17E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
B25	1.95E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
B38	8.98E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
B33	6.46E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
B34	4.69E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
C79	2.46E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
C80	2.46E-06	Based on June 2024 Source testing of C79 as C80 was not tested. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test
Total	1.37E-04	

Side Fire Reduction Estimate

Methodology

Estimate for the end of 2033 for side firing on CFM only

Reduction in 2033 = = [(% reduction) x (% of area that is CFM in the front end)] / Uncertainty Factor

Data

% CFM =	54%
% WUCS =	46%

Estimate of side firing technology on hex chrome emissions at stack:

Minimum Reduction Estimate =	0%
Maximum Reduction Estimate =	50%
Average Reduction Estimate =	25%
Uncertainty factor =	2
Reduction in 2033 =	6.75%

Sample Calculation

Percent Reduction in 2033 = Reduction Percent x Percent of area that is CFM / Uncertainty Factor

= 25% x 54% / 2

= 6.75%

Future Hexavalent Chromium Emission Rates

24 hour Emission Rates

Source ID	Reduction from Current	Emission Rate [g/s]	Comments
B24	0%	1.17E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
B25	0%	1.95E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
B38	6.75%	8.38E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test. Reduction of 6.75% applied for conversion to horizontal firing burner configuration on CFM FH only.
B33	0%	6.46E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
B34	0%	4.69E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
C79	0%	2.46E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
C80	0%	2.46E-06	Based on June 2024 Source testing of C79 as C80 was not tested. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
Total		1.31E-04	

Annualized Emission Rates

Source ID	Reduction from Current	Emission Rate [g/s]	Comments
B24	0%	1.17E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
B25	0%	1.95E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
B38	6.75%	8.38E-05	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-test. Reduction of 6.75% applied for conversion to horizontal firing burner configuration on CFM FH only.
B33	0%	6.46E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
B34	0%	4.69E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
C79	0%	2.46E-06	Based on June 2024 Source testing. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
C80	0%	2.46E-06	Based on June 2024 Source testing of C79 as C80 was not tested. Incorporating uncertainty using 95% confidence interval with 1-tailed T-tes
Total		1.31E-04	

APPENDIX I

PM, Speciated PM Emissions from Material Handling & Acid Gases Calculations

Emission rates from material handling silos/dust collectors

				Source ID	G63	G90	G61
				Unloading Medium	Bag	N/A	Truck
				Silo Contents	Sodium Sulphate / Salt Cake	Bad Batch Transfer	Soda Ash [5]
				Transfer Rate (kg/24 hr)	1,400	4,763	25,000
				Silica Content of Material	0%	62%	0%
Cont ID	Contaminant Name	Emission Factor (g PM/kg transferred) [1]	Control Efficiency [2]				
1	PM - PARTICULATE MATTER	1.5	99.9%		2.43E-05	8.27E-05	4.34E-04
190	SILICA-RESPIRABLE (<10um DIAMETER), QUARTZ	1.5	99.9%		N/A	5.13E-05	N/A
154	CALCIUM OXIDE	1.5	99.9%		N/A	N/A	N/A
2393	Sulfuric acid disodium salt	1.5	99.9%		2.43E-05	N/A	N/A
2297	Dolomite	1.5	99.9%		N/A	N/A	N/A

Notes:
[1] Emission factor for unloading and conveying taken from AP 42 Chapter 11.13 Table 11.13-1
[2] General Industry Standard for dust collectors
[3] Burnt Lime can be unloaded at G81 from truck and rail.
[4] Calcium oxide, sulphuric acid disodium salt and dolomite emissions assumed to be same as PM emissions
[5] Soda ash has been removed from site but has been maintained here for conservatism

Example Calculation for PM from Source ID G90 Bad Batch Transfer:

24 hr ER (g/s) = Transfer Rate (kg/24 hr) x Emission Factor (g PM/kg transferred) [1] x (1- Control Efficiency [2]) / seconds in 24 hrs (s)

24 hr ER (g/s) = 4763.48 (kg/24 hr) x 1.5 (g PM/kg transferred) x (1 - 99%) / (24 x 60 x 60)

24 hr ER (g/s) = 0.00008

Example Calculation for Silica from Source ID G90 Bad Batch Transfer:

24 hr ER (g/s) = PM Emission Rate (g/s) x Silica Content (%)

24 hr ER (g/s) = 0.00008 x 0.62

24 hr ER (g/s) = 0.00005

Emission Calculations - CFM Cyclone

Source of emission: C73

		CAS #	PM Emission Factor	Air Flow through Cyclone	Conversion Factor to g/s	Emission Rate from CFM Cyclone
	POLLUTANT		grains/ft3	(m3/s)		g/s
1	PM - PARTICULATE MATTER	N/A - M08	0.030	2.1	2.287	0.144

Total Binder = T250 + E240	
T250 =	116.5 g / kg glass pull
E240 =	66.5 g / kg glass pull
	183.0 g / kg glass pull
E240 as a fraction of the total Binder mixture =	0.36
Fraction of BPO in E240 =	0.05
Fraction of BPOI in total binder mixture =	0.0182

	Speciated particulate	CAS #	Wt fraction in liquid stream to cyclone	Emission Rate from CFM Cyclone (g/s)
512	BENZOYL PEROXIDE	94-36-0	0.0182	0.003

Notes:

Binder Cyclone strips off liquid from uncured pack' to reduce drying time in oven

Emissions are expected to be only particulate and any 'speciated' particulate

The only 'solid' is the E240 binder which is in suspension in the T250 liquid binder (not dissolved). The T250 is the 'carrier' for E240

No reactions expected as nothing is cured and the cyclone is a physical process only

Emission rates from Filter Box Louvre Exhaust (D64)

Parameter	Value	Unit
Loading Rate =	62.785	kg/hr
Uncertainty Factor =	2.00	
PM Emission Factor =	1.500	g/kg of material loaded
PRD Efficiency =	90%	% [1]
Filter Box Efficiency =	60%	% [1]
Conversion Factor =	0.00028	hr/s
PM Emission Rate =	0.002	g/s

Notes:
[1] Obtained from application to amend CofA 8-2250-92-006

Example Calculation

PM Emission Rate = Loading Rate (kg/hr) x Uncertainty Factor x PM Emission Factor (g/kg) x (1- PRD Efficiency) x (1 - Filter Box Efficiency) x Conversion Factor
PM Emission Rate = 62.785 (kg/hr) x 2 x 1.5 (g/kg of material loaded) x (1 - 0.9) x (1 - 0.6) x 0.00028
PM Emission Rate = 0.002 g/s

Emission rates from T105 Furnace Exhausts (B24 and B25)

Parameter	Value	Unit
PM Emission Factor =	0.033	g/s [1]
PM Uncertainty Factor =	1.25	
HF Emission Factor =	0.0101	g/kg [2]
HF Uncertainty Factor =	1.25	
HCL Emission Factor =	0.0063	g/kg [2]
HCL Uncertainty Factor =	1.25	
Glass Pull Rate =	1826.000	kg/hr
Conversion Factor =	0.00028	hr/s

	Source ID	
Contaminant	B24	B25
PM	0.021	0.021
HF	0.003	0.003
HCL	0.002	0.002

Notes:
[1] Source Testing report - OC Guelph, project 96127, April 1996.
[2] This stack testing result was for 107 furnace - project 99429.
For conservatism, the same # was used for 105 furnace.

Example Calculation

PM Emission Rate (for B24) = Emission Factor (g/s) x Uncertainty Factor /2
PM Emission Rate (for B24) = 0.033 (g/s) x 1.25 / 2
PM Emission Rate (for B24) = 0.021 g/s

HF Emission Rate (for B24) = Emission Factor
HF Emission Rate (for B24) = 0.0101 (g/kg) x 1.25 x 1826 (kg/hr) x 0.0003 (hr/s) / 2
HF Emission Rate (for B24) = 0.0032 g/s

Cooling Tower Particulate Emissions

Short Term Emission Rates

Source Identifier	Circulation Rate [1] (L/min)	Total Liquid Drift Factor [2] (L drift / L)	Cooling Tower Total Dissolved Solids [3] (mg/L)	Particulate Matter Emission Rate [4] (g/s)
A06	5 450	0.002%	1 200	0.002
A58	5 450	0.002%	1 200	0.002

Example

Particulate Emissions = Circulation Rate (L/min) x Total Liquid Drift Factor (L drift / L circulating) x Dissolved Solids Concentration (mg/L) / 1000 mg/g) / 60 (sec/min)
= 5450.4 (L/min) x 0.00002 (L drift / L circulating) x 1200 (mg/L) / 1000 mg/g) / 60 (sec/min)
= 0.002 g/s

Notes:

[1] Value supplied by Facility personnel
[2] Manufacturer information provided November 2015
[3] Cooling tower total dissolved solids, expected TDS post restart 1200ppm
[3] Particulate matter emission rate estimates calculated using AP-42, Section 13.4

References
AP42 - 13.4 Wet Cooling Towers
http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s04.pdf

Emission Calculations - PM Emissions

Source of emission (CFM Forming): C72, C99, C100, C101

Source of emission (WUCS Forming): B39, B16

Max rate of glass pull for CFM Line (kg/hr):	1383
Max rate of glass pull for CFM Line (tonne/hr):	1.38
Filter Removal Efficiency	25%

		Emission Factor [1]	Conversion Factor	Source	Emission Rate
	POLLUTANT	(kg/tonne)	(kg/hr to g/s)		(g/s)
1	PM - PARTICULATE MATTER	0.5	0.278	C72 [2]	0.036
1	PM - PARTICULATE MATTER			C99 [2]	0.036
1	PM - PARTICULATE MATTER			C100 [2]	0.036
1	PM - PARTICULATE MATTER			C101 [2]	0.036

Max rate of glass pull for WUCS Line (kg/hr):	444
Max rate of glass pull for WUCS Line (tonne/hr):	0.44
Filter Removal Efficiency	25%

		Emission Factor [1]	Conversion Factor	Source	Emission Rate
	POLLUTANT	(kg/tonne)	(kg/hr to g/s)		(g/s)
1	PM - PARTICULATE MATTER	0.5	0.278	B39	0.023
1	PM - PARTICULATE MATTER	0.5	0.278	B16	0.023

Notes:

[1] Emission factors from US EPA AP-42 Chapter 11.13, Table 11.13-1 for Forming - textile

[2] CFM Line emissions are evenly distributed across the four stacks

[3] WUCS Line emissions are evenly distributed across the two stacks

[4] Filter efficiency provided by manufacturer (Superior Fibers)

Example Calculation:

PM Emissions from Forming Stack - Source ID C72

PM ER (g/s) = Maximum Glass Pull Rate (tonne/hr) x Emission Factor (kg/tonne) x Conversion Factor (kg/hr to g/s) / 4
PM ER (g/s) = 1.383 (tonnes/hr) x 0.5 (kg/tonne) x 0.278 / 4
PM ER (g/s) = 0.036

Emission Calculations - PM Emissions
Source of emission (Curing): C75

Curing oven is equipped with an RTO for the destruction of VOCs.

		Tested Emission Rate (inlet) [1]	Conversion Factor	Uncertainty Factor	Emission Rate
	POLLUTANT	(kg/hr)	(kg/hr to g/s)		(g/s)
1	PM - PARTICULATE MATTER	0.2	0.278	1.25	0.069

Notes:
[1] RTO inlet emission rate obtained from source testing - Determination of Particulate Loading (RTO Inlet), LEHDER, Feb. 2005

Example Calculation:
PM ER (g/s) = Emission Rate at RTO Inlet (kg/hr) x Conversion Factor (kg/hr to g/s) x Uncertainty Factor
PM ER (g/s) = 0.2 (kg/hr) x 0.278 (kg/hr to g/s) x 1.25
PM ER (g/s) = 0.069

APPENDIX J
Chromium (Di & Trivalent) Emission Calculations

Di Tri Chromium Emission Rate Calculations

	Total Chromium	Hex chrome	Di/tri chrome (24 hour)	
	Emission Rate (g/s)	g/s	g/s	Comments
B24	2.42E-05	8.87E-06	1.53E-05	Average of June 2024 source testing emission rates
B25	4.05E-05	1.50E-05	2.55E-05	Average of June 2024 source testing emission rates
B38	8.99E-05	8.08E-05	9.20E-06	Average of June 2024 source testing emission rates
B33	6.73E-06	3.06E-06	3.66E-06	Average of June 2024 source testing emission rates
B34	2.40E-05	4.11E-06	1.99E-05	Average of June 2024 source testing emission rates
C79	4.91E-06	2.07E-06	2.84E-06	Average of June 2024 source testing emission rates
C80	4.91E-06	2.07E-06	2.84E-06	Equivalent to C79 as both fans were operating during the testing period but only one emission rate was tested
		Total:	7.93E-05	g/s

APPENDIX K
NOx and CO Emission Calculations

Natural Gas Fired Equipment - Process

Natural Gas Fired Equipment < 100MMBTU/hr

Source ID	Description	Maximum Input Heat Capacity		Conversion Factor		Maximum Input	Daily	Emission Rate	Emission Rate
C75	CFM RTO - Oven	31.00	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	31.00	24	0.383	0.383
G13	NGF Tire Cord Line #1 RTO	12.00	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	12.00	24	0.148	0.148
C114	DI Boilers	0.50	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.50	24	0.006	0.006
C115	DI Boilers	0.50	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.50	24	0.006	0.006
C119	Binder Heater	0.60	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	0.60	24	0.007	0.007
B38	105 Forehearth Stack	7.10	MMBTU/hr	1.00E+00	(MMBTU/hr) / (MMBTU/hr)	7.10	24	0.088	0.088
Total - Process						58.98			

NOx Emission Factor	
Source	AP 42 1.4-5 Table 1.4-1
Date	Jul-98
Rating	B
Emission Factor (lb/10^6scf)	100
Heat Value [1]	
Heat Value (10^6scf/MMBTU)	1/1020
Conversion Factors	
Conversion Factor (g/s)/(lb/hr)	0.1260

Conversion Factors to MMBTU/hr	
From	**Factor**
BTU/hr	1.00E-06
MMBTU/hr	1
kj/s	3.41E-03
--	
MJ/hr	9.48E-04
Boiler horsepower	3.35E-02

Example Calculations

1. Maximum Input Heat Capacity (MMBTU/hr) for Source C75

= Maximum Heat Input x Conversion Factor
= 31MMBTU/hr x 1(MMBTU/hr) / (MMBTU/hr)
= 31MMBTU/hr

2. Emission Rate1-hr avg (g/s) for Source C75

= Maximum Input Heat Capacity (MMBTU/hr) x Heat Value (106scf/MMBTU) x Emission Factor (lb/106scf) x Conversion Factor (g/s)/(lb/hr)
= 31MMBTU/hr x 0.00098 106scf/MMBTU x 100lb/106scf x 0.126(g/s)/(lb/hr)
= 0.383g/s

3. Emission Rate24-hr avg (g/s) for Source C75

= Maximum Input Heat Capacity (MMBTU/hr) x Heat Value (106scf/MMBTU) x Emission Factor (lb/106scf) x Conversion Factor (g/s)/(lb/hr) x Daily Operating Hours /24 hours per day
= 31MMBTU/hr x 0.00098 106scf/MMBTU x 100lb/106scf x 0.126(g/s)/(lb/hr) * 24 hours/day / 24 hours/day
= 0.383g/s

Notes

[1] Natural gas heat value of 1020 MMBTU/10^6scf obtained from AP-42, refer to Reference 1.

[2] Boiler horsepower is different from electric hp. Boiler hp x 33,472 = BTU/HR

References

1. U.S. Environmental Protection Agency. *AP 42, Fifth Edition, Volume I, Chapter 1: External Combustion Sources, Section 1.4: Natural Gas Combustion, Final Section, Table 1.4-1. Emission Factors for Nitrogen Oxides (NOx) and Carbon Monoxide (CO) from Natural Gas Combustion*. U.S. Environmental Protection Agency, July, 1998. Page 1.4-5. <http://www.epa.gov/ttn/chief/ap42/ch01/final/c01s04.pdf>

Natural Gas Fired Generator (Non-Emergency Use)

Description	**NG Generator #1**	**NG Generator #2**
Source ID	**A61**	**A62**
Generator Model	Generac SG350	Generac SG500
Rated Horsepower	636	777
Fuel Consumption Rate (ft3/hr) @100% load	4328.0	5820.0
Daily Operating Hours	24	24
Fuel Consumption Rate (MMBtu/hr) @100% load	4.41	5.94

LEHDER ID	**Contaminant**	**Emission Factor (g/bhp·hr) [1]**	**Emission Factor Source**	**Emission Rate 1-hr avg (g/s)**	**Emission Rate 24-hr avg (g/s)**	**Conversion Factor (g/bhp·hr) to (kg/MW·hr)**	**Converted Emission Factor (kg/MW·hr)**	**Ontario Emission Limits for Non-Emergency Generators (kg/MW·hr)**	**Acceptable? Yes/No**
4	NITROGEN OXIDES (EXPRESSED AS NO2)	0.14	Generac Spec Sheet (Model SG350)	0.025	0.025	1.341	0.19	0.40	Yes
7	CARBON MONOXIDE	0.82	Generac Spec Sheet (Model SG350)	[redacted]	[redacted]	1.341	1.10	3.5	Yes
	THC	0.18	Generac Spec Sheet (Model SG350)	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	NMHC [2]	0.01	calculated using EPA conversion ratio	[redacted]	[redacted]	1.341	0.01	0.19	Yes
LEHDER ID	**Contaminant**	**Emission Factor (lb/MMBtu)**	**Emission Factor Source**	**Emission Rate 1-hr avg (g/s)**	**Emission Rate 24-hr avg (g/s)**	**Conversion Factor (lb/hp-hr) to (kg/MW·hr)**	**Converted Emission Factor (kg/MW·hr)**	**Ontario Emission Limits for Non-Emergency Generators (kg/MW·hr)**	**Acceptable? Yes/No**
1	PM - PARTICULATE MATTER	3.48E-03	CEPEI Technical Memo, dated January 2018	[redacted]	[redacted]	608.814	0.015	0.02	Yes
LEHDER ID	**Contaminant**	**Emission Factor (g/bhp·hr) [2]**	**Emission Factor Source**	**Emission Rate 1-hr avg (g/s)**	**Emission Rate 24-hr avg (g/s)**	**Conversion Factor (g/bhp·hr) to (kg/MW·hr)**	**Converted Emission Factor (kg/MW·hr)**	**Ontario Emission Limits for Non-Emergency Generators (kg/MW·hr)**	**Acceptable? Yes/No**
4	NITROGEN OXIDES (EXPRESSED AS NO2)	0.07	Generac Model SG500 Emission Specs	0.015	0.015	1.341	0.09	0.40	Yes
7	CARBON MONOXIDE	0.05	Generac Model SG500 Emission Specs	[redacted]	[redacted]	1.341	0.07	3.5	Yes
	THC	0.07	Generac Model SG500 Emission Specs	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	NMHC [2]	0.003	calculated using EPA conversion ratio	[redacted]	[redacted]	1.341	0.005	0.19	Yes
LEHDER ID	**Contaminant**	**Emission Factor (lb/MMBtu)**	**Emission Factor Source**	**Emission Rate 1-hr avg (g/s)**	**Emission Rate 24-hr avg (g/s)**	**Conversion Factor (lb/hp-hr) to (kg/MW·hr)**	**Converted Emission Factor (kg/MW·hr)**	**Ontario Emission Limits for Non-Emergency Generators (kg/MW·hr)**	**Acceptable? Yes/No**
1	PM - PARTICULATE MATTER	3.48E-03	CEPEI Technical Memo, dated January 2018	[redacted]	[redacted]	608.814	0.016	0.02	Yes

Constants/Conversions:

NMHC/THC [2]	0.048	ratio
Conversion Factor (MMBTU to MW-hr)	3.412	MMBTU/MW-hr
Conversion Factor	454	g/lb
Conversion Factor	1341	hp-hr/MW-hr
Conversion Factor (hr to s)	3600	s/hr
Conversion Factor (Hp to MMBTU/hr)	0.0025	hp/MMBTU-hr
Heat Value of NG (MMBTU/10^6 SCF)	1020	MMBTU/10^6SCF

Example Calculations

1. **Fuel Consumption Rate (MMBtu/hr) @100% load for Source A61**
   = Fuel Consumption Rate (ft3/hr) @100% load x Heat Value of NG (MMBTU/106 SCF)
   = 4328 x 1020 / 1000000
   = 4.41456 MMBTU/hr
2. **Emission Rate1-hr avg (g/s) for Source A61**
   = Rated Horsepower x Emission Factor (g/bhp·hr) x Conversion Factor (hr to s)
   = 636 Hp x 0.14 g/bhp-hr / 3600 (s/hr)
   = 0.025 g/s
3. **Emission Rate24-hr avg (g/s) for Source A61**
   = Rated Horsepower x Emission Factor (g/bhp·hr) x Conversion Factor (hr to s) x Daily Operating Hours /24 hours per day
   = 636 Hp x 0.14 g/bhp-hr / 3600 (s/hr) x 24 hours/day / 24 hours/day
   = 0.025 g/s

Notes

[1] bhp=brake horsepower

[2] USEPA - Conversion Factors for Hydrocarbon Emission Components;EPA420-R-05-015, December 2005, NR-002c

References

1. **Generac Spec Sheet: Statement of Exhaust Emissions** 2018 Spark-Ignited Generators
2. **Generac Spec Sheet: Statement of Exhaust Emissions** 2019 Spark-Ignited Generators

Notes

[1] Generator #2 will exhaust through two stacks A62_1 and A62_2

LEHDER Environmental Services Limited
Combustion Gas Concentration and Emission Rate Calculations

Company: Owens Corning Canada
Location: Guelph
Source: T105 Furnace Stacks (West B24 and East B25)
Project No.: 180301
Date: November 2018

November 2018 NOx Stack Testing Data

Parameters	Units	B24 (West) 27-Nov-18 13:08 - 14:32	B24 (West) 27-Nov-18 14:54 - 16:18	B24 (West) 28-Nov-18 08:22 - 09:45	B25 (East) 28-Nov-18 10:06 - 11:28	B25 (East) 28-Nov-18 11:47 - 13:09	B25 (East) 28-Nov-18 13:27 - 14:49	B38 26-Nov-18 14:30 - 15:52	B38 27-Nov-18 09:09 - 10:31	B38 27-Nov-18 10:52 - 12:16	West Stack (B24) Averages	East Stack (B25) Averages	T105 Furnace Aggregate	Forehearth (B38) Averages [1]
Monitoring Time		80	80	80	80	80	80	80	80	80				
O_2 Concentration	% vol.	19.6	19.6	19.7	19.1	19.1	19.2	20.7	20.7	20.7	19.63	19.12	**19.38**	20.72
Effluent Flow Rate	R.m^3/s	0.76	0.72	0.69	0.72	0.70	0.71	2.97	2.89	2.90	0.72	0.71	**1.43**	2.92
NO_x Maximum														
Molecular Weight	mg/mmole	46	46	46	46	46	46	46	46	46				
Max Concentration	ppmvd	134	124	127	79	75	69	62	67	66	128.33	74.33	**101.54**	65.00
	mg/R.m^3	252	233	239	149	141	130	117	126	124	241.45	139.85	**191.03**	122.29
Mass Rate	g/s	0.19	0.17	0.16	0.107	0.099	0.092	0.35	0.36	0.36	0.17	0.10	**0.27**	0.36
NO_x Minimum														
Molecular Weight	mg/mmole	46	46	46	46	46	46	46	46	46				
Min Concentration	ppmvd	90	81	44	44	37	33	16	26	26	71.67	38.00	**54.96**	22.67
	mg/R.m^3	169	152	83	83	70	62	30	49	49	134.83	71.49	**103.40**	42.64
Mass Rate	g/s	0.13	0.11	0.057	0.060	0.049	0.044	0.09	0.14	0.14	0.10	0.05	**0.15**	0.12
NO_X Average														
Molecular Weight	mg/mmole	46	46	46	46	46	46	46	46	46				
Average Concentration	ppmvd	109	106	97	59	58	54	40	42	42	103.88	56.89	**80.57**	41.24
	mg/R.m^3	204	200	182	110	109	102	75	79	79	195.44	107.04	**151.58**	77.58
Mass Rate	g/s	0.15	0.14	0.13	0.080	0.077	0.072	0.22	0.23	0.23	0.14	0.08	**0.22**	0.23
Worst Case Mass Rate [1]	**g/s**										0.18	0.10	**0.27**	0.30

Notes:
[1] Average stack mass rate has been scaled up by an uncertainty factor of 1.25 as well as by a factor of 1.0441. Uncertainty factor used to reflect limited data, fluctuations in NOx emissions and to ensure conservatism. Scaling factor reflects increased foreheath burner capacity after furnace rebuild (7.1MMBTU/hr vs. 6.8 MMBTU/hr)

Carbon Monoxide (CO)

105 Furnace Emission Estimate

Compound	Emission Rate from Testing (g/s)	Uncertainty Factor	Emission Rate (g/s)
CO	0.029	2	0.058

CO ER, g/s = Emission Rate durng 107 testing, g/s x Uncertainty Factor

CO ER, g/s = 0.029 g/s x 2

CO ER, g/s = 0.058

This emission data is based on source testing results from December 1998 (project 99429)

APPENDIX L
Volatile Organic Compound Emission Calculations

Confidential

APPENDIX M
Current Hexavalent Chromium Modelling

Year	2024	2024	2024	2023	2023	2023	2023	2023	2023	2023	2023	2023

C80

		Monthly Hours at Operating Speed											
Speed (Hz)	Corresponding Flowrate (m^3/s)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Annual**
OFF	0.0	0	56	0	42	0	0	0	0	0	0	0	0	99
35	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0
35.5	13.4	744	576	592	325	273	83	0	83	199	393	668	626	4561
39	15.3	0	9	40	54	145	198	212	391	399	166	3	77	1694
42.5	15.4	0	7	51	15	149	191	353	133	90	60	33	14	1095
45	16.7	0	0	0	0	1	0	0	0	0	0	0	0	1
46	16.7	0	2	35	49	47	78	179	137	1	30	4	3	565
49.5	18.0	0	20	8	56	56	163	0	0	0	41	12	12	370
53	19.2	0	3	2	38	60	1	0	0	6	13	0	5	128
55	20.5	0	0	0	0	0	0	0	0	0	0	0	0	0
56.5	20.5	0	13	4	33	6	0	0	0	26	41	0	0	123
60	21.8	0	10	0	108	6	6	0	0	0	0	0	6	137
	Average Volumetric Flow Rate When Operating	13.4	13.9	13.9	16.2	15.3	15.9	15.7	15.4	15.0	14.9	13.6	13.8	14.8

C79

		Monthly Hours at Operating Speed												
Speed (Hz)	Corresponding Flowrate (m^3/s)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Annual**
OFF	0.0	4	0	0	0	0	0	0	0	0	0	0	0	5
35	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0
35.5	13.4	740	652	680	296	272	0	0	0	11	473	720	744	4588
39	15.3	0	0	1	1	2	0	0	0	18	1	0	0	22
42.5	15.4	0	44	1	1	121	0	0	0	0	1	0	0	168
45	16.7	0	0	0	0	0	0	0	0	0	0	0	0	0
46	16.7	0	0	0	1	1	0	0	0	0	1	0	0	3
49.5	18.0	0	0	1	5	1	0	0	0	0	2	0	0	10
53	19.2	0	0	0	0	1	0	0	0	1	1	0	0	3
55	20.5	0	0	0	0	0	0	0	0	0	0	0	0	0
56.5	20.5	0	0	1	0	1	0	0	0	5	20	0	0	27
60	21.8	0	0	49	417	345	720	744	744	683	246	0	0	3947
	Average Volumetric Flow Rate When Operating	13.4	13.5	14.0	18.3	17.6	21.8	21.8	21.8	21.5	16.4	13.4	13.4	17.2

B33

		Monthly Hours at Operating Speed												
Speed (Hz)	Corresponding Flowrate (m^3/s)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Annual**
OFF	0.0	744	680	706	566	476	304	177	338	482	664	719	741	6597
35	13.4	0	0	0	1	1	2	1	1	1	1	0	0	8
35.5	13.4	0	2	16	27	47	139	62	83	92	25	2	3	496
39	15.3	0	14	11	12	16	22	33	24	6	2	0	0	140
42.5	15.4	0	0	0	6	24	33	25	37	19	2	0	0	147
45	16.7	0	0	0	0	0	1	0	0	0	1	0	0	2
46	16.7	0	0	0	5	12	13	35	11	15	3	0	0	93
49.5	18.0	0	0	0	6	9	16	28	35	4	2	0	0	100
53	19.2	0	0	0	4	7	27	24	20	13	9	0	0	105
55	20.5	0	0	0	0	0	1	1	0	0	0	0	0	2
56.5	20.5	0	0	0	13	15	18	45	16	9	2	0	0	117
60	21.8	0	0	0	80	137	145	311	179	80	34	0	0	966
	Average Volumetric Flow Rate When Operating		15.1	14.2	19.0	18.8	17.6	19.5	18.4	17.3	18.1	13.4	13.4	18.4

B34

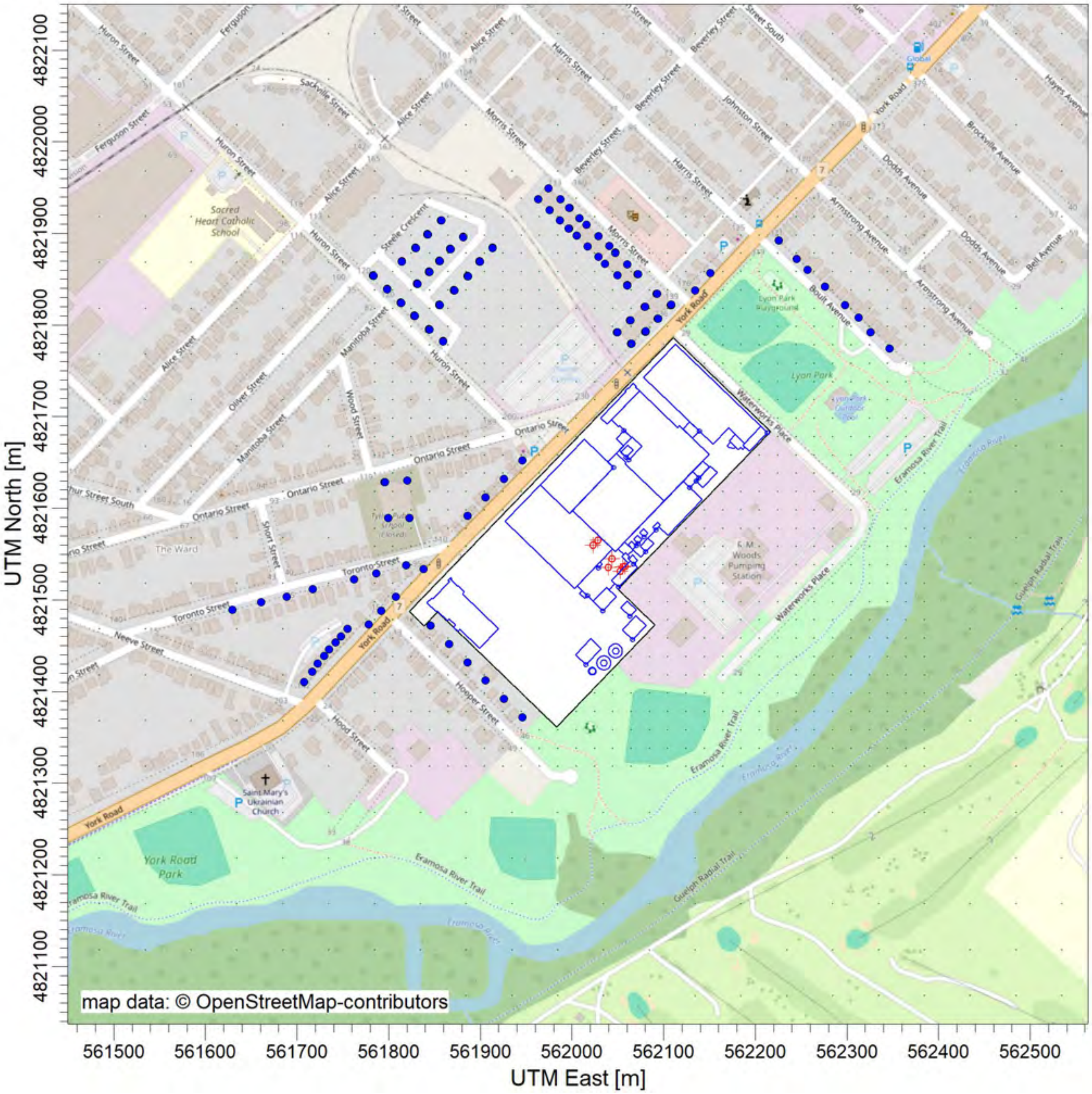
		Monthly Hours at Operating Speed												
Speed (Hz)	Corresponding Flowrate (m^3/s)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Annual**
OFF	0.0	744	696	733	651	620	591	478	615	647	712	720	744	7951
35	13.4	0	0	0	0	0	1	1	1	1	0	0	0	4
35.5	13.4	0	0	0	5	14	30	83	57	4	9	0	0	202
39	15.3	0	0	0	5	27	25	43	22	7	2	0	0	131
42.5	15.4	0	0	0	3	8	13	7	7	11	2	0	0	51
45	16.7	0	0	0	0	0	0	0	0	0	0	0	0	1
46	16.7	0	0	0	5	7	4	11	3	2	1	0	0	31
49.5	18.0	0	0	0	3	5	9	20	9	2	2	0	0	49
53	19.2	0	0	0	2	3	11	10	3	10	3	0	0	42
55	20.5	0	0	0	0	0	0	0	0	0	0	0	0	0
56.5	20.5	0	0	0	8	3	3	5	12	2	1	0	0	33
60	21.8	0	0	0	38	57	32	86	17	34	12	0	0	275

	Average Volumetric Flow Rate When Operating				19.7	18.5	17.1	17.3	16.1	18.9	18.0			17.6

Notes:	Annual average volumetric flowrate from 2023 and 2024 was used to calculate the velocity of the source for modelling.

PROJECT TITLE:

OC Guelph Glass Plant
Receptor Grid



map data: © OpenStreetMap-contributors

COMMENTS: Sensitive Receptors Indicated in Blue	SOURCES: **7**	COMPANY NAME: **Owens Corning Guelph Facility**	
	RECEPTORS: **2640**	MODELER: **Montrose Environmental Solutions Canada Inc.**	MONTROSE ENVIRONMENTAL
		SCALE: 1:7,000 0 — 0.2 km	
		DATE: **3/3/2025**	PROJECT NO.: **24-035387**

Current (Average) Emission Scenario

24 hour Stage 2 POI

Ingredient ID	Contaminant	CAS #	24 Hour Emission Rate (g/s)	Facility MAX GLC (µg/m³)	24 Hour POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.16E-04	0.00467	0.07	URT	Health	6.7%	Stage 2	Significant

Annual Stage 2 POI

Ingredient ID	Contaminant	CAS #	Annual Emission Rate (g/s)	Facility MAX GLC (µg/m³)	Annual POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.16E-04	0.00106	0.0024	SSS	Health	44.1%	Stage 2	Significant

Annual Assessment Value Stage 2 POI

Ingredient ID	Contaminant	CAS #	24-hr Emission Rate (g/s)	Facility MAX GLC (µg/m³)	AAV Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.16E-04	0.00106	0.024	AAV	Health	4.4%	Stage 2	Significant

Assessment Values

OC Guelph has prepared a comparison of modelling against assessment values in accordance with the MOECC *Technical bulletin: Using assessment values for contaminants with annual air standards, dated February, 2018.*

Daily Assessment Values (DAV)

Currently, all DAV are equal to their respective URTs. As documented in Section 13 of the ESDMR, all 24h modelling results were below their respective URTs.

Annual Assessment Values (AAV)

The 24 hour average worst case emission rates were input to the model in order to predict an annual maximum ground level concentration. OC Guelph has a site specific annual hexavalent chromium limit of 0.0024 µg/m³. This value was increased 10 times and used as the annual assessment value.

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	8.87E-6	560.90	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00001	556.40	16.77	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	3.06E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.11E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	28.00	0.00008	391.40	8.22	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.07E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.07E-6	315.40	9.45	1.41

Control Pathway

AERMOD

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - Annual and 24hr - Average Emission Rates

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

- ☒ Elevated Terrain
- ☐ No Stack-Tip Downwash (NOSTD)
- ☐ Run in Screening Mode
- ☐ Conversion of NOx to NO2 (OLM or PVMRM)
- ☐ No Checks for Non-Sequential Met Data
- ☐ Fast All Sources (FASTALL)
- ☐ Fast Area Sources (FASTAREA)
- ☐ Optimized Area Source Plume Depletion
- ☐ Gas Deposition

BETA Options:

- ☒ Capped and Horizontal Stack Releases
- ☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
- ☐ Low Wind Options

- ☐ SCIM (Sampled Chronological Input Model)
- ☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

- ☒ Concentration
- ☐ Total Deposition (Dry & Wet)
- ☐ Dry Deposition
- ☐ Wet Deposition

Plume Depletion

- ☐ Dry Removal
- ☐ Wet Removal

Output Warnings

- ☐ No Output Warnings
- ☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	1	2	3	4	6	8	12	24
	☐	☐	☐	☐	☐	☐	☐	☒

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Hexavalent Chromium - 24 Hour Averaging Period

*** THE MAXIMUM 1000 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***

RANK BY YEAR	YEAR	RANK	CONC	YYYYMMDDHH	XR	YR	TYPE	Ontario Reg. 419/05
1	2017	1	5.16468	2017012724	562070.91	4821533.11	DC	Discarded
1	2020	2	4.92705	2020111624	562070.91	4821533.11	DC	Discarded
2	2017	3	4.66664	2017010424	562070.91	4821533.11	DC	Highest

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - Annual and 24hr - Average Emission Rates

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	5.16468	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		1.00593	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		1.00574	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		1.05779	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.93223	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.99852	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		1.03535	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.56366	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.53738	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y1		0.53455	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y2		0.59727	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.47635	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.52874	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.56871	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	

Concentration Units: ng/m^3

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - Annual and 24hr - Average Emission Rates

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.70532	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.07577	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.07623	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.07744	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.07384	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.07258	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.08028	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.86323	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.43252	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.43882	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.43829	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.41317	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.42768	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.44464	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Current Annual SSS	% of Schedule 3 Standard	Address
R116	561838.1	4821533.5	4.9	3.36	5%	0.41	17%	293%	95 Toronto St
R117	561819.0	4821537.8	4.9	3.27	5%	0.40	17%	286%	91 Toronto St
R118	561786.4	4821528.8	4.9	3.15	5%	0.39	16%	276%	83/79 Toronto St
R113	561807.6	4821503.3	0.0	3.12	4%	0.38	16%	270%	160 York Road
R119	561761.8	4821522.6	4.9	2.96	4%	0.37	15%	264%	73 Toronto St
R6	561845.8	4821472.0	4.9	2.81	4%	0.37	15%	264%	12 Hooper St
R112	561791.8	4821488.1	0.0	2.99	4%	0.36	15%	257%	
R5	561865.8	4821452.0	4.9	2.98	4%	0.35	15%	252%	
Sch2	561822.3	4821589.7	4.9	2.90	4%	0.35	14%	248%	
Sch1	561799.4	4821589.7	4.9	2.63	4%	0.34	14%	244%	
R111	561778.1	4821473.3	0.0	2.61	4%	0.34	14%	243%	
R21	561755.0	4821468.8	7.3	2.61	4%	0.34	14%	240%	
R120	561717.2	4821511.9	4.9	2.65	4%	0.33	14%	235%	
R20	561747.9	4821460.2	7.3	2.47	4%	0.32	13%	230%	
R7	561885.8	4821592.0	4.9	3.27	5%	0.31	13%	224%	
R19	561742.2	4821453.8	7.3	2.34	3%	0.31	13%	223%	
R121	561688.4	4821503.6	4.9	2.48	4%	0.30	13%	217%	
R4	561885.8	4821432.0	4.9	2.98	4%	0.30	13%	215%	
R18	561735.0	4821445.9	7.3	2.26	3%	0.30	13%	215%	
Sch5	561796.1	4821628.3	7.3	2.78	4%	0.29	12%	210%	
R17	561729.3	4821438.8	7.3	2.24	3%	0.29	12%	208%	
Sch4	561795.6	4821628.3	4.9	2.70	4%	0.29	12%	204%	
Sch3	561820.1	4821630.4	4.9	2.69	4%	0.28	12%	203%	
R16	561722.1	4821430.9	7.3	2.19	3%	0.28	12%	201%	
R122	561660.7	4821497.3	4.9	2.31	3%	0.28	12%	200%	
R15	561716.4	4821421.6	7.3	2.13	3%	0.27	11%	193%	
R106	562346.4	4821774.7	4.9	2.49	4%	0.26	11%	186%	
R14	561707.7	4821410.4	7.3	2.05	3%	0.26	11%	184%	
R123	561629.6	4821489.0	4.9	2.10	3%	0.25	11%	180%	
R8	561905.8	4821612.0	4.9	2.49	4%	0.24	10%	173%	
R11	562325.8	4821792.0	4.9	2.14	3%	0.22	9%	159%	
R3	561905.8	4821412.0	4.9	2.54	4%	0.20	8%	141%	
R107	562312.5	4821808.4	4.9	1.59	2%	0.18	8%	131%	
R9	561925.8	4821632.0	4.9	1.72	2%	0.18	8%	129%	
R41	562064.7	4821780.0	7.3	1.59	2%	0.17	7%	122%	
R40	562049.7	4821792.3	7.3	1.63	2%	0.17	7%	121%	
R42	562063.9	4821805.4	7.3	1.57	2%	0.17	7%	121%	
R45	562080.2	4821793.1	7.3	1.76	3%	0.17	7%	120%	
R43	562079.6	4821820.1	7.3	1.67	2%	0.16	7%	115%	
R44	562093.9	4821807.1	7.3	1.84	3%	0.16	7%	114%	
R105	561859.5	4821782.0	7.3	1.88	3%	0.16	7%	112%	
R34	562063.4	4821805.1	4.9	1.42	2%	0.16	7%	112%	
R33	562064.2	4821779.7	4.9	1.37	2%	0.16	6%	111%	
R32	562049.2	4821792.0	4.9	1.46	2%	0.15	6%	111%	
R37	562079.7	4821792.8	4.9	1.58	2%	0.15	6%	110%	
R85	561859.0	4821782.5	4.9	1.77	3%	0.15	6%	109%	
R38	562093.0	4821834.3	7.3	1.70	2%	0.15	6%	109%	
R108	562297.6	4821821.9	4.9	1.13	2%	0.15	6%	108%	
R144	562060.4	4821843.4	6.1	1.46	2%	0.15	6%	108%	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Current Annual SSS	% of Schedule 3 Standard	Address
R39	562108.0	4821822.3	7.3	1.86	3%	0.15	6%	108%	
R104	561844.5	4821795.0	7.3	1.81	3%	0.15	6%	108%	
R35	562079.1	4821819.8	4.9	1.52	2%	0.15	6%	107%	
R65	561859.0	4821782.0	0.0	1.70	2%	0.15	6%	107%	
R36	562093.4	4821806.8	4.9	1.70	2%	0.15	6%	106%	
R145	562071.8	4821855.4	6.1	1.43	2%	0.15	6%	105%	
R146	562049.3	4821854.3	6.1	1.46	2%	0.15	6%	105%	
R84	561844.0	4821795.5	4.9	1.72	2%	0.15	6%	104%	
R26	562063.9	4821805.1	0.0	1.26	2%	0.15	6%	104%	
R147	562060.2	4821866.2	6.1	1.42	2%	0.14	6%	103%	
R64	561844.0	4821795.0	0.0	1.63	2%	0.14	6%	103%	
R10	561945.8	4821652.0	4.9	1.41	2%	0.14	6%	102%	
R103	561828.5	4821810.0	7.3	1.74	2%	0.14	6%	102%	
R24	562049.7	4821792.0	0.0	1.28	2%	0.14	6%	102%	
R30	562092.5	4821834.0	4.9	1.59	2%	0.14	6%	102%	
R25	562064.7	4821779.7	0.0	1.25	2%	0.14	6%	102%	
R29	562080.2	4821792.8	0.0	1.43	2%	0.14	6%	102%	
R27	562079.6	4821819.8	0.0	1.38	2%	0.14	6%	100%	
R31	562107.5	4821822.0	4.9	1.73	2%	0.14	6%	100%	
R148	562035.9	4821866.9	6.1	1.36	2%	0.14	6%	100%	
R149	562047.2	4821878.9	6.1	1.40	2%	0.14	6%	99%	
R83	561828.0	4821810.5	4.9	1.66	2%	0.14	6%	99%	
R124	562060.2	4821843.6	0.0	1.27	2%	0.14	6%	99%	
R28	562093.9	4821806.8	0.0	1.56	2%	0.14	6%	99%	
R63	561828.0	4821810.0	0.0	1.58	2%	0.14	6%	98%	
R102	561813.5	4821824.0	7.3	1.67	2%	0.14	6%	97%	
R99	561855.5	4821822.0	7.3	1.66	2%	0.14	6%	97%	
R150	562029.1	4821874.5	6.1	1.29	2%	0.14	6%	97%	
R125	562071.6	4821855.6	0.0	1.22	2%	0.14	6%	97%	
R151	562040.4	4821886.3	6.1	1.36	2%	0.14	6%	97%	
R126	562049.4	4821854.2	0.0	1.28	2%	0.14	6%	97%	
R110	562244.8	4821872.3	4.9	1.15	2%	0.13	6%	96%	
R22	562093.0	4821834.0	0.0	1.49	2%	0.13	6%	96%	
R127	562060.4	4821866.3	0.0	1.25	2%	0.13	6%	95%	
R109	562257.1	4821860.4	4.9	1.18	2%	0.13	6%	95%	
R82	561813.0	4821824.5	4.9	1.60	2%	0.13	6%	95%	
R79	561855.0	4821822.5	4.9	1.60	2%	0.13	6%	95%	
R23	562108.0	4821822.0	0.0	1.60	2%	0.13	6%	95%	
R12	562275.8	4821842.0	4.9	1.10	2%	0.13	5%	94%	
R62	561813.0	4821824.0	0.0	1.53	2%	0.13	5%	94%	
R59	561855.0	4821822.0	0.0	1.55	2%	0.13	5%	93%	
R128	562036.1	4821866.8	0.0	1.24	2%	0.13	5%	92%	
R129	562047.4	4821879.1	0.0	1.25	2%	0.13	5%	92%	
R153	562028.6	4821897.2	6.1	1.25	2%	0.13	5%	92%	
R101	561798.5	4821839.0	7.3	1.59	2%	0.13	5%	92%	
R152	562017.1	4821885.5	6.1	1.31	2%	0.13	5%	92%	
R2	561925.8	4821392.0	4.9	1.41	2%	0.13	5%	92%	
R13	562225.8	4821892.0	4.9	1.07	2%	0.13	5%	91%	
R98	561871.5	4821838.0	7.3	1.39	2%	0.13	5%	91%	

Sensitive Receptor Summary

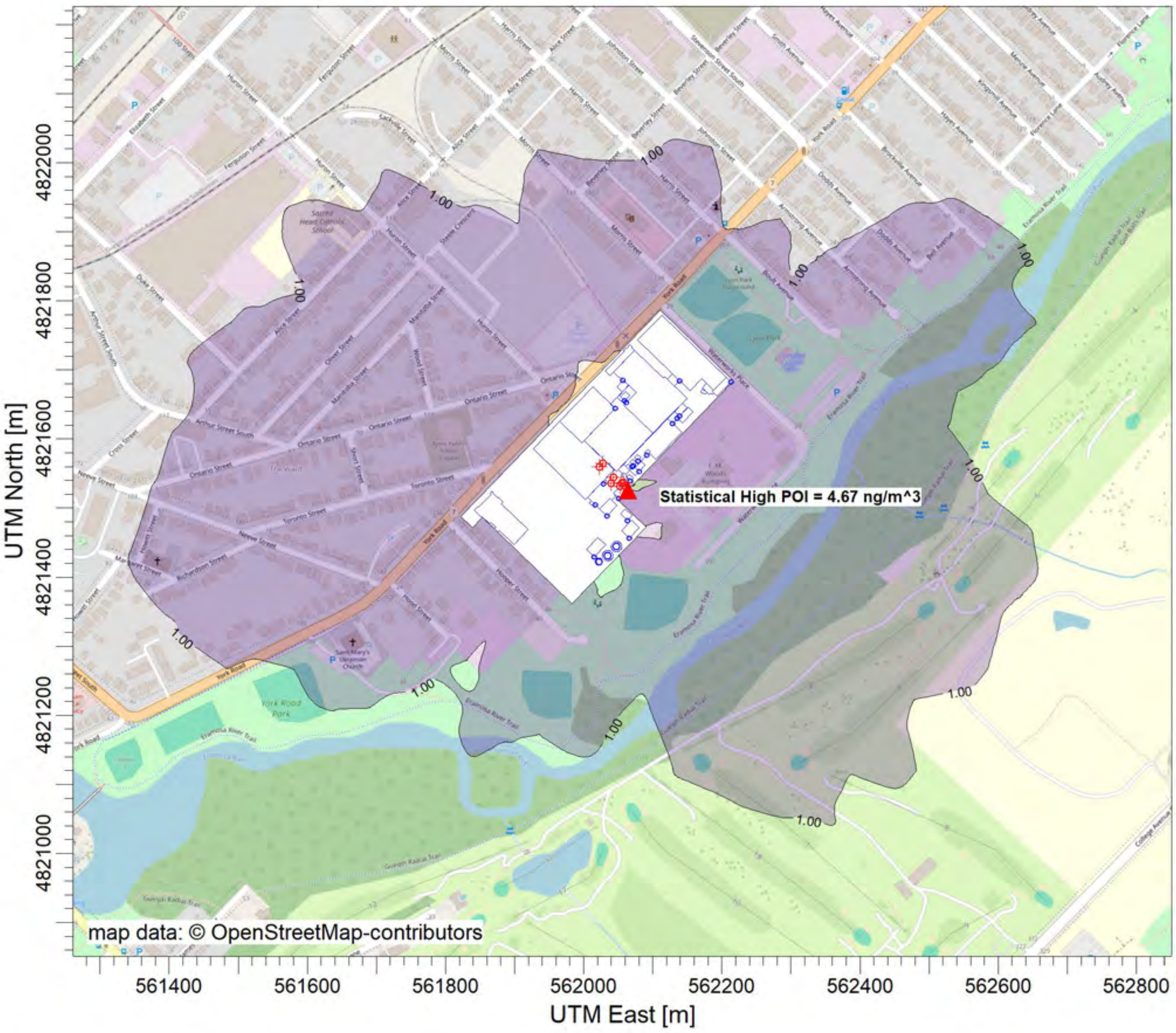
Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Current Annual SSS	% of Schedule 3 Standard	Address
R94	561831.5	4821845.0	7.3	1.61	2%	0.13	5%	91%	
R131	562040.5	4821886.3	0.0	1.24	2%	0.13	5%	90%	
R115	562134.4	4821838.0	0.0	1.47	2%	0.13	5%	90%	
R81	561798.0	4821839.5	4.9	1.53	2%	0.13	5%	90%	
R130	562028.9	4821874.5	0.0	1.21	2%	0.13	5%	90%	
R114	562151.0	4821856.9	4.9	1.44	2%	0.13	5%	90%	
R61	561798.0	4821839.0	0.0	1.47	2%	0.12	5%	89%	
R74	561831.0	4821845.5	4.9	1.55	2%	0.12	5%	88%	
R154	562005.2	4821897.4	6.1	1.37	2%	0.12	5%	88%	
R78	561871.0	4821838.5	4.9	1.38	2%	0.12	5%	88%	
R155	562015.9	4821909.4	6.1	1.25	2%	0.12	5%	87%	
R54	561831.0	4821845.0	0.0	1.49	2%	0.12	5%	87%	
R58	561871.0	4821838.0	0.0	1.37	2%	0.12	5%	87%	
R100	561783.5	4821854.0	7.3	1.50	2%	0.12	5%	86%	
R133	562028.7	4821897.2	0.0	1.19	2%	0.12	5%	86%	
R93	561844.5	4821858.0	7.3	1.44	2%	0.12	5%	86%	
R132	562017.0	4821885.5	0.0	1.19	2%	0.12	5%	86%	
R156	561996.5	4821905.5	6.1	1.39	2%	0.12	5%	86%	
R80	561783.0	4821854.5	4.9	1.44	2%	0.12	5%	85%	
R97	561886.5	4821853.0	7.3	1.33	2%	0.12	5%	84%	
R73	561844.0	4821858.5	4.9	1.40	2%	0.12	5%	84%	
R157	562008.1	4821916.9	6.1	1.28	2%	0.12	5%	84%	
R60	561783.0	4821854.0	0.0	1.39	2%	0.12	5%	84%	
R89	561814.5	4821869.0	7.3	1.51	2%	0.12	5%	84%	
R53	561844.0	4821858.0	0.0	1.36	2%	0.12	5%	83%	
R158	561986.9	4821914.1	6.1	1.39	2%	0.12	5%	83%	
R134	562005.3	4821897.4	0.0	1.25	2%	0.12	5%	83%	
R92	561855.5	4821870.0	7.3	1.28	2%	0.11	5%	82%	
R135	562015.9	4821909.4	0.0	1.15	2%	0.11	5%	82%	
R77	561886.0	4821853.5	4.9	1.32	2%	0.11	5%	82%	
R69	561814.0	4821869.5	4.9	1.46	2%	0.11	5%	81%	
R1	561945.8	4821372.0	4.9	1.89	3%	0.11	5%	81%	
R159	561997.1	4821927.7	6.1	1.30	2%	0.11	5%	81%	
R136	561996.6	4821905.5	0.0	1.28	2%	0.11	5%	81%	
R49	561814.0	4821869.0	0.0	1.40	2%	0.11	5%	80%	
R57	561886.0	4821853.0	0.0	1.31	2%	0.11	5%	80%	
R72	561855.0	4821870.5	4.9	1.24	2%	0.11	5%	80%	
R96	561899.5	4821869.0	7.3	1.22	2%	0.11	5%	79%	
R137	562008.3	4821916.9	0.0	1.18	2%	0.11	5%	79%	
R88	561829.5	4821884.0	7.3	1.31	2%	0.11	5%	79%	
R52	561855.0	4821870.0	0.0	1.25	2%	0.11	5%	79%	
R160	561975.3	4821925.7	6.1	1.37	2%	0.11	5%	79%	
R161	561987.3	4821937.5	6.1	1.30	2%	0.11	5%	78%	
R138	561986.8	4821914.1	0.0	1.29	2%	0.11	5%	78%	
R91	561867.5	4821883.0	7.3	1.21	2%	0.11	5%	77%	
R68	561829.0	4821884.5	4.9	1.28	2%	0.11	4%	77%	
R76	561899.0	4821869.5	4.9	1.21	2%	0.11	4%	76%	
R95	561913.5	4821884.0	7.3	1.14	2%	0.11	4%	76%	
R139	561997.2	4821927.6	0.0	1.20	2%	0.11	4%	76%	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Current Annual SSS	% of Schedule 3 Standard	Address
R48	561829.0	4821884.0	0.0	1.25	2%	0.11	4%	76%	
R71	561867.0	4821883.5	4.9	1.21	2%	0.10	4%	75%	
R56	561899.0	4821869.0	0.0	1.21	2%	0.10	4%	75%	
R140	561975.2	4821925.6	0.0	1.27	2%	0.10	4%	74%	
R163	561974.5	4821949.2	6.1	1.28	2%	0.10	4%	74%	
R87	561842.5	4821899.0	7.3	1.18	2%	0.10	4%	74%	
R162	561962.9	4821937.3	6.1	1.34	2%	0.10	4%	74%	
R51	561867.0	4821883.0	0.0	1.21	2%	0.10	4%	74%	
R141	561987.4	4821937.5	0.0	1.21	2%	0.10	4%	73%	
R75	561913.0	4821884.5	4.9	1.09	2%	0.10	4%	73%	
R90	561881.5	4821896.0	7.3	1.14	2%	0.10	4%	73%	
R67	561842.0	4821899.5	4.9	1.14	2%	0.10	4%	72%	
R55	561913.0	4821884.0	0.0	1.05	2%	0.10	4%	71%	
R47	561842.0	4821899.0	0.0	1.13	2%	0.10	4%	71%	
R70	561881.0	4821896.5	4.9	1.14	2%	0.10	4%	70%	
R143	561974.5	4821949.2	0.0	1.20	2%	0.10	4%	70%	
R142	561962.9	4821937.3	0.0	1.25	2%	0.10	4%	70%	
R50	561881.0	4821896.0	0.0	1.14	2%	0.10	4%	69%	
R86	561857.5	4821914.0	7.3	1.08	2%	0.10	4%	69%	
R66	561857.0	4821914.5	4.9	1.08	2%	0.09	4%	67%	
R46	561857.0	4821914.0	0.0	1.09	2%	0.09	4%	66%	

PROJECT TITLE:

OC Guelph Glass Plant
24 Hour Hexavalent Chromium Emissions - Current Mean



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL NANOGRAMS/M**3

Max: 5.16 [NANOGRAMS/M**3] at (562070.91, 4821533.11)

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1.00 4.00 5.00

COMMENTS:

24 Hour Averaging Period Statistical High = 4.6667 ng/m^3

SOURCES:

7

COMPANY NAME:

Owens Corning Guelph Facility

RECEPTORS:

2640

MODELER:

Montrose Environmental Solutions Canada Inc.

MONTROSE ENVIRONMENTAL

OUTPUT TYPE:

Concentration

SCALE: 1:10,000

0 0.3 km

MAX:

5.16 NANOGRAMS/M3**

DATE:

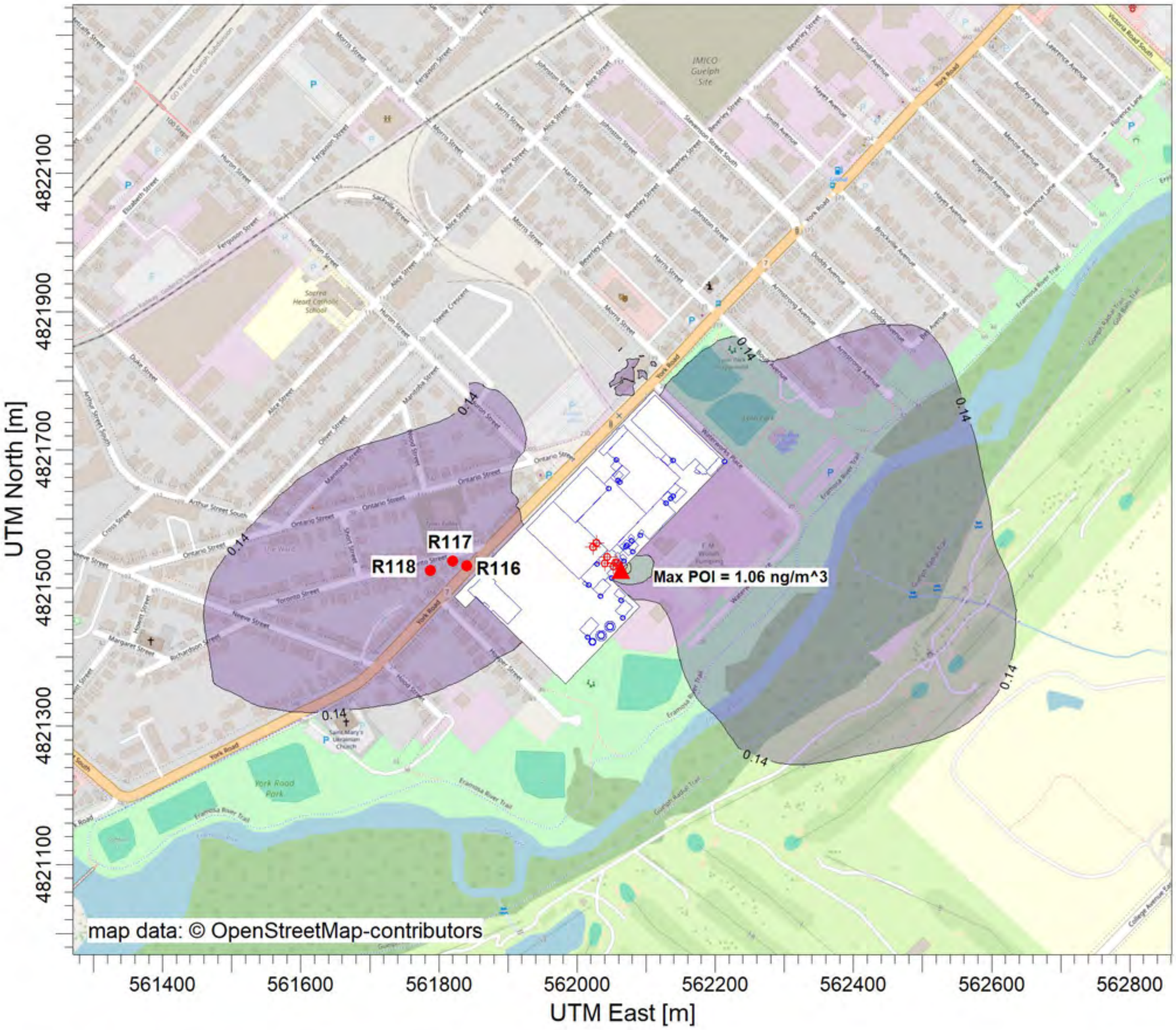
3/3/2025

PROJECT NO.:

24-035387

PROJECT TITLE:

OC Guelph Glass Plant
Annual Hexavalent Chromium Emissions - Current Mean



POST/PLOT FILE OF ANNUAL VALUES FOR YEAR 1 FOR SOURCE GROUP: ALL NANOGRAMS/M**3

Max: 1.06 [NANOGRAMS/M**3] at (562063.97, 4821525.92)

0.14 – 0.50	0.50 – 0.90	0.90 – 1.00	1.00 – 1.30	1.30 –

COMMENTS: Hexavalent Chromium - Annual Averaging Period - Worst Case Year - Year 2	SOURCES: **7**	COMPANY NAME: **Owens Corning Guelph Facility**
	RECEPTORS: **2640**	MODELER: **Montrose Environmental Solutions Canada Inc.**
	OUTPUT TYPE: **Concentration**	SCALE: 1:10,000 0 — 0.3 km
	MAX: **1.06 NANOGRAMS/M**3**	DATE: **3/3/2025**
		PROJECT NO.: **24-035387**

MONTROSE ENVIRONMENTAL

AERMOD View - Lakes Environmental Software E:\OC_Guelph\24035387_SSS\SSS_CRVI_R7\SSS_CRVI_R7.isc

Current (Average) Emission Scenario with Uncertainty

24 hour Stage 2 POI

Ingredient ID	Contaminant	CAS #	24 Hour Emission Rate (g/s)	Facility MAX GLC (µg/m³)	24 Hour POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.37E-04	0.00567	0.07	URT	Health	8.1%	Stage 2	Significant

Annual Stage 2 POI

Ingredient ID	Contaminant	CAS #	Annual Emission Rate (g/s)	Facility MAX GLC (µg/m³)	Annual POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.37E-04	0.00133	0.0024	SSS	Health	55.5%	Stage 2	Significant

Annual Assessment Value Stage 2 POI

Ingredient ID	Contaminant	CAS #	24-hr Emission Rate (g/s)	Facility MAX GLC (µg/m³)	AAV Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.37E-04	0.00133	0.024	AAV	Health	5.6%	Stage 2	Significant

Assessment Values

OC Guelph has prepared a comparison of modelling against assessment values in accordance with the MOECC *Technical bulletin: Using assessment values for contaminants with annual air standards, dated February, 2018.*

Daily Assessment Values (DAV)

Currently, all DAV are equal to their respective URTs. As documented in Section 13 of the ESDMR, all 24h modelling results were below their respective URTs.

Annual Assessment Values (AAV)

The 24 hour average worst case emission rates were input to the model in order to predict an annual maximum ground level concentration. OC Guelph has a site specific annual hexavalent chromium limit of 0.0024 µg/m^3. This value was increased 10 times and used as the annual assessment value.

Source Pathway - Source Inputs

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	560.90	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	556.40	16.77	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	28.00	0.00009	391.40	8.22	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Control Pathway

AERMOD

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - Annual and 24hr - with 1 tailed uncertainty

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:
☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type
☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion
☐ Dry Removal
☐ Wet Removal

Output Warnings
☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	1	2	3	4	6	8	12	24
	☐	☐	☐	☐	☐	☐	☐	☒

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Hexavalent Chromium - 24 Hour Averaging Period

*** THE MAXIMUM 1000 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***

RANK BY YEAR	YEAR	RANK	CONC	YYYYMMDDHH	XR	YR	TYPE	Ontario Reg. 419/05
1	2017	1	6.12283	2017012724	562070.91	4821533.11	DC	Discarded
1	2020	2	5.90335	2020111624	562070.91	4821533.11	DC	Discarded
2	2017	3	5.67308	2017010424	562070.91	4821533.11	DC	Highest

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - Annual and 24hr - with 1 tailed uncertainty

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	6.12283	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		1.27661	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		1.27944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		1.33269	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		1.19129	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		1.26823	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		1.31142	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.37834	NOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	11/27/2020, 24
ANNUAL		0.04069	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.04105	NOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y2		0.04145	NOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y3		0.03938	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y4		0.03883	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y5		0.04326	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	

Concentration Units: ng/m^3

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - Annual and 24hr - with 1 tailed uncertainty

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.55131	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.05970	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.06004	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.06035	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.05806	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.05739	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.06306	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - Annual and 24hr - with 1 tailed uncertainty

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.96391	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.59774	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y1		0.59458	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y2		0.66435	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.52985	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.58813	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.63259	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - Annual and 24hr - with 1 tailed uncertainty

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - Annual and 24hr - with 1 tailed uncertainty

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.98848	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.64950	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y1		0.64821	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y2		0.71827	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.58590	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.64337	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.68478	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.92267	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.09911	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.09973	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.10130	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.09659	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.09494	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.10501	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - Annual and 24hr - with 1 tailed uncertainty

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Current Annual SSS	% of Schedule 3 Standard	Address
R116	561838.1	4821533.5	4.9	3.97	6%	0.49	20%	348%	95 Toronto St
R117	561819.0	4821537.8	4.9	3.86	6%	0.47	20%	339%	91 Toronto St
R118	561786.4	4821528.8	4.9	3.73	5%	0.46	19%	328%	83/79 Toronto St
R113	561807.6	4821503.3	0.0	3.71	5%	0.45	19%	322%	160 York Road
R119	561761.8	4821522.6	4.9	3.51	5%	0.44	18%	314%	73 Toronto St
R6	561845.8	4821472.0	4.9	3.32	5%	0.44	18%	314%	12 Hooper St
R112	561791.8	4821488.1	0.0	3.57	5%	0.43	18%	306%	
R5	561865.8	4821452.0	4.9	3.50	5%	0.42	17%	299%	
Sch2	561822.3	4821589.7	4.9	3.42	5%	0.41	17%	293%	
R111	561778.1	4821473.3	0.0	3.13	4%	0.41	17%	290%	
Sch1	561799.4	4821589.7	4.9	3.11	4%	0.40	17%	287%	
R21	561755.0	4821468.8	7.3	3.11	4%	0.40	17%	286%	
R120	561717.2	4821511.9	4.9	3.15	4%	0.39	16%	280%	
R20	561747.9	4821460.2	7.3	2.94	4%	0.38	16%	274%	
R19	561742.2	4821453.8	7.3	2.80	4%	0.37	15%	265%	
R7	561885.8	4821592.0	4.9	3.86	6%	0.37	15%	265%	
R121	561688.4	4821503.6	4.9	2.94	4%	0.36	15%	258%	
R18	561735.0	4821445.9	7.3	2.69	4%	0.36	15%	256%	
R4	561885.8	4821432.0	4.9	3.53	5%	0.36	15%	256%	
Sch5	561796.1	4821628.3	7.3	3.27	5%	0.35	14%	248%	
R17	561729.3	4821438.8	7.3	2.65	4%	0.35	14%	247%	
Sch4	561795.6	4821628.3	4.9	3.19	5%	0.34	14%	241%	
Sch3	561820.1	4821630.4	4.9	3.17	5%	0.34	14%	239%	
R16	561722.1	4821430.9	7.3	2.60	4%	0.33	14%	239%	
R122	561660.7	4821497.3	4.9	2.73	4%	0.33	14%	238%	
R15	561716.4	4821421.6	7.3	2.53	4%	0.32	13%	230%	
R106	562346.4	4821774.7	4.9	2.93	4%	0.31	13%	219%	
R14	561707.7	4821410.4	7.3	2.43	3%	0.31	13%	219%	
R123	561629.6	4821489.0	4.9	2.48	4%	0.30	13%	215%	
R8	561905.8	4821612.0	4.9	2.91	4%	0.29	12%	205%	
R11	562325.8	4821792.0	4.9	2.51	4%	0.26	11%	187%	
R3	561905.8	4821412.0	4.9	3.01	4%	0.24	10%	170%	
R107	562312.5	4821808.4	4.9	1.86	3%	0.22	9%	155%	
R9	561925.8	4821632.0	4.9	2.02	3%	0.22	9%	154%	
R41	562064.7	4821780.0	7.3	1.84	3%	0.20	8%	143%	
R42	562063.9	4821805.4	7.3	1.83	3%	0.20	8%	141%	
R40	562049.7	4821792.3	7.3	1.90	3%	0.20	8%	141%	
R45	562080.2	4821793.1	7.3	2.04	3%	0.20	8%	140%	
R43	562079.6	4821820.1	7.3	1.94	3%	0.19	8%	135%	
R44	562093.9	4821807.1	7.3	2.14	3%	0.19	8%	134%	
R105	561859.5	4821782.0	7.3	2.22	3%	0.19	8%	133%	
R34	562063.4	4821805.1	4.9	1.65	2%	0.18	8%	130%	
R33	562064.2	4821779.7	4.9	1.60	2%	0.18	8%	130%	
R32	562049.2	4821792.0	4.9	1.69	2%	0.18	8%	129%	
R37	562079.7	4821792.8	4.9	1.83	3%	0.18	8%	129%	
R85	561859.0	4821782.5	4.9	2.10	3%	0.18	8%	129%	
R108	562297.6	4821821.9	4.9	1.33	2%	0.18	7%	129%	
R38	562093.0	4821834.3	7.3	1.97	3%	0.18	7%	128%	
R104	561844.5	4821795.0	7.3	2.15	3%	0.18	7%	127%	
R39	562108.0	4821822.3	7.3	2.17	3%	0.18	7%	127%	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Current Annual SSS	% of Schedule 3 Standard	Address
R65	561859.0	4821782.0	0.0	2.00	3%	0.18	7%	126%	
R144	562060.4	4821843.4	6.1	1.70	2%	0.18	7%	126%	
R35	562079.1	4821819.8	4.9	1.76	3%	0.18	7%	126%	
R36	562093.4	4821806.8	4.9	1.98	3%	0.17	7%	124%	
R84	561844.0	4821795.5	4.9	2.04	3%	0.17	7%	123%	
R145	562071.8	4821855.4	6.1	1.65	2%	0.17	7%	123%	
R146	562049.3	4821854.3	6.1	1.69	2%	0.17	7%	122%	
R10	561945.8	4821652.0	4.9	1.67	2%	0.17	7%	122%	
R64	561844.0	4821795.0	0.0	1.93	3%	0.17	7%	121%	
R26	562063.9	4821805.1	0.0	1.47	2%	0.17	7%	121%	
R147	562060.2	4821866.2	6.1	1.65	2%	0.17	7%	121%	
R103	561828.5	4821810.0	7.3	2.06	3%	0.17	7%	121%	
R30	562092.5	4821834.0	4.9	1.85	3%	0.17	7%	120%	
R24	562049.7	4821792.0	0.0	1.49	2%	0.17	7%	119%	
R29	562080.2	4821792.8	0.0	1.66	2%	0.17	7%	119%	
R25	562064.7	4821779.7	0.0	1.46	2%	0.17	7%	119%	
R31	562107.5	4821822.0	4.9	2.02	3%	0.17	7%	118%	
R27	562079.6	4821819.8	0.0	1.60	2%	0.16	7%	118%	
R83	561828.0	4821810.5	4.9	1.96	3%	0.16	7%	117%	
R148	562035.9	4821866.9	6.1	1.57	2%	0.16	7%	116%	
R28	562093.9	4821806.8	0.0	1.81	3%	0.16	7%	116%	
R149	562047.2	4821878.9	6.1	1.63	2%	0.16	7%	116%	
R63	561828.0	4821810.0	0.0	1.87	3%	0.16	7%	116%	
R124	562060.2	4821843.6	0.0	1.48	2%	0.16	7%	116%	
R99	561855.5	4821822.0	7.3	1.96	3%	0.16	7%	115%	
R110	562244.8	4821872.3	4.9	1.36	2%	0.16	7%	115%	
R102	561813.5	4821824.0	7.3	1.98	3%	0.16	7%	115%	
R109	562257.1	4821860.4	4.9	1.40	2%	0.16	7%	114%	
R125	562071.6	4821855.6	0.0	1.41	2%	0.16	7%	113%	
R150	562029.1	4821874.5	6.1	1.50	2%	0.16	7%	113%	
R126	562049.4	4821854.2	0.0	1.49	2%	0.16	7%	113%	
R22	562093.0	4821834.0	0.0	1.73	2%	0.16	7%	113%	
R151	562040.4	4821886.3	6.1	1.57	2%	0.16	7%	113%	
R12	562275.8	4821842.0	4.9	1.32	2%	0.16	7%	112%	
R82	561813.0	4821824.5	4.9	1.89	3%	0.16	7%	112%	
R79	561855.0	4821822.5	4.9	1.89	3%	0.16	7%	112%	
R23	562108.0	4821822.0	0.0	1.87	3%	0.16	7%	112%	
R127	562060.4	4821866.3	0.0	1.46	2%	0.16	7%	111%	
R62	561813.0	4821824.0	0.0	1.81	3%	0.16	6%	111%	
R59	561855.0	4821822.0	0.0	1.84	3%	0.15	6%	110%	
R2	561925.8	4821392.0	4.9	1.66	2%	0.15	6%	110%	
R101	561798.5	4821839.0	7.3	1.88	3%	0.15	6%	109%	
R13	562225.8	4821892.0	4.9	1.26	2%	0.15	6%	109%	
R128	562036.1	4821866.8	0.0	1.44	2%	0.15	6%	108%	
R153	562028.6	4821897.2	6.1	1.46	2%	0.15	6%	108%	
R129	562047.4	4821879.1	0.0	1.46	2%	0.15	6%	108%	
R98	561871.5	4821838.0	7.3	1.64	2%	0.15	6%	108%	
R152	562017.1	4821885.5	6.1	1.53	2%	0.15	6%	108%	
R94	561831.5	4821845.0	7.3	1.91	3%	0.15	6%	107%	
R115	562134.4	4821838.0	0.0	1.73	2%	0.15	6%	107%	

Sensitive Receptor Summary

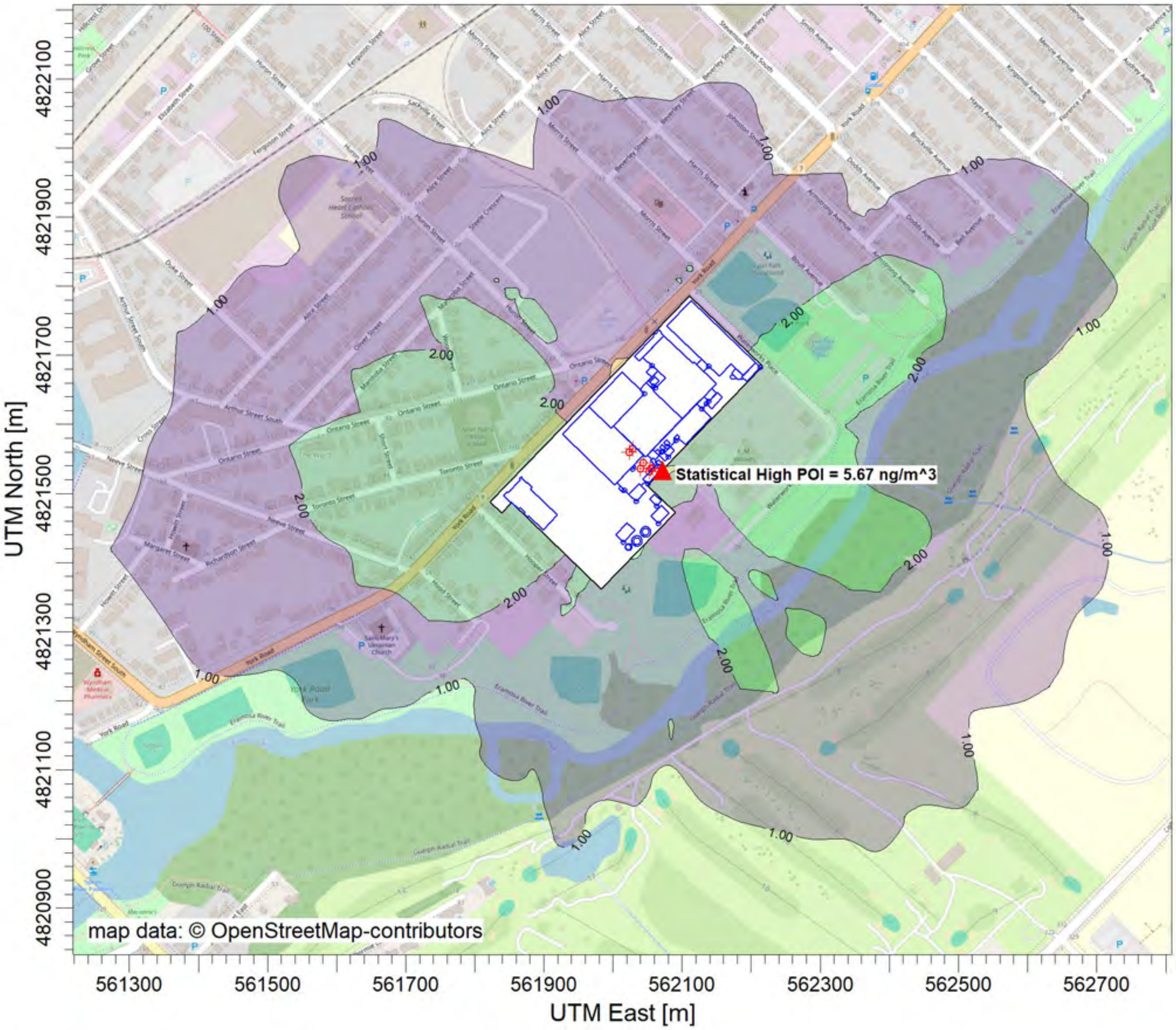
Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m^3)	% of 24hr URT	Annual POI (ng/m^3)	% of Current Annual SSS	% of Schedule 3 Standard	Address
R114	562151.0	4821856.9	4.9	1.69	2%	0.15	6%	106%	
R81	561798.0	4821839.5	4.9	1.81	3%	0.15	6%	106%	
R131	562040.5	4821886.3	0.0	1.44	2%	0.15	6%	105%	
R61	561798.0	4821839.0	0.0	1.74	2%	0.15	6%	105%	
R130	562028.9	4821874.5	0.0	1.40	2%	0.15	6%	105%	
R78	561871.0	4821838.5	4.9	1.61	2%	0.15	6%	104%	
R74	561831.0	4821845.5	4.9	1.83	3%	0.15	6%	104%	
R154	562005.2	4821897.4	6.1	1.61	2%	0.15	6%	104%	
R54	561831.0	4821845.0	0.0	1.76	3%	0.14	6%	103%	
R58	561871.0	4821838.0	0.0	1.61	2%	0.14	6%	103%	
R93	561844.5	4821858.0	7.3	1.70	2%	0.14	6%	102%	
R100	561783.5	4821854.0	7.3	1.77	3%	0.14	6%	102%	
R155	562015.9	4821909.4	6.1	1.46	2%	0.14	6%	102%	
R156	561996.5	4821905.5	6.1	1.63	2%	0.14	6%	101%	
R133	562028.7	4821897.2	0.0	1.38	2%	0.14	6%	101%	
R97	561886.5	4821853.0	7.3	1.56	2%	0.14	6%	100%	
R132	562017.0	4821885.5	0.0	1.39	2%	0.14	6%	100%	
R80	561783.0	4821854.5	4.9	1.71	2%	0.14	6%	100%	
R73	561844.0	4821858.5	4.9	1.65	2%	0.14	6%	100%	
R60	561783.0	4821854.0	0.0	1.65	2%	0.14	6%	99%	
R89	561814.5	4821869.0	7.3	1.79	3%	0.14	6%	99%	
R157	562008.1	4821916.9	6.1	1.50	2%	0.14	6%	99%	
R53	561844.0	4821858.0	0.0	1.61	2%	0.14	6%	98%	
R158	561986.9	4821914.1	6.1	1.64	2%	0.14	6%	98%	
R77	561886.0	4821853.5	4.9	1.55	2%	0.14	6%	97%	
R134	562005.3	4821897.4	0.0	1.47	2%	0.14	6%	97%	
R92	561855.5	4821870.0	7.3	1.51	2%	0.14	6%	97%	
R1	561945.8	4821372.0	4.9	2.26	3%	0.14	6%	97%	
R69	561814.0	4821869.5	4.9	1.72	2%	0.13	6%	96%	
R135	562015.9	4821909.4	0.0	1.34	2%	0.13	6%	96%	
R57	561886.0	4821853.0	0.0	1.55	2%	0.13	6%	96%	
R159	561997.1	4821927.7	6.1	1.53	2%	0.13	6%	95%	
R136	561996.6	4821905.5	0.0	1.51	2%	0.13	6%	95%	
R49	561814.0	4821869.0	0.0	1.66	2%	0.13	6%	95%	
R96	561899.5	4821869.0	7.3	1.44	2%	0.13	6%	95%	
R72	561855.0	4821870.5	4.9	1.46	2%	0.13	6%	95%	
R52	561855.0	4821870.0	0.0	1.46	2%	0.13	5%	93%	
R160	561975.3	4821925.7	6.1	1.63	2%	0.13	5%	93%	
R88	561829.5	4821884.0	7.3	1.55	2%	0.13	5%	93%	
R137	562008.3	4821916.9	0.0	1.38	2%	0.13	5%	93%	
R138	561986.8	4821914.1	0.0	1.52	2%	0.13	5%	92%	
R91	561867.5	4821883.0	7.3	1.43	2%	0.13	5%	92%	
R161	561987.3	4821937.5	6.1	1.53	2%	0.13	5%	92%	
R95	561913.5	4821884.0	7.3	1.37	2%	0.13	5%	92%	
R76	561899.0	4821869.5	4.9	1.43	2%	0.13	5%	91%	
R68	561829.0	4821884.5	4.9	1.51	2%	0.13	5%	91%	
R139	561997.2	4821927.6	0.0	1.42	2%	0.13	5%	90%	
R48	561829.0	4821884.0	0.0	1.48	2%	0.13	5%	90%	
R56	561899.0	4821869.0	0.0	1.43	2%	0.13	5%	90%	
R71	561867.0	4821883.5	4.9	1.42	2%	0.13	5%	89%	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Current Annual SSS	% of Schedule 3 Standard	Address
R75	561913.0	4821884.5	4.9	1.31	2%	0.12	5%	88%	
R51	561867.0	4821883.0	0.0	1.42	2%	0.12	5%	88%	
R162	561962.9	4821937.3	6.1	1.60	2%	0.12	5%	88%	
R140	561975.2	4821925.6	0.0	1.52	2%	0.12	5%	88%	
R87	561842.5	4821899.0	7.3	1.40	2%	0.12	5%	88%	
R163	561974.5	4821949.2	6.1	1.52	2%	0.12	5%	88%	
R90	561881.5	4821896.0	7.3	1.34	2%	0.12	5%	87%	
R141	561987.4	4821937.5	0.0	1.42	2%	0.12	5%	87%	
R55	561913.0	4821884.0	0.0	1.25	2%	0.12	5%	86%	
R67	561842.0	4821899.5	4.9	1.35	2%	0.12	5%	85%	
R70	561881.0	4821896.5	4.9	1.34	2%	0.12	5%	84%	
R47	561842.0	4821899.0	0.0	1.32	2%	0.12	5%	84%	
R142	561962.9	4821937.3	0.0	1.49	2%	0.12	5%	83%	
R143	561974.5	4821949.2	0.0	1.42	2%	0.12	5%	83%	
R50	561881.0	4821896.0	0.0	1.34	2%	0.12	5%	83%	
R86	561857.5	4821914.0	7.3	1.28	2%	0.12	5%	82%	
R66	561857.0	4821914.5	4.9	1.28	2%	0.11	5%	80%	
R46	561857.0	4821914.0	0.0	1.28	2%	0.11	5%	79%	

PROJECT TITLE:

OC Guelph Glass Plant
24 Hour Hexavalent Chromium Emissions - Current With Uncertainty



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

NANOGRAMS/M**3

Max: 6.12 [NANOGRAMS/M**3] at (562070.91, 4821533.11)

🟪	🟩	🟨	🟥
1.00	2.00	5.00	6.00

COMMENTS:

24 Hour Averaging Period Statistical High= 5.6731 ng/m^3

SOURCES:

7

COMPANY NAME:

Owens Corning Guelph Facility

RECEPTORS:

2640

MODELER:

Montrose Environmental Solutions Canada Inc.

MONTROSE ENVIRONMENTAL

OUTPUT TYPE:

Concentration

SCALE:

1:10,000

0 0.3 km

MAX:

6.12 NANOGRAMS/M3**

DATE:

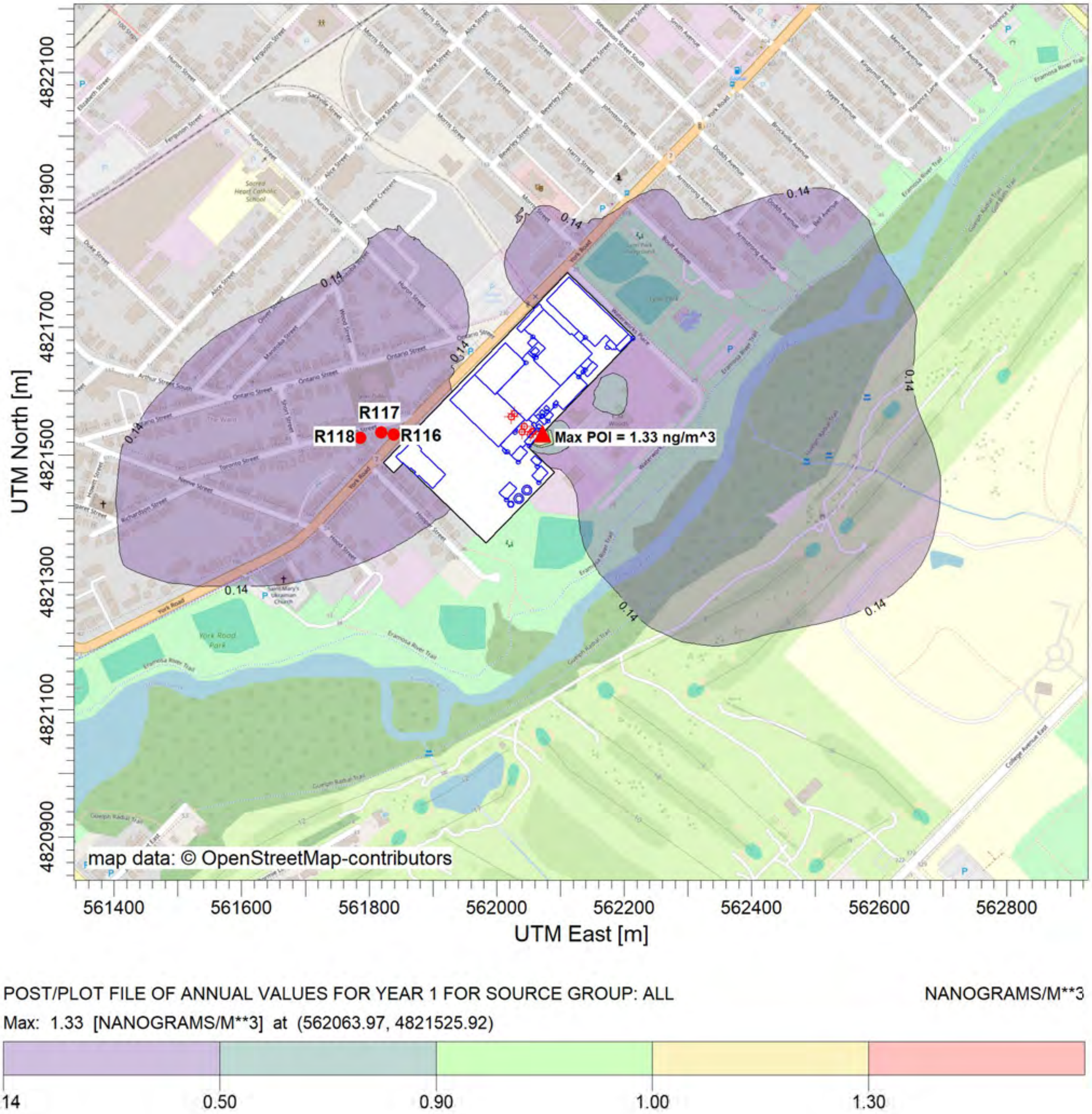
3/3/2025

PROJECT NO.:

24-035387

PROJECT TITLE:

OC Guelph Glass Plant
Annual Hexavalent Chromium Emissions - Current With Uncertainty



COMMENTS: Hexavalent Chromium - Annual Averaging Period - Worst Case Year - Year 2	SOURCES: **7**	COMPANY NAME: **Owens Corning Guelph Facility**
	RECEPTORS: **2640**	MODELER: **Montrose Environmental Solutions Canada Inc.**
	OUTPUT TYPE: **Concentration**	SCALE: 1:10,000 0 — 0.3 km
	MAX: **1.33 NANOGRAMS/M**3**	DATE: **3/3/2025**

MONTROSE ENVIRONMENTAL

PROJECT NO.:

24-035387

AERMOD View - Lakes Environmental Software

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APPENDIX N
Future Hexavalent Chromium Modelling

	Year	2024	2024	2024	2023	2023	2023	2023	2023	2023	2023	2023	2023

C80

		Monthly Hours at Operating Speed											
Speed (Hz)	Corresponding Flowrate (m^3/s)	1	2	3	4	5	6	7	8	9	10	11	12	Annual
OFF	0.0	0	56	0	42	0	0	0	0	0	0	0	0	99
35	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0
35.5	13.4	744	576	592	325	273	83	0	83	199	393	668	626	4561
39	15.3	0	9	40	54	145	198	212	391	399	166	3	77	1694
42.5	15.4	0	7	51	15	149	191	353	133	90	60	33	14	1095
45	16.7	0	0	0	0	1	0	0	0	0	0	0	0	1
46	16.7	0	2	35	49	47	78	179	137	1	30	4	3	565
49.5	18.0	0	20	8	56	56	163	0	0	0	41	12	12	370
53	19.2	0	3	2	38	60	1	0	0	6	13	0	5	128
55	20.5	0	0	0	0	0	0	0	0	0	0	0	0	0
56.5	20.5	0	13	4	33	6	0	0	0	26	41	0	0	123
60	21.8	0	10	0	108	6	6	0	0	0	0	0	6	137
	Average Volumetric Flow Rate When Operating	13.4	13.9	13.9	16.2	15.3	15.9	15.7	15.4	15.0	14.9	13.6	13.8	14.8

C79

		Monthly Hours at Operating Speed												
Speed (Hz)	Corresponding Flowrate (m^3/s)	1	2	3	4	5	6	7	8	9	10	11	12	Annual
OFF	0.0	4	0	0	0	0	0	0	0	0	0	0	0	5
35	13.4	0	0	0	0	0	0	0	0	0	0	0	0	0
35.5	13.4	740	652	680	296	272	0	0	0	11	473	720	744	4588
39	15.3	0	0	1	1	2	0	0	0	18	1	0	0	22
42.5	15.4	0	44	1	1	121	0	0	0	0	1	0	0	168
45	16.7	0	0	0	0	0	0	0	0	0	0	0	0	0
46	16.7	0	0	0	1	1	0	0	0	0	1	0	0	3
49.5	18.0	0	0	1	5	1	0	0	0	0	2	0	0	10
53	19.2	0	0	0	0	1	0	0	0	1	1	0	0	3
55	20.5	0	0	0	0	0	0	0	0	0	0	0	0	0
56.5	20.5	0	0	1	0	1	0	0	0	5	20	0	0	27
60	21.8	0	0	49	417	345	720	744	744	683	246	0	0	3947
	Average Volumetric Flow Rate When Operating	13.4	13.5	14.0	18.3	17.6	21.8	21.8	21.8	21.5	16.4	13.4	13.4	17.2

B33

		Monthly Hours at Operating Speed												
Speed (Hz)	Corresponding Flowrate (m^3/s)	1	2	3	4	5	6	7	8	9	10	11	12	Annual
OFF	0.0	744	680	706	566	476	304	177	338	482	664	719	741	6597
35	13.4	0	0	0	1	1	2	1	1	1	1	0	0	8
35.5	13.4	0	2	16	27	47	139	62	83	92	25	2	3	496
39	15.3	0	14	11	12	16	22	33	24	6	2	0	0	140
42.5	15.4	0	0	0	6	24	33	25	37	19	2	0	0	147
45	16.7	0	0	0	0	0	1	0	0	0	1	0	0	2
46	16.7	0	0	0	5	12	13	35	11	15	3	0	0	93
49.5	18.0	0	0	0	6	9	16	28	35	4	2	0	0	100
53	19.2	0	0	0	4	7	27	24	20	13	9	0	0	105
55	20.5	0	0	0	0	0	1	1	0	0	0	0	0	2
56.5	20.5	0	0	0	13	15	18	45	16	9	2	0	0	117
60	21.8	0	0	0	80	137	145	311	179	80	34	0	0	966
	Average Volumetric Flow Rate When Operating		15.1	14.2	19.0	18.8	17.6	19.5	18.4	17.3	18.1	13.4	13.4	18.4

B34

		Monthly Hours at Operating Speed												
Speed (Hz)	Corresponding Flowrate (m^3/s)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Annual**
OFF	0.0	744	696	733	651	620	591	478	615	647	712	720	744	7951
35	13.4	0	0	0	0	0	1	1	1	1	0	0	0	4
35.5	13.4	0	0	0	5	14	30	83	57	4	9	0	0	202
39	15.3	0	0	0	5	27	25	43	22	7	2	0	0	131
42.5	15.4	0	0	0	3	8	13	7	7	11	2	0	0	51
45	16.7	0	0	0	0	0	0	0	0	0	0	0	0	1
46	16.7	0	0	0	5	7	4	11	3	2	1	0	0	31
49.5	18.0	0	0	0	3	5	9	20	9	2	2	0	0	49
53	19.2	0	0	0	2	3	11	10	3	10	3	0	0	42
55	20.5	0	0	0	0	0	0	0	0	0	0	0	0	0
56.5	20.5	0	0	0	8	3	3	5	12	2	1	0	0	33
60	21.8	0	0	0	38	57	32	86	17	34	12	0	0	275

	Average Volumetric Flow Rate When Operating				19.7	18.5	17.1	17.3	16.1	18.9	18.0			17.6

Notes: Annual average volumetric flowrate from 2023 and 2024 was used to calculate the velocity of the source for modelling.

APPENDIX N
Milestone 1

24 hour Stage 2 POI

Ingredient ID	Contaminant	CAS #	24 Hour Emission Rate (g/s)	Facility MAX GLC (µg/m³)	24 Hour POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.37E-04	0.00261	0.07	URT	Health	3.7%	Stage 2	Significant

Annual Stage 2 POI

Ingredient ID	Contaminant	CAS #	Annual Emission Rate (g/s)	Facility MAX GLC (µg/m³)	Annual POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.37E-04	0.00069	0.00133	Proposed SSS	Health	51.7%	Stage 2	Significant

Annual Assessment Value Stage 2 POI

Ingredient ID	Contaminant	CAS #	24-hr Emission Rate (g/s)	Facility MAX GLC (µg/m³)	AAV Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.37E-04	0.00069	0.0133	AAV	Health	5.2%	Stage 2	Significant

Assessment Values

OC Guelph has prepared a comparison of modelling against assessment values in accordance with the MOECC *Technical bulletin: Using assessment values for contaminants with annual air standards, dated February, 2018.*

Daily Assessment Values (DAV)

Currently, all DAV are equal to their respective URTs. As documented in Section 13 of the ESDMR, all 24h modelling results were below their respective URTs.

Annual Assessment Values (AAV)

The 24 hour average worst case emission rates were input to the model in order to predict an annual maximum ground level concentration. OC Guelph is proposing a site specific annual hexavalent chromium limit of 0.00133 µg/m^3. This value was increased 10 times and used as the annual assessment value.

Source Pathway - Source Inputs

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	344.80	60.00	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	344.80	60.00	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	32.00	0.00009	323.50	24.90	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Control Pathway

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC5_1Tailed_R0

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

- ☒ Elevated Terrain
- ☐ No Stack-Tip Downwash (NOSTD)
- ☐ Run in Screening Mode
- ☐ Conversion of NOx to NO2 (OLM or PVMRM)
- ☐ No Checks for Non-Sequential Met Data
- ☐ Fast All Sources (FASTALL)
- ☐ Fast Area Sources (FASTAREA)
- ☐ Optimized Area Source Plume Depletion
- ☐ Gas Deposition

BETA Options:

- ☒ Capped and Horizontal Stack Releases
- ☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
- ☐ Low Wind Options

- ☐ SCIM (Sampled Chronological Input Model)
- ☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

- ☒ Concentration
- ☐ Total Deposition (Dry & Wet)
- ☐ Dry Deposition
- ☐ Wet Deposition

Plume Depletion

- ☐ Dry Removal
- ☐ Wet Removal

Output Warnings

- ☐ No Output Warnings
- ☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	☐	☐	☐	☐	☐	☐	☐	☒
	1	2	3	4	6	8	12	24

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Hexavalent Chromium - 24 Hour Averaging Period

*** THE MAXIMUM 1000 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL   ***

RANK BY YEAR	YEAR	RANK	CONC	YYYYMMDDHH	XR	YR	TYPE	Ontario Reg. 419/05
1	2019	1	2.7714	2019101724	562064.35	4821518.39	DC	Discarded
2	2019	2	2.73512	2019101724	562063.97	4821525.92	DC	Discarded
1	2018	3	2.62291	2018112724	562084.35	4821518.39	DC	Discarded
1	2016	4	2.62037	2016112124	562064.35	4821518.39	DC	Discarded
3	2019	5	2.60889	2019011024	562064.35	4821518.39	DC	Highest

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC5_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.77140	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.67388	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.68246	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.68467	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.64672	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.66858	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.68698	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.21461	NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.01832	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.01880	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.01931	NOGRAMS/M	562264.35	4821618.39	311.42	0.00	311.42	
ANNUAL Y3		0.01747	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y4		0.01751	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.01873	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	

Concentration Units: ng/m^3

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC5_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.32578	NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.02910	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y1		0.02952	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.03063	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.02786	NOGRAMS/M	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.02781	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y5		0.03024	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC5_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.37186	NOGRAMS/M	561845.76	4821472.01	312.16	4.90	312.16	12/16/2020, 24
ANNUAL		0.10992	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y1		0.11235	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.10933	NOGRAMS/M	562304.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.13038	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y4		0.12113	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y5		0.10494	NOGRAMS/M	562384.35	4821458.39	308.76	0.00	337.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC5_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC5_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.85757	ANOGRAMS/M	561845.76	4821472.01	312.16	4.90	312.16	12/16/2020, 24
ANNUAL		0.14528	ANOGRAMS/M	562304.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y1		0.14733	ANOGRAMS/M	562304.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y2		0.15911	ANOGRAMS/M	562304.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.16190	ANOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y4		0.15817	ANOGRAMS/M	561761.83	4821522.60	314.00	4.90	314.00	
ANNUAL Y5		0.15259	ANOGRAMS/M	562304.35	4821638.39	311.00	0.00	311.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.54040	ANOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.04732	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.04832	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.04986	ANOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.04526	ANOGRAMS/M	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.04513	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.04894	ANOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC5_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Proposed Annual SSS	% of Schedule 3 Standard	Address
R118	561786.4	4821528.8	4.9	2.01	3%	0.24	18%	171%	83/79 Toronto St
R117	561819.0	4821537.8	4.9	2.01	3%	0.24	18%	169%	91 Toronto St
R119	561761.8	4821522.6	4.9	1.99	3%	0.24	18%	169%	73 Toronto St
R116	561838.1	4821533.5	4.9	2.01	3%	0.23	17%	165%	95 Toronto St
Sch1	561799.4	4821589.7	4.9	1.88	3%	0.22	17%	160%	
Sch2	561822.3	4821589.7	4.9	2.00	3%	0.22	17%	157%	
R120	561717.2	4821511.9	4.9	1.88	3%	0.22	16%	156%	
R113	561807.6	4821503.3	0.0	2.16	3%	0.22	16%	155%	160 York Road
R21	561755.0	4821468.8	7.3	2.03	3%	0.21	16%	151%	
R112	561791.8	4821488.1	0.0	2.14	3%	0.21	16%	151%	
R20	561747.9	4821460.2	7.3	1.85	3%	0.21	15%	147%	
Sch5	561796.1	4821628.3	7.3	2.00	3%	0.20	15%	146%	
R111	561778.1	4821473.3	0.0	1.93	3%	0.20	15%	146%	
R121	561688.4	4821503.6	4.9	1.79	3%	0.20	15%	146%	
R19	561742.2	4821453.8	7.3	1.71	2%	0.20	15%	143%	
R6	561845.8	4821472.0	4.9	2.26	3%	0.20	15%	142%	12 Hooper St
Sch4	561795.6	4821628.3	4.9	1.90	3%	0.20	15%	140%	
R18	561735.0	4821445.9	7.3	1.75	2%	0.20	15%	140%	
R122	561660.7	4821497.3	4.9	1.69	2%	0.19	14%	136%	
R17	561729.3	4821438.8	7.3	1.80	3%	0.19	14%	136%	
Sch3	561820.1	4821630.4	4.9	1.82	3%	0.19	14%	134%	
R16	561722.1	4821430.9	7.3	1.84	3%	0.19	14%	133%	
R15	561716.4	4821421.6	7.3	1.88	3%	0.18	14%	128%	
R123	561629.6	4821489.0	4.9	1.59	2%	0.17	13%	124%	
R5	561865.8	4821452.0	4.9	2.11	3%	0.17	13%	123%	
R14	561707.7	4821410.4	7.3	1.87	3%	0.17	13%	123%	
R7	561885.8	4821592.0	4.9	1.87	3%	0.17	13%	123%	
R106	562346.4	4821774.7	4.9	1.25	2%	0.15	11%	107%	
R4	561885.8	4821432.0	4.9	1.42	2%	0.14	10%	98%	
R11	562325.8	4821792.0	4.9	1.00	1%	0.13	10%	95%	
R8	561905.8	4821612.0	4.9	1.13	2%	0.13	10%	94%	
R107	562312.5	4821808.4	4.9	0.86	1%	0.12	9%	85%	
R42	562063.9	4821805.4	7.3	1.09	2%	0.12	9%	85%	
R45	562080.2	4821793.1	7.3	1.10	2%	0.12	9%	85%	
R41	562064.7	4821780.0	7.3	1.06	2%	0.12	9%	84%	
R40	562049.7	4821792.3	7.3	1.12	2%	0.12	9%	84%	
R43	562079.6	4821820.1	7.3	1.06	2%	0.12	9%	83%	
R44	562093.9	4821807.1	7.3	1.08	2%	0.12	9%	83%	
R105	561859.5	4821782.0	7.3	1.22	2%	0.12	9%	82%	
R39	562108.0	4821822.3	7.3	1.04	1%	0.11	8%	80%	
R38	562093.0	4821834.3	7.3	1.05	1%	0.11	8%	80%	
R108	562297.6	4821821.9	4.9	0.79	1%	0.11	8%	79%	
R104	561844.5	4821795.0	7.3	1.19	2%	0.11	8%	79%	
R34	562063.4	4821805.1	4.9	0.99	1%	0.11	8%	79%	
R85	561859.0	4821782.5	4.9	1.13	2%	0.11	8%	79%	
R37	562079.7	4821792.8	4.9	1.03	1%	0.11	8%	78%	
R144	562060.4	4821843.4	6.1	1.02	1%	0.11	8%	78%	
R35	562079.1	4821819.8	4.9	1.01	1%	0.11	8%	77%	
R36	562093.4	4821806.8	4.9	1.02	1%	0.11	8%	77%	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Proposed Annual SSS	% of Schedule 3 Standard	Address
R32	562049.2	4821792.0	4.9	1.00	1%	0.11	8%	77%	
R33	562064.2	4821779.7	4.9	0.97	1%	0.11	8%	77%	
R145	562071.8	4821855.4	6.1	0.97	1%	0.11	8%	77%	
R65	561859.0	4821782.0	0.0	1.07	2%	0.11	8%	76%	
R146	562049.3	4821854.3	6.1	1.02	1%	0.11	8%	76%	
R84	561844.0	4821795.5	4.9	1.10	2%	0.11	8%	76%	
R109	562257.1	4821860.4	4.9	1.05	1%	0.11	8%	76%	
R12	562275.8	4821842.0	4.9	0.98	1%	0.11	8%	76%	
R103	561828.5	4821810.0	7.3	1.15	2%	0.11	8%	76%	
R110	562244.8	4821872.3	4.9	1.02	1%	0.11	8%	75%	
R147	562060.2	4821866.2	6.1	1.00	1%	0.11	8%	75%	
R31	562107.5	4821822.0	4.9	0.95	1%	0.10	8%	75%	
R30	562092.5	4821834.0	4.9	0.99	1%	0.10	8%	75%	
R64	561844.0	4821795.0	0.0	1.03	1%	0.10	8%	74%	
R26	562063.9	4821805.1	0.0	0.93	1%	0.10	8%	74%	
R148	562035.9	4821866.9	6.1	0.95	1%	0.10	8%	73%	
R29	562080.2	4821792.8	0.0	0.98	1%	0.10	8%	73%	
R83	561828.0	4821810.5	4.9	1.06	2%	0.10	8%	73%	
R99	561855.5	4821822.0	7.3	1.10	2%	0.10	8%	73%	
R102	561813.5	4821824.0	7.3	1.11	2%	0.10	8%	73%	
R149	562047.2	4821878.9	6.1	0.98	1%	0.10	8%	73%	
R27	562079.6	4821819.8	0.0	0.96	1%	0.10	8%	73%	
R28	562093.9	4821806.8	0.0	0.97	1%	0.10	8%	73%	
R9	561925.8	4821632.0	4.9	0.72	1%	0.10	8%	72%	
R24	562049.7	4821792.0	0.0	0.89	1%	0.10	8%	72%	
R124	562060.2	4821843.6	0.0	0.89	1%	0.10	8%	71%	
R150	562029.1	4821874.5	6.1	0.91	1%	0.10	7%	71%	
R13	562225.8	4821892.0	4.9	0.87	1%	0.10	7%	71%	
R63	561828.0	4821810.0	0.0	0.99	1%	0.10	7%	71%	
R151	562040.4	4821886.3	6.1	0.95	1%	0.10	7%	71%	
R25	562064.7	4821779.7	0.0	0.92	1%	0.10	7%	71%	
R23	562108.0	4821822.0	0.0	0.91	1%	0.10	7%	71%	
R22	562093.0	4821834.0	0.0	0.95	1%	0.10	7%	71%	
R114	562151.0	4821856.9	4.9	0.82	1%	0.10	7%	71%	
R125	562071.6	4821855.6	0.0	0.87	1%	0.10	7%	70%	
R82	561813.0	4821824.5	4.9	1.03	1%	0.10	7%	70%	
R79	561855.0	4821822.5	4.9	1.05	1%	0.10	7%	70%	
R115	562134.4	4821838.0	0.0	0.79	1%	0.10	7%	70%	
R126	562049.4	4821854.2	0.0	0.89	1%	0.10	7%	70%	
R98	561871.5	4821838.0	7.3	1.02	1%	0.10	7%	69%	
R101	561798.5	4821839.0	7.3	1.07	2%	0.10	7%	69%	
R127	562060.4	4821866.3	0.0	0.87	1%	0.10	7%	69%	
R152	562017.1	4821885.5	6.1	0.81	1%	0.10	7%	69%	
R62	561813.0	4821824.0	0.0	0.96	1%	0.10	7%	69%	
R3	561905.8	4821412.0	4.9	0.97	1%	0.10	7%	68%	
R153	562028.6	4821897.2	6.1	0.88	1%	0.10	7%	68%	
R59	561855.0	4821822.0	0.0	1.00	1%	0.10	7%	68%	
R94	561831.5	4821845.0	7.3	1.07	2%	0.10	7%	68%	
R154	562005.2	4821897.4	6.1	0.85	1%	0.09	7%	68%	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Proposed Annual SSS	% of Schedule 3 Standard	Address
R128	562036.1	4821866.8	0.0	0.84	1%	0.09	7%	67%	
R129	562047.4	4821879.1	0.0	0.87	1%	0.09	7%	67%	
R81	561798.0	4821839.5	4.9	1.00	1%	0.09	7%	67%	
R78	561871.0	4821838.5	4.9	0.98	1%	0.09	7%	67%	
R156	561996.5	4821905.5	6.1	0.88	1%	0.09	7%	66%	
R97	561886.5	4821853.0	7.3	0.98	1%	0.09	7%	66%	
R131	562040.5	4821886.3	0.0	0.85	1%	0.09	7%	66%	
R130	562028.9	4821874.5	0.0	0.80	1%	0.09	7%	66%	
R93	561844.5	4821858.0	7.3	0.98	1%	0.09	7%	66%	
R74	561831.0	4821845.5	4.9	1.01	1%	0.09	7%	66%	
R155	562015.9	4821909.4	6.1	0.79	1%	0.09	7%	66%	
R100	561783.5	4821854.0	7.3	1.01	1%	0.09	7%	65%	
R61	561798.0	4821839.0	0.0	0.93	1%	0.09	7%	65%	
R58	561871.0	4821838.0	0.0	0.95	1%	0.09	7%	65%	
R158	561986.9	4821914.1	6.1	0.92	1%	0.09	7%	65%	
R132	562017.0	4821885.5	0.0	0.76	1%	0.09	7%	65%	
R157	562008.1	4821916.9	6.1	0.79	1%	0.09	7%	65%	
R54	561831.0	4821845.0	0.0	0.97	1%	0.09	7%	64%	
R96	561899.5	4821869.0	7.3	0.91	1%	0.09	7%	64%	
R133	562028.7	4821897.2	0.0	0.79	1%	0.09	7%	64%	
R77	561886.0	4821853.5	4.9	0.95	1%	0.09	7%	64%	
R134	562005.3	4821897.4	0.0	0.76	1%	0.09	7%	64%	
R73	561844.0	4821858.5	4.9	0.93	1%	0.09	7%	63%	
R92	561855.5	4821870.0	7.3	0.95	1%	0.09	7%	63%	
R80	561783.0	4821854.5	4.9	0.95	1%	0.09	7%	63%	
R89	561814.5	4821869.0	7.3	1.02	1%	0.09	7%	63%	
R95	561913.5	4821884.0	7.3	0.90	1%	0.09	7%	63%	
R159	561997.1	4821927.7	6.1	0.83	1%	0.09	7%	63%	
R136	561996.6	4821905.5	0.0	0.79	1%	0.09	7%	63%	
R160	561975.3	4821925.7	6.1	0.94	1%	0.09	7%	62%	
R57	561886.0	4821853.0	0.0	0.93	1%	0.09	7%	62%	
R53	561844.0	4821858.0	0.0	0.90	1%	0.09	7%	62%	
R60	561783.0	4821854.0	0.0	0.88	1%	0.09	7%	62%	
R135	562015.9	4821909.4	0.0	0.75	1%	0.09	7%	62%	
R76	561899.0	4821869.5	4.9	0.88	1%	0.09	6%	61%	
R161	561987.3	4821937.5	6.1	0.86	1%	0.09	6%	61%	
R138	561986.8	4821914.1	0.0	0.83	1%	0.09	6%	61%	
R72	561855.0	4821870.5	4.9	0.92	1%	0.09	6%	61%	
R91	561867.5	4821883.0	7.3	0.93	1%	0.09	6%	61%	
R69	561814.0	4821869.5	4.9	0.95	1%	0.09	6%	61%	
R137	562008.3	4821916.9	0.0	0.75	1%	0.09	6%	61%	
R88	561829.5	4821884.0	7.3	0.91	1%	0.08	6%	60%	
R75	561913.0	4821884.5	4.9	0.85	1%	0.08	6%	60%	
R56	561899.0	4821869.0	0.0	0.86	1%	0.08	6%	60%	
R52	561855.0	4821870.0	0.0	0.90	1%	0.08	6%	60%	
R162	561962.9	4821937.3	6.1	0.96	1%	0.08	6%	60%	
R49	561814.0	4821869.0	0.0	0.91	1%	0.08	6%	60%	
R139	561997.2	4821927.6	0.0	0.75	1%	0.08	6%	59%	
R90	561881.5	4821896.0	7.3	0.88	1%	0.08	6%	59%	

Sensitive Receptor Summary

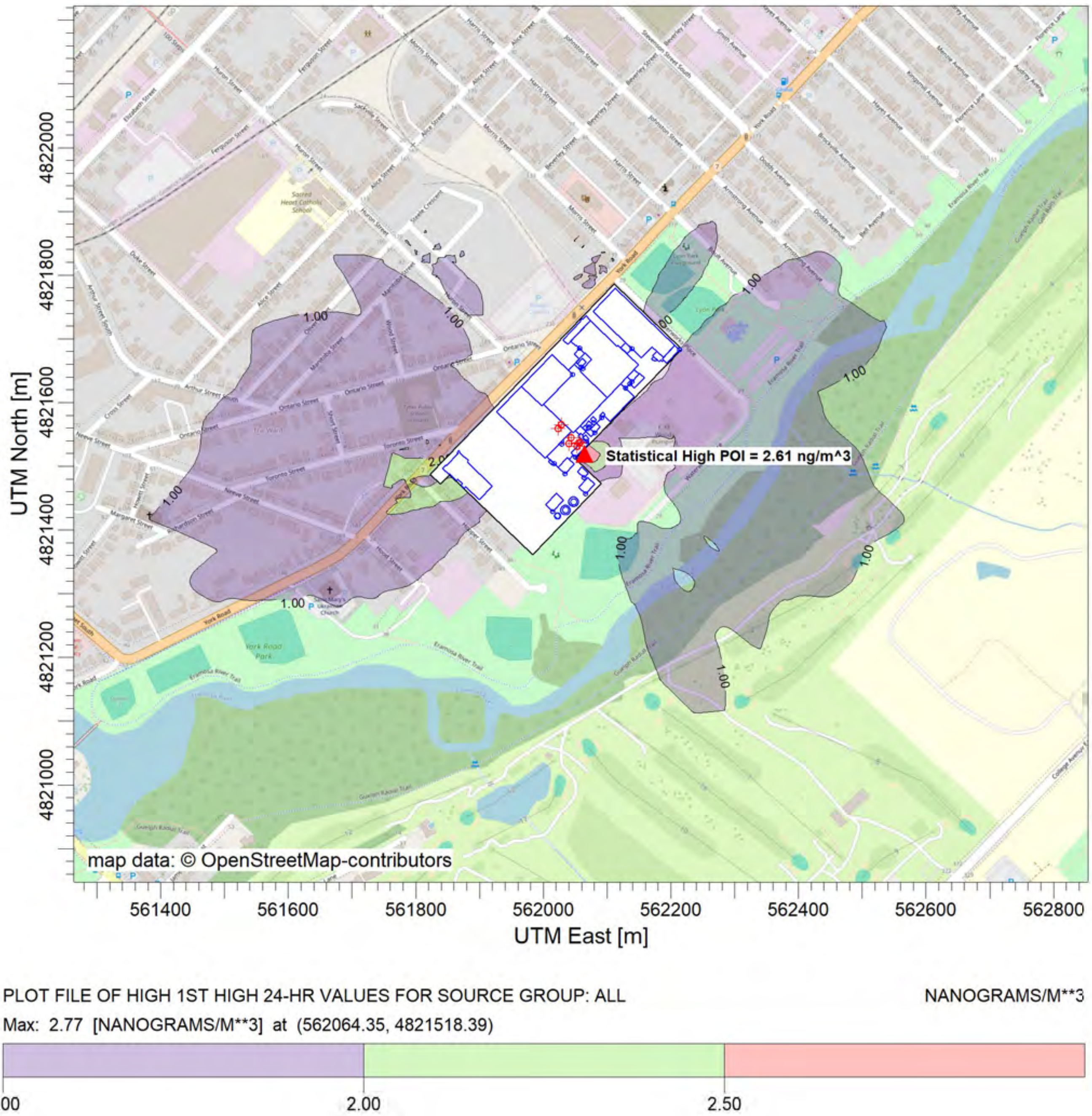
Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Proposed Annual SSS	% of Schedule 3 Standard	Address
R140	561975.2	4821925.6	0.0	0.86	1%	0.08	6%	59%	
R163	561974.5	4821949.2	6.1	0.88	1%	0.08	6%	59%	
R55	561913.0	4821884.0	0.0	0.81	1%	0.08	6%	59%	
R71	561867.0	4821883.5	4.9	0.91	1%	0.08	6%	59%	
R68	561829.0	4821884.5	4.9	0.87	1%	0.08	6%	58%	
R141	561987.4	4821937.5	0.0	0.78	1%	0.08	6%	58%	
R87	561842.5	4821899.0	7.3	0.88	1%	0.08	6%	58%	
R51	561867.0	4821883.0	0.0	0.89	1%	0.08	6%	57%	
R10	561945.8	4821652.0	4.9	0.68	1%	0.08	6%	57%	
R48	561829.0	4821884.0	0.0	0.84	1%	0.08	6%	57%	
R70	561881.0	4821896.5	4.9	0.86	1%	0.08	6%	57%	
R142	561962.9	4821937.3	0.0	0.88	1%	0.08	6%	56%	
R143	561974.5	4821949.2	0.0	0.81	1%	0.08	6%	56%	
R67	561842.0	4821899.5	4.9	0.86	1%	0.08	6%	56%	
R50	561881.0	4821896.0	0.0	0.84	1%	0.08	6%	55%	
R86	561857.5	4821914.0	7.3	0.85	1%	0.08	6%	55%	
R47	561842.0	4821899.0	0.0	0.84	1%	0.08	6%	55%	
R66	561857.0	4821914.5	4.9	0.84	1%	0.07	6%	53%	
R46	561857.0	4821914.0	0.0	0.82	1%	0.07	5%	52%	
R2	561925.8	4821392.0	4.9	0.78	1%	0.07	5%	52%	
R1	561945.8	4821372.0	4.9	0.95	1%	0.07	5%	48%	

Current (Average) Emission Scenario

Current (Mean) Emission Scenario with Uncertainty

PROJECT TITLE:

OC Guelph Glass Plant
24 Hour Hexavalent Chromium Emissions - Future - Milestone 1



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

Max: 2.77 [NANOGRAMS/M**3] at (562064.35, 4821518.39)

COMMENTS:

24 Hour Averaging Period Statistical High = 2.6090 ng/m^3

SOURCES:

7

COMPANY NAME:

Owens Corning Guelph Facility

RECEPTORS:

2640

MODELER:

Montrose Environmental Solutions Canada Inc.

OUTPUT TYPE:

Concentration

SCALE: 1:10,000

0 0.3 km

MAX:

2.77 NANOGRAMS/M3**

DATE:

3/3/2025

PROJECT NO.:

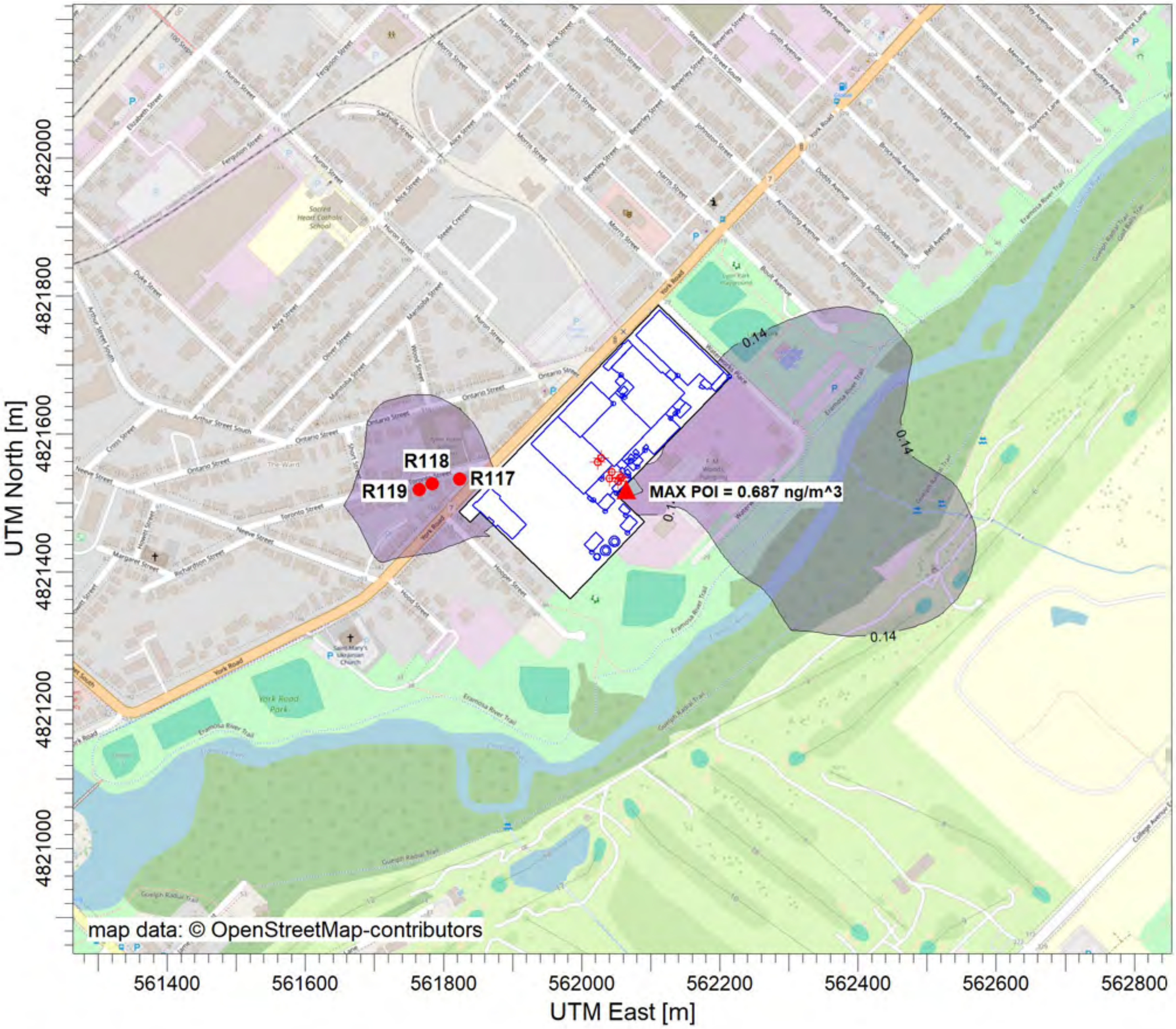
24-035387

AERMOD View - Lakes Environmental Software

E:\OC_Guelph\24035387_SSS\VPCC5_SSS_R0\VPCC5_SSS_R0.isc

PROJECT TITLE:

OC Guelph Glass Plant
Annual Hexavalent Chromium Emissions - Future - Milestone 1



POST/PLOT FILE OF ANNUAL VALUES FOR YEAR 1 FOR SOURCE GROUP: ALL

NANOGRAMS/M**3

Max: 0.687 [NANOGRAMS/M**3] at (562063.97, 4821525.92)

0.140	0.500	0.900	1.000	1.300
🟪	🟦	🟩	🟨	🟥

COMMENTS:

Hexavalent Chromium - Annual Averaging Period - Worst Case Year - Year 5

SOURCES:

7

COMPANY NAME:

Owens Corning Guelph Facility

RECEPTORS:

2640

MODELER:

Montrose Environmental Solutions Canada Inc.

MONTROSE ENVIRONMENTAL

OUTPUT TYPE:

Concentration

SCALE:

1:10,000

0 0.3 km

MAX:

0.687 NANOGRAMS/M3**

DATE:

3/3/2025

PROJECT NO.:

24-035387

Current (Average) Emission Scenario with Uncertainty

APPENDIX N

Milestone 2 (Default Pollution Control Combination and Preferred Pollution Control Combination)

24 hour Stage 2 POI

Ingredient ID	Contaminant	CAS #	24 Hour Emission Rate (g/s)	Facility MAX GLC (µg/m³)	24 Hour POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.31E-04	0.00261	0.07	URT	Health	3.7%	Stage 2	Significant

Annual Stage 2 POI

Ingredient ID	Contaminant	CAS #	Annual Emission Rate (g/s)	Facility MAX GLC (µg/m³)	Annual POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.31E-04	0.00068	0.00133	Proposed SSS	Health	51.5%	Stage 2	Significant

Annual Assessment Value Stage 2 POI

Ingredient ID	Contaminant	CAS #	24-hr Emission Rate (g/s)	Facility MAX GLC (µg/m³)	AAV Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.31E-04	0.00068	0.0133	AAV	Health	5.1%	Stage 2	Significant

Assessment Values

OC Guelph has prepared a comparison of modelling against assessment values in accordance with the MOECC *Technical bulletin: Using assessment values for contaminants with annual air standards, dated February, 2018.*

Daily Assessment Values (DAV)

Currently, all DAV are equal to their respective URTs. As documented in Section 13 of the ESDMR, all 24h modelling results were below their respective URTs.

Annual Assessment Values (AAV)

The 24 hour average worst case emission rates were input to the model in order to predict an annual maximum ground level concentration. OC Guelph is proposing a site specific annual hexavalent chromium limit of 0.00133 µg/m^3. This value was increased 10 times and used as the annual assessment value.

Source Pathway - Source Inputs

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	344.80	60.00	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	344.80	60.00	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	32.00	0.00008	323.50	24.90	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Control Pathway

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC13_1Tailed_R0

Dispersion Options

☐ Regulatory Default   ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:
☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion

☐ Dry Removal
☐ Wet Removal

Output Warnings

☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	1	2	3	4	6	8	12	24
	☐	☐	☐	☐	☐	☐	☐	☒

☐ Month   ☐ Period   ☒ Annual

Exponential Decay

☐ Yes   ☒ No

Terrain Height Options

☐ Flat   ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes   ☐ No

Default Height = 0.00 m

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Hexavalent Chromium - 24 Hour Averaging Period

*** THE MAXIMUM 1000 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***

RANK BY YEAR	YEAR	RANK	CONC	YYYYMMDDHH	XR	YR	TYPE	Ontario Reg. 419/05
1	2019	1	2.77039	2019101724	562064.35	4821518.39	DC	Discarded
2	2019	2	2.73416	2019101724	562063.97	4821525.92	DC	Discarded
1	2018	3	2.62238	2018112724	562084.35	4821518.39	DC	Discarded
1	2016	4	2.61917	2016112124	562064.35	4821518.39	DC	Discarded
3	2019	5	2.60857	2019011024	562064.35	4821518.39	DC	Highest

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC13_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.77039	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.67154	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.68023	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.68199	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.64452	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.66621	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.68474	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.21461	NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.01832	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.01880	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.01931	NOGRAMS/M	562264.35	4821618.39	311.42	0.00	311.42	
ANNUAL Y3		0.01747	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y4		0.01751	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.01873	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	

Concentration Units: ng/m^3

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC13_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.32578	NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.02910	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y1		0.02952	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.03063	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.02786	NOGRAMS/M	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.02781	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y5		0.03024	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC13_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	ANOGRAMS/M*	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	ANOGRAMS/M*	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	ANOGRAMS/M*	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	ANOGRAMS/M*	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	ANOGRAMS/M*	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	ANOGRAMS/M*	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	ANOGRAMS/M*	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.27926	ANOGRAMS/M*	561845.76	4821472.01	312.16	4.90	312.16	12/16/2020, 24
ANNUAL		0.10250	ANOGRAMS/M*	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y1		0.10477	ANOGRAMS/M*	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.10195	ANOGRAMS/M*	562304.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.12158	ANOGRAMS/M*	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y4		0.11296	ANOGRAMS/M*	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y5		0.09786	ANOGRAMS/M*	562384.35	4821458.39	308.76	0.00	337.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC13_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC13_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.76497	NOGRAMS/M	561845.76	4821472.01	312.16	4.90	312.16	12/16/2020, 24
ANNUAL		0.13862	NOGRAMS/M	562304.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y1		0.14058	NOGRAMS/M	562304.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y2		0.15173	NOGRAMS/M	562304.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.15310	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y4		0.15007	NOGRAMS/M	561761.83	4821522.60	314.00	4.90	314.00	
ANNUAL Y5		0.14556	NOGRAMS/M	562304.35	4821638.39	311.00	0.00	311.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.54040	NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.04732	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.04832	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.04986	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.04526	NOGRAMS/M	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.04513	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.04894	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC13_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Proposed Future Annual SSS	% of Schedule 3 Standard	Address
R118	561786.4	4821528.8	4.9	1.93	3%	0.23	17%	165%	83/79 Toronto St
R117	561819.0	4821537.8	4.9	1.94	3%	0.23	17%	163%	91 Toronto St
R119	561761.8	4821522.6	4.9	1.91	3%	0.23	17%	163%	73 Toronto St
R116	561838.1	4821533.5	4.9	1.94	3%	0.22	17%	159%	95 Toronto St
Sch1	561799.4	4821589.7	4.9	1.80	3%	0.22	16%	154%	
Sch2	561822.3	4821589.7	4.9	1.91	3%	0.21	16%	151%	
R120	561717.2	4821511.9	4.9	1.80	3%	0.21	16%	150%	
R113	561807.6	4821503.3	0.0	2.08	3%	0.21	16%	150%	160 York Road
R21	561755.0	4821468.8	7.3	1.95	3%	0.20	15%	146%	
R112	561791.8	4821488.1	0.0	2.06	3%	0.20	15%	146%	
R20	561747.9	4821460.2	7.3	1.78	3%	0.20	15%	142%	
R111	561778.1	4821473.3	0.0	1.86	3%	0.20	15%	141%	
R121	561688.4	4821503.6	4.9	1.72	2%	0.20	15%	141%	
Sch5	561796.1	4821628.3	7.3	1.91	3%	0.20	15%	140%	
R19	561742.2	4821453.8	7.3	1.65	2%	0.19	15%	139%	
R6	561845.8	4821472.0	4.9	2.16	3%	0.19	14%	137%	12 Hooper St
R18	561735.0	4821445.9	7.3	1.68	2%	0.19	14%	135%	
Sch4	561795.6	4821628.3	4.9	1.82	3%	0.19	14%	134%	
R122	561660.7	4821497.3	4.9	1.62	2%	0.18	14%	132%	
R17	561729.3	4821438.8	7.3	1.72	2%	0.18	14%	131%	
Sch3	561820.1	4821630.4	4.9	1.74	2%	0.18	14%	129%	
R16	561722.1	4821430.9	7.3	1.76	3%	0.18	13%	128%	
R15	561716.4	4821421.6	7.3	1.80	3%	0.17	13%	124%	
R123	561629.6	4821489.0	4.9	1.52	2%	0.17	13%	120%	
R5	561865.8	4821452.0	4.9	2.03	3%	0.17	13%	120%	
R14	561707.7	4821410.4	7.3	1.79	3%	0.17	12%	119%	
R7	561885.8	4821592.0	4.9	1.80	3%	0.17	12%	118%	
R106	562346.4	4821774.7	4.9	1.21	2%	0.15	11%	104%	
R4	561885.8	4821432.0	4.9	1.38	2%	0.13	10%	95%	
R11	562325.8	4821792.0	4.9	0.96	1%	0.13	10%	92%	
R8	561905.8	4821612.0	4.9	1.09	2%	0.13	10%	91%	
R107	562312.5	4821808.4	4.9	0.83	1%	0.12	9%	82%	
R42	562063.9	4821805.4	7.3	1.05	1%	0.11	9%	82%	
R45	562080.2	4821793.1	7.3	1.06	2%	0.11	9%	82%	
R41	562064.7	4821780.0	7.3	1.01	1%	0.11	9%	81%	
R40	562049.7	4821792.3	7.3	1.07	2%	0.11	8%	81%	
R44	562093.9	4821807.1	7.3	1.04	1%	0.11	8%	80%	
R43	562079.6	4821820.1	7.3	1.02	1%	0.11	8%	80%	
R105	561859.5	4821782.0	7.3	1.17	2%	0.11	8%	79%	
R39	562108.0	4821822.3	7.3	1.00	1%	0.11	8%	77%	
R38	562093.0	4821834.3	7.3	1.00	1%	0.11	8%	77%	
R108	562297.6	4821821.9	4.9	0.76	1%	0.11	8%	76%	
R104	561844.5	4821795.0	7.3	1.14	2%	0.11	8%	76%	
R34	562063.4	4821805.1	4.9	0.95	1%	0.11	8%	76%	
R85	561859.0	4821782.5	4.9	1.08	2%	0.11	8%	76%	
R37	562079.7	4821792.8	4.9	0.99	1%	0.11	8%	75%	
R144	562060.4	4821843.4	6.1	0.98	1%	0.10	8%	75%	
R35	562079.1	4821819.8	4.9	0.97	1%	0.10	8%	74%	
R36	562093.4	4821806.8	4.9	0.98	1%	0.10	8%	74%	
R32	562049.2	4821792.0	4.9	0.96	1%	0.10	8%	74%	
R33	562064.2	4821779.7	4.9	0.93	1%	0.10	8%	74%	
R65	561859.0	4821782.0	0.0	1.02	1%	0.10	8%	74%	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Proposed Future Annual SSS	% of Schedule 3 Standard	Address
R145	562071.8	4821855.4	6.1	0.93	1%	0.10	8%	73%	
R12	562275.8	4821842.0	4.9	0.94	1%	0.10	8%	73%	
R109	562257.1	4821860.4	4.9	1.00	1%	0.10	8%	73%	
R84	561844.0	4821795.5	4.9	1.06	2%	0.10	8%	73%	
R146	562049.3	4821854.3	6.1	0.98	1%	0.10	8%	73%	
R103	561828.5	4821810.0	7.3	1.10	2%	0.10	8%	73%	
R110	562244.8	4821872.3	4.9	0.98	1%	0.10	8%	73%	
R147	562060.2	4821866.2	6.1	0.95	1%	0.10	8%	72%	
R31	562107.5	4821822.0	4.9	0.92	1%	0.10	8%	72%	
R30	562092.5	4821834.0	4.9	0.95	1%	0.10	8%	72%	
R64	561844.0	4821795.0	0.0	0.99	1%	0.10	7%	71%	
R26	562063.9	4821805.1	0.0	0.89	1%	0.10	7%	71%	
R29	562080.2	4821792.8	0.0	0.95	1%	0.10	7%	70%	
R148	562035.9	4821866.9	6.1	0.91	1%	0.10	7%	70%	
R83	561828.0	4821810.5	4.9	1.03	1%	0.10	7%	70%	
R99	561855.5	4821822.0	7.3	1.06	2%	0.10	7%	70%	
R28	562093.9	4821806.8	0.0	0.94	1%	0.10	7%	70%	
R27	562079.6	4821819.8	0.0	0.92	1%	0.10	7%	70%	
R102	561813.5	4821824.0	7.3	1.07	2%	0.10	7%	70%	
R149	562047.2	4821878.9	6.1	0.94	1%	0.10	7%	70%	
R9	561925.8	4821632.0	4.9	0.69	1%	0.10	7%	70%	
R24	562049.7	4821792.0	0.0	0.85	1%	0.10	7%	69%	
R124	562060.2	4821843.6	0.0	0.85	1%	0.10	7%	69%	
R13	562225.8	4821892.0	4.9	0.83	1%	0.10	7%	69%	
R150	562029.1	4821874.5	6.1	0.87	1%	0.10	7%	68%	
R25	562064.7	4821779.7	0.0	0.88	1%	0.10	7%	68%	
R23	562108.0	4821822.0	0.0	0.87	1%	0.10	7%	68%	
R63	561828.0	4821810.0	0.0	0.95	1%	0.10	7%	68%	
R151	562040.4	4821886.3	6.1	0.91	1%	0.10	7%	68%	
R22	562093.0	4821834.0	0.0	0.91	1%	0.10	7%	68%	
R114	562151.0	4821856.9	4.9	0.79	1%	0.10	7%	68%	
R125	562071.6	4821855.6	0.0	0.84	1%	0.09	7%	68%	
R115	562134.4	4821838.0	0.0	0.76	1%	0.09	7%	67%	
R82	561813.0	4821824.5	4.9	1.00	1%	0.09	7%	67%	
R79	561855.0	4821822.5	4.9	1.00	1%	0.09	7%	67%	
R126	562049.4	4821854.2	0.0	0.85	1%	0.09	7%	67%	
R3	561905.8	4821412.0	4.9	0.95	1%	0.09	7%	67%	
R98	561871.5	4821838.0	7.3	0.97	1%	0.09	7%	67%	
R101	561798.5	4821839.0	7.3	1.03	1%	0.09	7%	67%	
R127	562060.4	4821866.3	0.0	0.84	1%	0.09	7%	67%	
R152	562017.1	4821885.5	6.1	0.78	1%	0.09	7%	67%	
R62	561813.0	4821824.0	0.0	0.92	1%	0.09	7%	66%	
R153	562028.6	4821897.2	6.1	0.85	1%	0.09	7%	66%	
R59	561855.0	4821822.0	0.0	0.96	1%	0.09	7%	66%	
R94	561831.5	4821845.0	7.3	1.03	1%	0.09	7%	66%	
R154	562005.2	4821897.4	6.1	0.82	1%	0.09	7%	65%	
R128	562036.1	4821866.8	0.0	0.81	1%	0.09	7%	65%	
R129	562047.4	4821879.1	0.0	0.83	1%	0.09	7%	65%	
R81	561798.0	4821839.5	4.9	0.96	1%	0.09	7%	64%	
R78	561871.0	4821838.5	4.9	0.94	1%	0.09	7%	64%	
R156	561996.5	4821905.5	6.1	0.85	1%	0.09	7%	64%	
R97	561886.5	4821853.0	7.3	0.94	1%	0.09	7%	64%	

Sensitive Receptor Summary

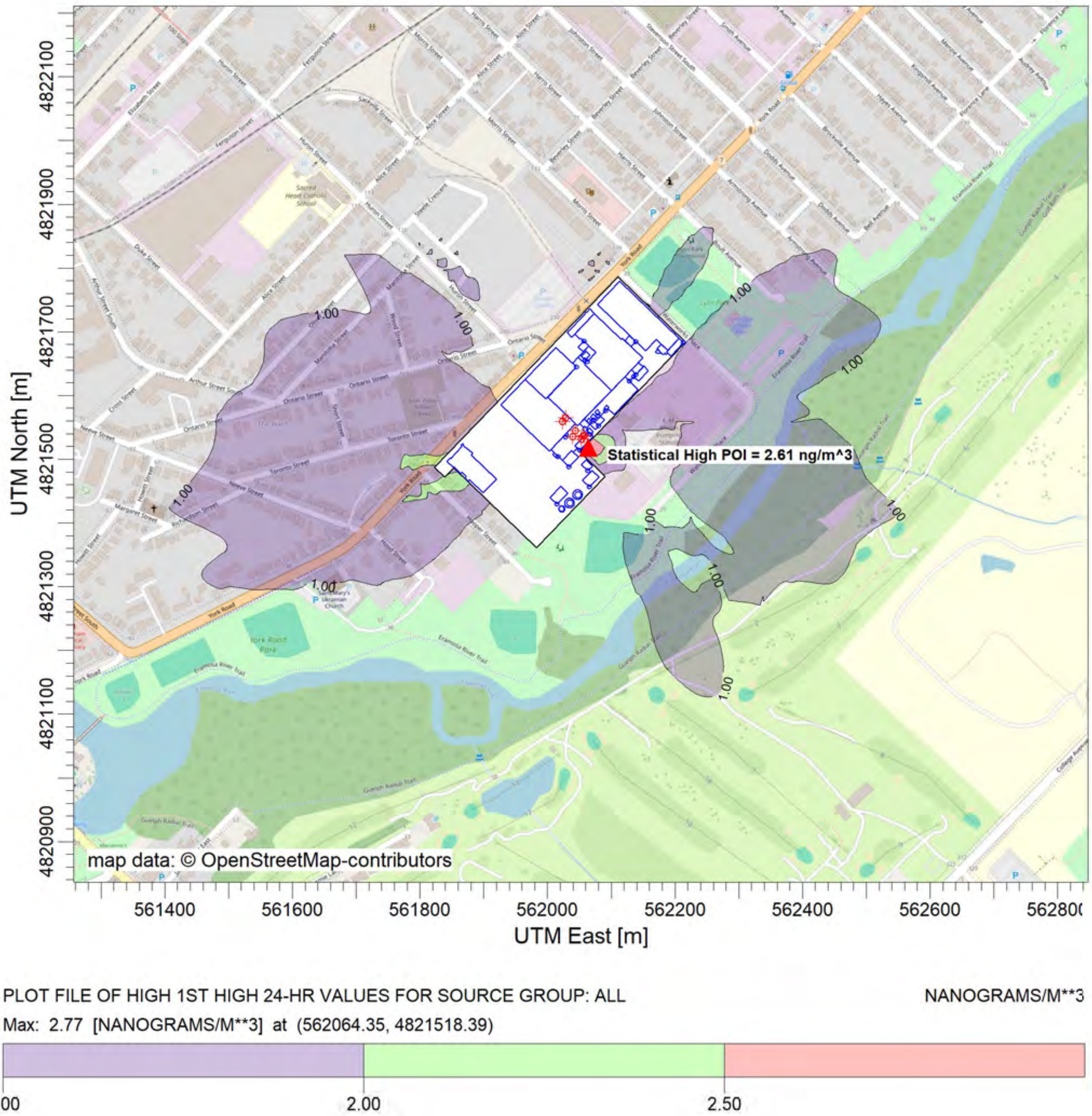
Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Proposed Future Annual SSS	% of Schedule 3 Standard	Address
R130	562028.9	4821874.5	0.0	0.77	1%	0.09	7%	63%	
R131	562040.5	4821886.3	0.0	0.81	1%	0.09	7%	63%	
R93	561844.5	4821858.0	7.3	0.94	1%	0.09	7%	63%	
R74	561831.0	4821845.5	4.9	0.97	1%	0.09	7%	63%	
R155	562015.9	4821909.4	6.1	0.75	1%	0.09	7%	63%	
R61	561798.0	4821839.0	0.0	0.89	1%	0.09	7%	63%	
R100	561783.5	4821854.0	7.3	0.98	1%	0.09	7%	63%	
R58	561871.0	4821838.0	0.0	0.91	1%	0.09	7%	63%	
R158	561986.9	4821914.1	6.1	0.88	1%	0.09	7%	62%	
R132	562017.0	4821885.5	0.0	0.73	1%	0.09	7%	62%	
R157	562008.1	4821916.9	6.1	0.76	1%	0.09	7%	62%	
R54	561831.0	4821845.0	0.0	0.93	1%	0.09	7%	62%	
R96	561899.5	4821869.0	7.3	0.87	1%	0.09	6%	62%	
R133	562028.7	4821897.2	0.0	0.76	1%	0.09	6%	61%	
R77	561886.0	4821853.5	4.9	0.91	1%	0.09	6%	61%	
R134	562005.3	4821897.4	0.0	0.73	1%	0.09	6%	61%	
R73	561844.0	4821858.5	4.9	0.89	1%	0.09	6%	61%	
R92	561855.5	4821870.0	7.3	0.90	1%	0.09	6%	61%	
R95	561913.5	4821884.0	7.3	0.87	1%	0.09	6%	61%	
R80	561783.0	4821854.5	4.9	0.91	1%	0.09	6%	61%	
R159	561997.1	4821927.7	6.1	0.80	1%	0.08	6%	61%	
R89	561814.5	4821869.0	7.3	0.98	1%	0.08	6%	60%	
R136	561996.6	4821905.5	0.0	0.76	1%	0.08	6%	60%	
R160	561975.3	4821925.7	6.1	0.91	1%	0.08	6%	60%	
R57	561886.0	4821853.0	0.0	0.89	1%	0.08	6%	60%	
R53	561844.0	4821858.0	0.0	0.86	1%	0.08	6%	60%	
R60	561783.0	4821854.0	0.0	0.85	1%	0.08	6%	60%	
R135	562015.9	4821909.4	0.0	0.71	1%	0.08	6%	59%	
R76	561899.0	4821869.5	4.9	0.85	1%	0.08	6%	59%	
R161	561987.3	4821937.5	6.1	0.82	1%	0.08	6%	59%	
R138	561986.8	4821914.1	0.0	0.80	1%	0.08	6%	59%	
R72	561855.0	4821870.5	4.9	0.88	1%	0.08	6%	59%	
R91	561867.5	4821883.0	7.3	0.89	1%	0.08	6%	59%	
R137	562008.3	4821916.9	0.0	0.71	1%	0.08	6%	58%	
R69	561814.0	4821869.5	4.9	0.92	1%	0.08	6%	58%	
R75	561913.0	4821884.5	4.9	0.83	1%	0.08	6%	58%	
R88	561829.5	4821884.0	7.3	0.87	1%	0.08	6%	58%	
R56	561899.0	4821869.0	0.0	0.82	1%	0.08	6%	58%	
R162	561962.9	4821937.3	6.1	0.92	1%	0.08	6%	57%	
R52	561855.0	4821870.0	0.0	0.86	1%	0.08	6%	57%	
R49	561814.0	4821869.0	0.0	0.88	1%	0.08	6%	57%	
R139	561997.2	4821927.6	0.0	0.72	1%	0.08	6%	57%	
R55	561913.0	4821884.0	0.0	0.79	1%	0.08	6%	57%	
R140	561975.2	4821925.6	0.0	0.83	1%	0.08	6%	57%	
R90	561881.5	4821896.0	7.3	0.84	1%	0.08	6%	57%	
R163	561974.5	4821949.2	6.1	0.85	1%	0.08	6%	57%	
R71	561867.0	4821883.5	4.9	0.87	1%	0.08	6%	56%	
R68	561829.0	4821884.5	4.9	0.83	1%	0.08	6%	56%	
R141	561987.4	4821937.5	0.0	0.75	1%	0.08	6%	56%	
R10	561945.8	4821652.0	4.9	0.66	1%	0.08	6%	55%	
R87	561842.5	4821899.0	7.3	0.84	1%	0.08	6%	55%	
R51	561867.0	4821883.0	0.0	0.85	1%	0.08	6%	55%	

Sensitive Receptor Summary

Receptor ID	Easting (m)	Northing (m)	Receptor Height	24 Hour POI (ng/m³)	% of 24hr URT	Annual POI (ng/m³)	% of Proposed Future Annual SSS	% of Schedule 3 Standard	Address
R48	561829.0	4821884.0	0.0	0.80	1%	0.08	6%	55%	
R70	561881.0	4821896.5	4.9	0.82	1%	0.08	6%	55%	
R142	561962.9	4821937.3	0.0	0.85	1%	0.08	6%	54%	
R143	561974.5	4821949.2	0.0	0.78	1%	0.08	6%	54%	
R50	561881.0	4821896.0	0.0	0.80	1%	0.07	6%	53%	
R67	561842.0	4821899.5	4.9	0.82	1%	0.07	6%	53%	
R86	561857.5	4821914.0	7.3	0.81	1%	0.07	6%	53%	
R47	561842.0	4821899.0	0.0	0.81	1%	0.07	6%	52%	
R66	561857.0	4821914.5	4.9	0.80	1%	0.07	5%	51%	
R2	561925.8	4821392.0	4.9	0.77	1%	0.07	5%	51%	
R46	561857.0	4821914.0	0.0	0.79	1%	0.07	5%	50%	
R1	561945.8	4821372.0	4.9	0.93	1%	0.07	5%	47%	

PROJECT TITLE:

OC Guelph Glass Plant
24 Hour Hexavalent Chromium Emissions - Future - Milestone 2



map data: © OpenStreetMap-contributors

PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL NANOGRAMS/M**3

Max: 2.77 [NANOGRAMS/M**3] at (562064.35, 4821518.39)

COMMENTS:

24 Hour Averaging Period Statistical High = 2.6086 ng/m^3

SOURCES:

7

COMPANY NAME:

Owens Corning Guelph Facility

RECEPTORS:

2640

MODELER:

Montrose Environmental Solutions Canada Inc.

OUTPUT TYPE:

Concentration

SCALE: 1:10,000

0 0.3 km

MAX:

2.77 NANOGRAMS/M3**

DATE:

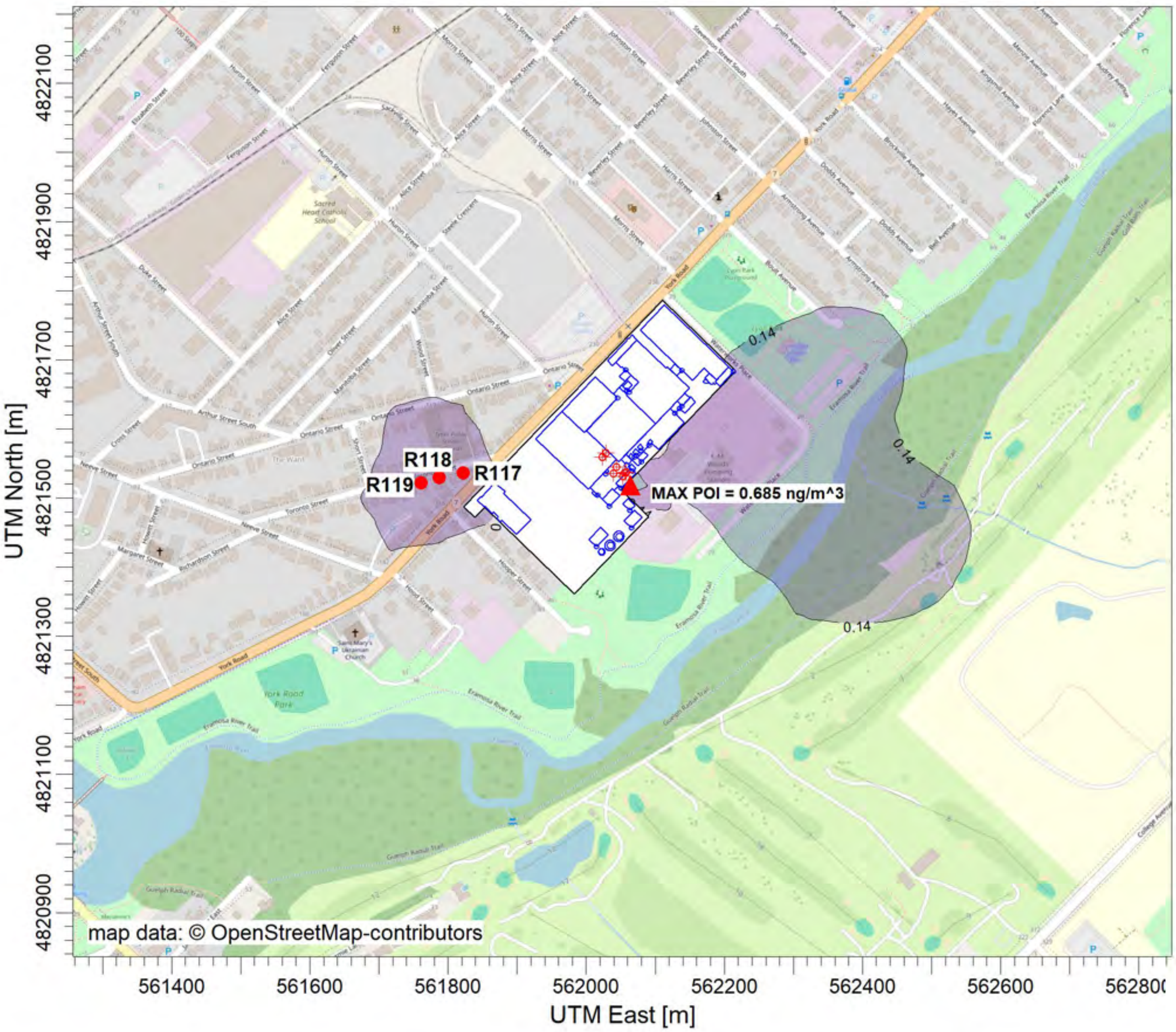
3/3/2025

PROJECT NO.:

24-035387

PROJECT TITLE:

OC Guelph Glass Plant
Annual Hexavalent Chromium Emissions - Future - Milestone 2



map data: © OpenStreetMap-contributors

POST/PLOT FILE OF ANNUAL VALUES FOR YEAR 1 FOR SOURCE GROUP: ALL

NANOGRAMS/M**3

Max: 0.685 [NANOGRAMS/M**3] at (562063.97, 4821525.92)

🟪	🟦	🟩	🟨	🟥
0.140	0.500	0.900	1.000	1.300

COMMENTS:

Hexavalent Chromium - Annual Averaging Period - Worst Case Year - Year 5

SOURCES:

7

COMPANY NAME:

Owens Corning Guelph Facility

RECEPTORS:

2640

MODELER:

Montrose Environmental Solutions Canada Inc.

OUTPUT TYPE:

Concentration

SCALE:

1:10,000

0 0.3 km

MAX:

0.685 NANOGRAMS/M3**

DATE:

3/3/2025

PROJECT NO.:

24-035387

APPENDIX O
Technology Benchmarking Modelling

Combination ID	Averaging Time	Emission Rate	Maximum Modelled Concentration	POI Concentration % Reduction from Current with Uncertainty	Modelling Files Location
		(g/s)	(ng/m^3)		
Current (Mean Emission Rates)	Annual	1.16E-04	1.06	NA	Appendix M
Current (with Uncertainty)	Annual	1.37E-04	1.33	NA	Appendix M
VPCC13_SSS	Annual	1.31E-04	0.68	-48.6%	Appendix N
VPCC5_SSS	Annual	1.37E-04	0.69	-48.5%	Appendix N
VPCC10_SSS	Annual	1.31E-04	0.73	-45.0%	Appendix O
VPCC4_SSS	Annual	1.37E-04	0.73	-44.9%	Appendix O
VPCC12_SSS	Annual	1.31E-04	0.77	-42.3%	Appendix O
VPCC14_SSS	Annual	1.37E-04	0.78	-41.7%	Appendix O
VPCC11_SSS	Annual	1.31E-04	0.78	-41.5%	Appendix O
VPCC3_SSS	Annual	1.37E-04	0.78	-41.4%	Appendix O
VPCC15_SSS	Annual	1.37E-04	0.79	-40.7%	Appendix O
VPCC9_SSS	Annual	1.31E-04	0.82	-38.7%	Appendix O
VPCC6_SSS	Annual	1.37E-04	0.83	-38.1%	Appendix O
VPCC8_SSS	Annual	1.31E-04	0.83	-37.9%	Appendix O
VPCC7_SSS	Annual	1.37E-04	0.84	-37.1%	Appendix O
VPCC16_SSS	Annual	1.37E-04	1.10	-17.7%	Appendix O
PCC4_SSS	Annual	1.31E-04	1.29	-3.2%	Appendix O

Tech Benchmarking Individual Options

Source Group	Category	Individual Option Description	Reduction Efficiency	Ranking
Furnace	Add on Control	Dust collector (DC)	NA	NA
	Material Substitution	Substituting with Low Sublimation Chromium Refractory	0%	NA
	Process Change	NA	NA	NA
	Stack Re-engineering	Furnace volumetric flow rate increased to 5.13m^3/s. Temperature estimated based on relative volumes of air and added air at 25C	53%	1
Forehearth	Add on Control	Dust collector (DC)	NA	NA
	Material Substitution	Substituting with Low Sublimation Chromium Refractory	0%	NA
	Process Change	Horizontal burner firing in the CFM forehearth	7%	1
	Stack Re-engineering	Forehearth - Volumetric flow rate increased to 11m^3/s - Temperature estimated based on relative	71%	1
		Forehearth - stack height increase (to 32mag)	63%	2
		FH stack reduced diameter to 0.45m	38%	3
General	No Technically Feasible Options		NA	NA

Technical Benchmarking Strategies

Source Group	Strategy	Strategy ID	% POI Reduction by Source Group	Ranking
Furnace	Furnace volumetric flow rate increased to 5.13m^3/s. Temperature estimated based on relative volumes of air and added air at 25C	VFN2	53%	1
	Substituting with Low Sublimation Chromium Refractory	FN2	0%	2
		VFN1	0%	3
Forehearth	Horizontal burner firing in the CFM forehearth Forehearth - stack height increase (to 32mag) Forehearth - Volumetric flow rate increased to 11m^3/s - Temperature estimated based on relative volumes of air and added air at 25C Substituting with Low Sublimation Chromium Refractory	VFH9	82%	1
	Forehearth - stack height increase (to 32mag) Forehearth - Volumetric flow rate increased to 11m^3/s - Temperature estimated based on relative volumes of air and added air at 25C Substituting with Low Sublimation Chromium Refractory	VFH4	80%	2
	Horizontal burner firing in the CFM forehearth Forehearth - Volumetric flow rate increased to 11m^3/s - Temperature estimated based on relative volumes of air and added air at 25C Substituting with Low Sublimation Chromium Refractory	VFH7	73%	3
	Forehearth - Volumetric flow rate increased to 11m^3/s - Temperature estimated based on relative volumes of air and added air at 25C Substituting with Low Sublimation Chromium Refractory	VFH6	71%	4
	Forehearth - stack height increase (to 32mag) FH stack reduced diameter to 0.45m Substituting with Low Sublimation Chromium Refractory	VFH3	69%	5
	Horizontal burner firing in the CFM forehearth Forehearth - stack height increase (to 32mag) Substituting with Low Sublimation Chromium Refractory	VFH8	65%	6
	Forehearth - stack height increase (to 32mag) Substituting with Low Sublimation Chromium Refractory	VFH5	63%	7
	FH stack reduced diameter to 0.45m Substituting with Low Sublimation Chromium Refractory	VFH10	38%	8
	Horizontal burner firing in the CFM forehearth Substituting with Low Sublimation Chromium Refractory	FH2	7%	9
General Ventilation	No Technically Feasible Options	GV1	NA	NA

Technical Benchmarking Combinations

Combination Description	Combination ID	Overall Percent Reduction	Ranking
Furnace: VFN2 Forehearth: VFH9	VPCC13_SSS	49%	1
Furnace: VFN2 Forehearth: VFH4	VPCC5_SSS	48%	2
Furnace: VFN1 Forehearth: VFH9	VPCC10_SSS	45%	3
Furnace: VFN1 Forehearth: VFH4	VPCC4_SSS	45%	4
Furnace: VFN2 Forehearth: VFH8	VPCC12_SSS	42%	5
Furnace: VFN2 Forehearth: VFH5	VPCC14_SSS	42%	6
Furnace: VFN2 Forehearth: VFH7	VPCC11_SSS	41%	7
Furnace: VFN1 Forehearth: VFH3	VPCC3_SSS	41%	8
Furnace: VFN2 Forehearth: VFH6	VPCC15_SSS	41%	9
Furnace: VFN1 Forehearth: VFH8	VPCC9_SSS	39%	10
Furnace: VFN1 Forehearth: VFH5	VPCC6_SSS	38%	11
Furnace: VFN1 Forehearth: VFH7	VPCC8_SSS	38%	12
Furnace: VFN1 Forehearth: VFH6	VPCC7_SSS	37%	13
Furnace: VFN1 Forehearth: VFH10	VPCC16_SSS	18%	14
Furnace: FN2 Forehearth: FH2	PCC4_SSS	3%	15

Sensitive Receptor Summary

Ranking	Combination ID	Source ID (group)	Strategy ID	Overall % of Sch 3 Future Standard	% of Max POI at Specified Receptor (Sensitive Receptor with the highest % Max POI)	POI Exceedance Frequency
Current	NA	Status quo		952%	332.0% (at 95 Toronto St)	100% (at 95 Toronto St)
Best (Default) Technically Feasible PCC[1]	VPCC13_SSS	Furnace Forehearth General Ventilation	VFN2 VFH9 NA	489%	164.7% (at 83/79 Toronto St)	100.0% (at 83/79 Toronto St)
2nd Best Technically Feasible PCC	VPCC5_SSS	Furnace Forehearth General Ventilation	VFN2 VFH4 NA	491%	170.7% (at 83/79 Toronto St)	100.0% (at 83/79 Toronto St)
3rd Best Technically Feasible PCC	VPCC10_SSS	Furnace Forehearth General Ventilation	VFN1 VFH9 NA	523%	191.8% (at 83/79 Toronto St)	100.0% (at 83/79 Toronto St)
4th Best Technically Feasible PCC	VPCC4_SSS	Furnace Forehearth General Ventilation	VFN1 VFH4 NA	525%	197.7% (at 83/79 Toronto St)	100.0% (at 83/79 Toronto St)
5th Best Technically Feasible PCC	VPCC12_SSS	Furnace Forehearth General Ventilation	VFN2 VFH8 NA	549%	248.3% (at 95 Toronto St)	100.0% (at 95 Toronto St)
6th Best Technically Feasible PCC	VPCC14_SSS	Furnace Forehearth General Ventilation	VFN2 VFH5 NA	555%	260.2% (at 95 Toronto St)	100.0% (at 95 Toronto St)
7th Best Technically Feasible PCC	VPCC11_SSS	Furnace Forehearth General Ventilation	VFN2 VFH7 NA	557%	210.0% (at 91 Toronto St)	100.0% (at 91 Toronto St)
8th Best Technically Feasible PCC	VPCC3_SSS	Furnace Forehearth General Ventilation	VFN1 VFH3 NA	558%	260.6% (at 95 Toronto St)	100.0% (at 95 Toronto St)
9th Best Technically Feasible PCC	VPCC15_SSS	Furnace Forehearth General Ventilation	VFN2 VFH6 NA	564%	219.2% (at 91 Toronto St)	100.0% (at 91 Toronto St)
10th Best Technically Feasible PCC	VPCC9_SSS	Furnace Forehearth General Ventilation	VFN1 VFH8 NA	584%	278.3% (at 95 Toronto St)	100.0% (at 95 Toronto St)
11th Best Technically Feasible PCC	VPCC6_SSS	Furnace Forehearth General Ventilation	VFN1 VFH5 NA	590%	290.2% (at 95 Toronto St)	100.0% (at 95 Toronto St)
12th Best Technically Feasible PCC	VPCC8_SSS	Furnace Forehearth General Ventilation	VFN1 VFH7 NA	591%	238.6% (at 91 Toronto St)	100.0% (at 91 Toronto St)
13th Best Technically Feasible PCC	VPCC7_SSS	Furnace Forehearth General Ventilation	VFN1 VFH6 NA	598%	247.8% (at 91 Toronto St)	100.0% (at 91 Toronto St)
14th Best Technically Feasible PCC	VPCC16_SSS	Furnace Forehearth General Ventilation	VFN1 VFH10 NA	783%	333.3% (at 95 Toronto St)	100.0% (at 95 Toronto St)
15th Best Technically Feasible PCC	PCC4_SSS	Furnace Forehearth General Ventilation	FN2 FH2 NA	921%	332.0% (at 95 Toronto St)	100.0% (at 95 Toronto St)

Control Pathway

AERMOD

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC10_1Tailed_R0

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:
☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type
☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion
☐ Dry Removal
☐ Wet Removal

Output Warnings
☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	1	2	3	4	6	8	12	24
	☐	☐	☐	☐	☐	☐	☐	☒

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59	4821531.65	312.94	35.09	0.00001	560.90	18.09	0.33
		105 Furnace Stack (West)							
POINT	B25	562057.67	4821536.90	313.00	35.09	0.00002	556.40	16.77	0.33
		105 Furnace Stack (East)							
POINT	B33	562055.21	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
		General Ventilation above T107 Furnace							
POINT	B34	562039.70	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
		General Exhaust Above T107A F/H							
POINT	B38	562043.48	4821544.79	313.00	32.00	0.00008	323.50	24.90	0.75
		105 Forehearth Stack							
POINT	C79	562023.15	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
		General Exhaust West CFM F/H							
POINT	C80	562028.25	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41
		General Exhaust East CFM F/H							

Side Fire Reduction Estimate

Methodology

Estimate for the end of 2033 for side firing on CFM only

Reduction in 2033 = = [(% reduction) x (% of area that is CFM in the front end)] / Uncertainty Factor

Data

% CFM = 54%

% WUCS = 46%

Estimate of side firing technology on hex chrome emissions at stack:

Minimum Reduction Estimate = 0%

Maximum Reduction Estimate = 50%

Average Reduction Estimate = 25%

Uncertainty factor = 2

Reduction in 2033 = 6.75%

Sample Calculation

Percent Reduction in 2033 = Reduction Percent x Percent of area that is CFM / Uncertainty Factor

= 25% x 54% / 2

= 6.75%

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC10_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.77226	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.71877	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.72683	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.72973	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.69178	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.71285	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.73267	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.37834	NOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	11/27/2020, 24
ANNUAL		0.04069	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.04105	NOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y2		0.04145	NOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y3		0.03938	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y4		0.03883	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y5		0.04326	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC10_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.55131	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.05970	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.06004	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.06035	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.05806	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.05739	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.06306	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC10_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.27926	ANOGRAMS/M	561845.76	4821472.01	312.16	4.90	312.16	12/16/2020, 24
ANNUAL		0.10250	ANOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y1		0.10477	ANOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.10195	ANOGRAMS/M	562304.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.12158	ANOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y4		0.11296	ANOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y5		0.09786	ANOGRAMS/M	562384.35	4821458.39	308.76	0.00	337.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC10_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC10_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.95560	NOGRAMS/M	561866.90	4821473.54	312.00	0.00	312.00	12/16/2020, 24
ANNUAL		0.18444	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.18561	NOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.19810	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.18914	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y4		0.18619	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y5		0.19597	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.92267	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.09911	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.09973	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.10130	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.09659	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.09494	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.10501	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC10_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC4_1Tailed_R0

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:

☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion

☐ Dry Removal
☐ Wet Removal

Output Warnings

☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours

	☐	☐	☐	☐	☐	☐	☐	☒
	1	2	3	4	6	8	12	24

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	560.90	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	556.40	16.77	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	32.00	0.00009	323.50	24.90	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC4_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.77327	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.72112	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.72907	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.73242	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.69397	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.71522	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.73491	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.37834	ANOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	11/27/2020, 24
ANNUAL		0.04069	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.04105	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y2		0.04145	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y3		0.03938	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y4		0.03883	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y5		0.04326	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC4_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.55131	ANOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.05970	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.06004	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.06035	ANOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.05806	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.05739	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.06306	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC4_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.37186	ANOGRAMS/M	561845.76	4821472.01	312.16	4.90	312.16	12/16/2020, 24
ANNUAL		0.10992	ANOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y1		0.11235	ANOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.10933	ANOGRAMS/M	562304.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.13038	ANOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y4		0.12113	ANOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y5		0.10494	ANOGRAMS/M	562384.35	4821458.39	308.76	0.00	337.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC4_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC4_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.04514	ANOGRAMS/M	561866.90	4821473.54	312.00	0.00	312.00	12/16/2020, 24
ANNUAL		0.19091	ANOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.19191	ANOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.20527	ANOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.19742	ANOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y4		0.19436	ANOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y5		0.20283	ANOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.92267	ANOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.09911	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.09973	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.10130	ANOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.09659	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.09494	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.10501	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC4_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

AERMOD

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC12_1Tailed_R0

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:

☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion

☐ Dry Removal
☐ Wet Removal

Output Warnings

☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	☐	☐	☐	☐	☐	☐	☐	☒
	1	2	3	4	6	8	12	24

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	344.80	60.00	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	344.80	60.00	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	32.00	0.00008	391.40	8.22	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Side Fire Reduction Estimate

Methodology

Estimate for the end of 2033 for side firing on CFM only
Reduction in 2033 = = [(% reduction) x (% of area that is CFM in the front end)] / Uncertainty Factor

Data

% CFM = 54%
% WUCS = 46%
Estimate of side firing technology on hex chrome emissions at stack:
Minimum Reduction Estimate = 0%
Maximum Reduction Estimate = 50%
Average Reduction Estimate = 25%
Uncertainty factor = 2

Reduction in 2033 = 6.75%

Sample Calculation

Percent Reduction in 2033 = Reduction Percent x Percent of area that is CFM / Uncertainty Factor
= 25% x 54% / 2
= 6.75%

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC12_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.85434	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	5/25/2017, 24
ANNUAL		0.75211	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.76118	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.76669	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.71725	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.74627	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.76915	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.21461	ANOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.01832	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.01880	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.01931	ANOGRAMS/M	562264.35	4821618.39	311.42	0.00	311.42	
ANNUAL Y3		0.01747	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y4		0.01751	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.01873	ANOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC12_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.32578	ANOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.02910	ANOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y1		0.02952	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.03063	ANOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.02786	ANOGRAMS/M	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.02781	ANOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y5		0.03024	ANOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC12_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.04686	ANOGRAMS/M	561824.35	4821558.39	313.00	0.00	313.00	1/22/2018, 24
ANNUAL		0.20369	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y1		0.19292	ANOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.20399	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y3		0.23088	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y4		0.22886	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y5		0.16850	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC12_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC12_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.28528	\NOGRAMS/M	561824.35	4821558.39	313.00	0.00	313.00	1/22/2018, 24
ANNUAL		0.23049	\NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y1		0.22012	\NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.22996	\NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y3		0.26264	\NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y4		0.25936	\NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y5		0.21447	\NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.54040	\NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.04732	\NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.04832	\NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.04986	\NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.04526	\NOGRAMS/M	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.04513	\NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.04894	\NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC12_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC14_1Tailed_R0

Dispersion Options

☐ Regulatory Default   ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:
☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type
☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion
☐ Dry Removal
☐ Wet Removal

Output Warnings
☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	1	2	3	4	6	8	12	24
	☐	☐	☐	☐	☐	☐	☐	☒

☐ Month   ☐ Period   ☒ Annual

Exponential Decay

☐ Yes   ☒ No

Terrain Height Options

☐ Flat   ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes   ☐ No

Default Height = 0.00 m

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	344.80	60.00	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	344.80	60.00	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	32.00	0.00009	391.40	8.22	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC14_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.00022	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	5/25/2017, 24
ANNUAL		0.76029	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.76927	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.77550	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.72472	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.75444	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.77750	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.21461	NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.01832	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.01880	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.01931	NOGRAMS/M	562264.35	4821618.39	311.42	0.00	311.42	
ANNUAL Y3		0.01747	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y4		0.01751	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.01873	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC14_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.32578	NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.02910	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y1		0.02952	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.03063	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.02786	NOGRAMS/M	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.02781	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y5		0.03024	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC14_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.19503	NOGRAMS/M	561824.35	4821558.39	313.00	0.00	313.00	1/22/2018, 24
ANNUAL		0.21844	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y1		0.20688	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.21875	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y3		0.24759	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y4		0.24542	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y5		0.18069	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC14_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC14_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.43344	ANOGRAMS/M	561824.35	4821558.39	313.00	0.00	313.00	1/22/2018, 24
ANNUAL		0.24524	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y1		0.23408	ANOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.24473	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y3		0.27927	ANOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y4		0.27593	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y5		0.22654	ANOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.54040	ANOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.04732	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.04832	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.04986	ANOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.04526	ANOGRAMS/M	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.04513	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.04894	ANOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC14_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	\NOGRAMS/M'	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	\NOGRAMS/M'	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	\NOGRAMS/M'	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	\NOGRAMS/M'	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	\NOGRAMS/M'	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	\NOGRAMS/M'	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	\NOGRAMS/M'	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC11_1Tailed_R0

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:

☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion

☐ Dry Removal
☐ Wet Removal

Output Warnings

☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	☐	☐	☐	☐	☐	☐	☐	☒
	1	2	3	4	6	8	12	24

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	344.80	60.00	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	344.80	60.00	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	28.00	0.00008	323.50	24.90	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Side Fire Reduction Estimate

Methodology

Estimate for the end of 2033 for side firing on CFM only

Reduction in 2033 = = [(% reduction) x (% of area that is CFM in the front end)] / Uncertainty Factor

Data

% CFM =	54%
% WUCS =	46%

Estimate of side firing technology on hex chrome emissions at stack:

Minimum Reduction Estimate =	0%
Maximum Reduction Estimate =	50%
Average Reduction Estimate =	25%
Uncertainty factor =	2
Reduction in 2033 =	6.75%

Sample Calculation

Percent Reduction in 2033 = Reduction Percent x Percent of area that is CFM / Uncertainty Factor
= 25% x 54% / 2
= 6.75%

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC11_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.67294	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	2/27/2020, 24
ANNUAL		0.75988	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.76761	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.78011	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.71916	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.75450	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.77804	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.21461	NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.01832	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.01880	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.01931	NOGRAMS/M	562264.35	4821618.39	311.42	0.00	311.42	
ANNUAL Y3		0.01747	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y4		0.01751	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.01873	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC11_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.32578	NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.02910	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y1		0.02952	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.03063	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.02786	NOGRAMS/M	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.02781	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y5		0.03024	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC11_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.76437	NOGRAMS/M	561866.90	4821473.54	312.00	0.00	312.00	12/16/2020, 24
ANNUAL		0.15512	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y1		0.15295	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.16049	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.17833	NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y4		0.17303	NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y5		0.15473	NOGRAMS/M	562284.35	4821498.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC11_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC11_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.26066	ANOGRAMS/M*	561866.90	4821473.54	312.00	0.00	312.00	12/16/2020, 24
ANNUAL		0.19194	ANOGRAMS/M*	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.19512	ANOGRAMS/M*	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.20951	ANOGRAMS/M*	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.21427	ANOGRAMS/M*	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y4		0.20887	ANOGRAMS/M*	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y5		0.20094	ANOGRAMS/M*	562244.35	4821618.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.54040	ANOGRAMS/M*	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.04732	ANOGRAMS/M*	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.04832	ANOGRAMS/M*	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.04986	ANOGRAMS/M*	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.04526	ANOGRAMS/M*	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.04513	ANOGRAMS/M*	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.04894	ANOGRAMS/M*	562284.35	4821638.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC11_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC3_1Tailed_R0

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:

☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion

☐ Dry Removal
☐ Wet Removal

Output Warnings

☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 ☐ 8 ☐ 12 ☒ 24

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	560.90	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	556.40	16.77	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	32.00	0.00009	391.40	22.84	0.45
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC3_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.10096	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	5/25/2017, 24
ANNUAL		0.76505	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.77295	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.77861	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.73446	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.75857	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.78069	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.37834	ANOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	11/27/2020, 24
ANNUAL		0.04069	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.04105	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y2		0.04145	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y3		0.03938	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y4		0.03883	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y5		0.04326	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC3_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.55131	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.05970	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.06004	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.06035	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.05806	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.05739	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.06306	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC3_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.92638	NOGRAMS/M	561824.35	4821558.39	313.00	0.00	313.00	1/22/2018, 24
ANNUAL		0.18375	NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y1		0.18365	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.18425	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y3		0.20898	NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y4		0.20568	NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y5		0.15993	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC3_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC3_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.56190	ANOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	1/20/2017, 24
ANNUAL		0.24782	ANOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y1		0.24690	ANOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.26393	ANOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.28195	ANOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y4		0.27689	ANOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y5		0.26114	ANOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.92267	ANOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.09911	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.09973	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.10130	ANOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.09659	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.09494	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.10501	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC3_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	\NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	\NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	\NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	\NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	\NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	\NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	\NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

AERMOD

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC15_1Tailed_R0

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:
☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion

☐ Dry Removal
☐ Wet Removal

Output Warnings

☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	☐	☐	☐	☐	☐	☐	☐	☒
	1	2	3	4	6	8	12	24

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	344.80	60.00	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	344.80	60.00	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	28.00	0.00009	323.50	24.90	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC15_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.75778	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	2/27/2020, 24
ANNUAL		0.76862	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.77617	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.78989	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.72676	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.76326	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.78704	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.21461	ANOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.01832	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.01880	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.01931	ANOGRAMS/M	562264.35	4821618.39	311.42	0.00	311.42	
ANNUAL Y3		0.01747	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y4		0.01751	ANOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.01873	ANOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC15_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.32578	NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.02910	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y1		0.02952	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.03063	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.02786	NOGRAMS/M	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.02781	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	
ANNUAL Y5		0.03024	NOGRAMS/M	562304.35	4821658.39	311.00	0.00	311.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC15_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.89208	NOGRAMS/M	561866.90	4821473.54	312.00	0.00	312.00	12/16/2020, 24
ANNUAL		0.16635	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y1		0.16402	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.17211	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.19124	NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y4		0.18555	NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y5		0.16593	NOGRAMS/M	562284.35	4821498.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC15_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC15_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.38838	NOGRAMS/M	561866.90	4821473.54	312.00	0.00	312.00	12/16/2020, 24
ANNUAL		0.20249	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.20582	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.22113	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.22711	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y4		0.22135	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y5		0.21202	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.54040	NOGRAMS/M	561865.76	4821452.01	312.00	4.90	312.00	12/16/2020, 24
ANNUAL		0.04732	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y1		0.04832	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y2		0.04986	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	
ANNUAL Y3		0.04526	NOGRAMS/M	562284.35	4821658.39	311.07	0.00	311.07	
ANNUAL Y4		0.04513	NOGRAMS/M	562264.35	4821638.39	311.41	0.00	311.41	
ANNUAL Y5		0.04894	NOGRAMS/M	562284.35	4821638.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC15_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC9_1Tailed_R0

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:

☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion

☐ Dry Removal
☐ Wet Removal

Output Warnings

☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours

1	2	3	4	6	8	12	24
☐	☐	☐	☐	☐	☐	☐	☒

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	560.90	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	556.40	16.77	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	32.00	0.00008	391.40	8.22	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Side Fire Reduction Estimate

Methodology

Estimate for the end of 2033 for side firing on CFM only

Reduction in 2033 = = [(% reduction) x (% of area that is CFM in the front end)] / Uncertainty Factor

Data

% CFM =	54%
% WUCS =	46%

Estimate of side firing technology on hex chrome emissions at stack:

Minimum Reduction Estimate =	0%
Maximum Reduction Estimate =	50%
Average Reduction Estimate =	25%
Uncertainty factor =	2
Reduction in 2033 =	6.75%

Sample Calculation

Percent Reduction in 2033 = Reduction Percent x Percent of area that is CFM / Uncertainty Factor

= 25% x 54% / 2

= 6.75%

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC9_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.22693	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	5/25/2017, 24
ANNUAL		0.79934	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.80778	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.81444	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.76451	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.79291	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.81708	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.37834	ANOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	11/27/2020, 24
ANNUAL		0.04069	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.04105	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y2		0.04145	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y3		0.03938	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y4		0.03883	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y5		0.04326	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC9_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.55131	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.05970	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.06004	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.06035	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.05806	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.05739	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.06306	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC9_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.04686	NOGRAMS/M	561824.35	4821558.39	313.00	0.00	313.00	1/22/2018, 24
ANNUAL		0.20369	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y1		0.19292	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.20399	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y3		0.23088	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y4		0.22886	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y5		0.16850	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC9_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC9_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.64100	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	5/25/2017, 24
ANNUAL		0.26780	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y1		0.25732	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.27132	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.30368	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y4		0.30055	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y5		0.26791	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.92267	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.09911	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.09973	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.10130	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.09659	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.09494	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.10501	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC9_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC6_1Tailed_R0

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

- ☒ Elevated Terrain
- ☐ No Stack-Tip Downwash (NOSTD)
- ☐ Run in Screening Mode
- ☐ Conversion of NOx to NO2 (OLM or PVMRM)
- ☐ No Checks for Non-Sequential Met Data
- ☐ Fast All Sources (FASTALL)
- ☐ Fast Area Sources (FASTAREA)
- ☐ Optimized Area Source Plume Depletion
- ☐ Gas Deposition

BETA Options:

- ☒ Capped and Horizontal Stack Releases
- ☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
- ☐ Low Wind Options

- ☐ SCIM (Sampled Chronological Input Model)
- ☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

- ☒ Concentration
- ☐ Total Deposition (Dry & Wet)
- ☐ Dry Deposition
- ☐ Wet Deposition

Plume Depletion

- ☐ Dry Removal
- ☐ Wet Removal

Output Warnings

- ☐ No Output Warnings
- ☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	1	2	3	4	6	8	12	24
	☐	☐	☐	☐	☐	☐	☐	☒

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	560.90	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	556.40	16.77	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	32.00	0.00009	391.40	8.22	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC6_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.37281	ANOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	5/25/2017, 24
ANNUAL		0.80752	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.81587	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.82325	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.77197	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.80107	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.82543	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.37834	ANOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	11/27/2020, 24
ANNUAL		0.04069	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.04105	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y2		0.04145	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y3		0.03938	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y4		0.03883	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y5		0.04326	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC6_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.55131	ANOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.05970	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.06004	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.06035	ANOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.05806	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.05739	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.06306	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC6_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.19503	NOGRAMS/M	561824.35	4821558.39	313.00	0.00	313.00	1/22/2018, 24
ANNUAL		0.21844	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y1		0.20688	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.21875	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y3		0.24759	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y4		0.24542	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y5		0.18069	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC6_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC6_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.78688	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	5/25/2017, 24
ANNUAL		0.28254	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y1		0.26877	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.28379	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.32039	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y4		0.31711	NOGRAMS/M	561838.11	4821533.49	313.00	4.90	313.00	
ANNUAL Y5		0.27997	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.92267	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.09911	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.09973	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.10130	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.09659	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.09494	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.10501	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC6_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

AERMOD

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC8_1Tailed_R0

Dispersion Options

☐ Regulatory Default   ☑ Non-Default Options

☑ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:
☑ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

☑ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion

☐ Dry Removal
☐ Wet Removal

Output Warnings

☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	☐	☐	☐	☐	☐	☐	☐	☑
	1	2	3	4	6	8	12	24

☐ Month   ☐ Period   ☑ Annual

Exponential Decay

☐ Yes   ☑ No

Terrain Height Options

☐ Flat   ☑ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☑ Yes   ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	560.90	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	556.40	16.77	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	28.00	0.00008	323.50	24.90	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Side Fire Reduction Estimate

Methodology

Estimate for the end of 2033 for side firing on CFM only

Reduction in 2033 = = [(% reduction) x (% of area that is CFM in the front end)] / Uncertainty Factor

Data

% CFM =	54%
% WUCS =	46%

Estimate of side firing technology on hex chrome emissions at stack:

Minimum Reduction Estimate =	0%
Maximum Reduction Estimate =	50%
Average Reduction Estimate =	25%
Uncertainty factor =	2
Reduction in 2033 =	6.75%

Sample Calculation

Percent Reduction in 2033 = Reduction Percent x Percent of area that is CFM / Uncertainty Factor

= 25% x 54% / 2

= 6.75%

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC8_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.68477	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	2/27/2020, 24
ANNUAL		0.80712	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.81421	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.82786	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.76642	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.80114	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.82597	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.37834	NOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	11/27/2020, 24
ANNUAL		0.04069	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.04105	NOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y2		0.04145	NOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y3		0.03938	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y4		0.03883	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y5		0.04326	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC8_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.55131	ANOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.05970	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.06004	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.06035	ANOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.05806	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.05739	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.06306	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC8_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.76437	NOGRAMS/M	561866.90	4821473.54	312.00	0.00	312.00	12/16/2020, 24
ANNUAL		0.15512	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y1		0.15295	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.16049	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.17833	NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y4		0.17303	NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y5		0.15473	NOGRAMS/M	562284.35	4821498.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC8_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC8_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.49288	NOGRAMS/M	561873.73	4821466.95	312.00	0.00	312.00	12/16/2020, 24
ANNUAL		0.24111	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.24447	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.25947	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.25209	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y4		0.24560	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y5		0.25437	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.92267	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.09911	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.09973	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.10130	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.09659	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.09494	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.10501	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC8_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC7_1Tailed_R0

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

- ☒ Elevated Terrain
- ☐ No Stack-Tip Downwash (NOSTD)
- ☐ Run in Screening Mode
- ☐ Conversion of NOx to NO2 (OLM or PVMRM)
- ☐ No Checks for Non-Sequential Met Data
- ☐ Fast All Sources (FASTALL)
- ☐ Fast Area Sources (FASTAREA)
- ☐ Optimized Area Source Plume Depletion
- ☐ Gas Deposition

BETA Options:

- ☒ Capped and Horizontal Stack Releases
- ☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
- ☐ Low Wind Options

- ☐ SCIM (Sampled Chronological Input Model)
- ☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

- ☒ Concentration
- ☐ Total Deposition (Dry & Wet)
- ☐ Dry Deposition
- ☐ Wet Deposition

Plume Depletion

- ☐ Dry Removal
- ☐ Wet Removal

Output Warnings

- ☐ No Output Warnings
- ☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	1	2	3	4	6	8	12	24
	☐	☐	☐	☐	☐	☐	☐	☒

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	560.90	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	556.40	16.77	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	28.00	0.00009	323.50	24.90	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC7_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.76962	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	2/27/2020, 24
ANNUAL		0.81586	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.82277	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.83764	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.77402	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.80990	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.83497	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.37834	NOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	11/27/2020, 24
ANNUAL		0.04069	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.04105	NOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y2		0.04145	NOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y3		0.03938	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y4		0.03883	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y5		0.04326	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC7_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.55131	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.05970	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.06004	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.06035	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.05806	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.05739	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.06306	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC7_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.89208	NOGRAMS/M	561866.90	4821473.54	312.00	0.00	312.00	12/16/2020, 24
ANNUAL		0.16635	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y1		0.16402	NOGRAMS/M	561799.38	4821589.67	314.00	4.90	314.00	
ANNUAL Y2		0.17211	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.19124	NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y4		0.18555	NOGRAMS/M	561818.97	4821537.84	313.00	4.90	313.00	
ANNUAL Y5		0.16593	NOGRAMS/M	562284.35	4821498.39	311.00	0.00	311.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC7_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC7_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.61850	NOGRAMS/M	561873.73	4821466.95	312.00	0.00	312.00	12/16/2020, 24
ANNUAL		0.25153	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.25500	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.27109	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.26493	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y4		0.25807	NOGRAMS/M	561786.42	4821528.84	313.80	4.90	313.80	
ANNUAL Y5		0.26546	NOGRAMS/M	562244.35	4821618.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.92267	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.09911	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.09973	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.10130	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.09659	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.09494	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.10501	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC7_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

AERMOD

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC16_1Tailed_R0

Dispersion Options

☐ Regulatory Default   ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:
☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type
☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion
☐ Dry Removal
☐ Wet Removal

Output Warnings
☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 ☐ 8 ☐ 12 ☒ 24

☐ Month   ☐ Period   ☒ Annual

Exponential Decay

☐ Yes   ☒ No

Terrain Height Options

☐ Flat   ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes   ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	560.90	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	556.40	16.77	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	28.00	0.00009	391.40	22.84	0.45
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC16_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	4.85269	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	11/16/2020, 24
ANNUAL		1.05467	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		1.05881	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		1.09664	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.99071	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		1.04715	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		1.08002	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.37834	ANOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	11/27/2020, 24
ANNUAL		0.04069	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.04105	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y2		0.04145	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y3		0.03938	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y4		0.03883	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y5		0.04326	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC16_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.55131	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.05970	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.06004	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.06035	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.05806	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.05739	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.06306	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC16_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.72793	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	11/16/2020, 24
ANNUAL		0.36829	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.36286	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.41025	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.32928	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.36705	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.38151	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC16_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC16_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.27929	NOGRAMS/M	562184.35	4821638.39	313.00	0.00	313.00	1/3/2018, 24
ANNUAL		0.42442	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.41845	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.46418	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.38533	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.42229	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.43419	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.92267	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.09911	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.09973	NOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.10130	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.09659	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.09494	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.10501	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - VPCC16_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Control Pathway

AERMOD

Dispersion Options

Titles

OC Guelph Chromium (VI)
June Chromium (VI) - PCC4_1Tailed_R0

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

☒ Elevated Terrain
☐ No Stack-Tip Downwash (NOSTD)
☐ Run in Screening Mode
☐ Conversion of NOx to NO2 (OLM or PVMRM)
☐ No Checks for Non-Sequential Met Data
☐ Fast All Sources (FASTALL)
☐ Fast Area Sources (FASTAREA)
☐ Optimized Area Source Plume Depletion
☐ Gas Deposition

BETA Options:
☒ Capped and Horizontal Stack Releases
☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
☐ Low Wind Options

☐ SCIM (Sampled Chronological Input Model)
☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type
☒ Concentration
☐ Total Deposition (Dry & Wet)
☐ Dry Deposition
☐ Wet Deposition

Plume Depletion
☐ Dry Removal
☐ Wet Removal

Output Warnings
☐ No Output Warnings
☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - CRVI

Averaging Time Options

Hours	☐	☐	☐	☐	☐	☐	☐	☒
	1	2	3	4	6	8	12	24

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.00001	560.90	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.00002	556.40	16.77	0.33
POINT	B33	562055.21 General Ventilation above T107 Furnace	4821536.35	313.00	18.02	6.46E-6	315.40	11.79	1.41
POINT	B34	562039.70 General Exhaust Above T107A F/H	4821535.65	313.00	18.02	4.69E-6	315.40	11.29	1.41
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	28.00	0.00008	391.40	8.22	0.75
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	2.46E-6	315.40	11.05	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	2.46E-6	315.40	9.45	1.41

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - PCC4_1Tailed_R0

CRVI - Concentration - Source Group: ALL

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	5.85526	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		1.23677	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		1.24005	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		1.28949	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		1.15552	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		1.22853	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		1.27027	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B24

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.37834	ANOGRAMS/M	562244.35	4821638.39	312.00	0.00	312.00	11/27/2020, 24
ANNUAL		0.04069	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y1		0.04105	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y2		0.04145	ANOGRAMS/M	562184.35	4821598.39	312.77	0.00	312.77	
ANNUAL Y3		0.03938	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y4		0.03883	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y5		0.04326	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - PCC4_1Tailed_R0

CRVI - Concentration - Source Group: B25

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.55133	NOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.05970	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.06004	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y2		0.06036	NOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.05807	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.05739	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.06306	NOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

CRVI - Concentration - Source Group: B33

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.38033	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	7/17/2018, 24
ANNUAL		0.28347	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.28944	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.27912	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.27783	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.28404	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.28693	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - PCC4_1Tailed_R0

CRVI - Concentration - Source Group: B34

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	1.04097	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.18680	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.18637	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.19738	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.17219	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.18382	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.19475	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: B38

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.69634	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	1/27/2017, 24
ANNUAL		0.55739	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y1		0.55445	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y2		0.61950	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.49408	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.54843	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.58989	NOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - PCC4_1Tailed_R0

CRVI - Concentration - Source Group: C79

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.43233	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.07446	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.07600	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.07441	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.07119	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.07431	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.07640	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

CRVI - Concentration - Source Group: C80

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.47208	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	5/6/2017, 24
ANNUAL		0.08756	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y1		0.09153	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y2		0.08461	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y3		0.08803	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y4		0.08407	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	
ANNUAL Y5		0.08957	ANOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - PCC4_1Tailed_R0

CRVI - Concentration - Source Group: FUR&FOR

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	3.73221	ANOGRAMS/M	562184.35	4821638.39	313.00	0.00	313.00	1/3/2018, 24
ANNUAL		0.60915	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y1		0.60807	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y2		0.67343	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	
ANNUAL Y3		0.55014	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.60367	ANOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64208	ANOGRAMS/M	562070.91	4821533.11	313.00	0.00	313.00	

CRVI - Concentration - Source Group: FURNACE

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	0.92269	ANOGRAMS/M	562264.35	4821658.39	311.60	0.00	311.60	11/27/2020, 24
ANNUAL		0.09911	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y1		0.09973	ANOGRAMS/M	562204.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y2		0.10130	ANOGRAMS/M	562224.35	4821618.39	312.00	0.00	312.00	
ANNUAL Y3		0.09660	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y4		0.09494	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	
ANNUAL Y5		0.10501	ANOGRAMS/M	562224.35	4821638.39	312.00	0.00	312.00	

Results Summary

OC Guelph Chromium (VI)
June Chromium (VI) - PCC4_1Tailed_R0

CRVI - Concentration - Source Group: ROOFV

Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)	Peak Date, Start Hour
24-HR	1ST	2.75632	NOGRAMS/M	562064.35	4821518.39	312.36	0.00	312.36	10/17/2019, 24
ANNUAL		0.63024	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y1		0.64036	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y2		0.63479	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y3		0.60538	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y4		0.62486	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	
ANNUAL Y5		0.64583	NOGRAMS/M	562063.97	4821525.92	312.69	0.00	312.69	

APPENDIX P
Stage 1 – All Other Contaminants

Dispersion Factors

Source	1 hr	24 hr	10 min	30 min	Annual	30 day	Annual 1	Annual 2	Annual 3	Annual 4	Annual 5	1hr, 24hr & Annual File Name & Run Date
Emission Threshold Factor (Table B-1)	10000	4100	16500	12000	787	1600						
A06	236.618	58.662	390.420	283.942	6.662	22.878	6.616	6.391	6.662	6.429	6.302	ESDMR_DF_R0; 2025-2-6
A58	240.048	65.944	396.080	288.058	7.769	25.718	7.660	7.365	7.769	7.165	7.092	ESDMR_DF_R0; 2025-2-6
A61	439.251	272.101	724.764	527.101	46.837	106.119	46.713	43.643	45.232	46.837	45.886	ESDMR_DF_R0; 2025-2-6
A62_1	1,359.994	707.166	2,243.991	1,631.993	147.275	275.795	136.581	146.638	127.777	137.674	147.275	ESDMR_DF_R0; 2025-2-6
A62_2	1,393.827	695.207	2,299.814	1,672.592	149.502	271.131	138.619	149.502	129.798	141.740	149.148	ESDMR_DF_R0; 2025-2-6
B16	322.970	116.093	532.900	387.564	27.985	45.276	25.730	27.985	22.727	25.983	27.674	ESDMR_DF_R0; 2025-2-6
B24	64.145	32.371	105.839	76.974	3.701	12.625	3.513	3.547	3.369	3.323	3.701	ESDMR_DF_R0; 2025-2-6
B25	58.952	28.335	97.271	70.742	3.242	11.050	3.086	3.102	2.984	2.950	3.242	ESDMR_DF_R0; 2025-2-6
B33	369.301	214.626	609.346	443.161	45.123	83.704	45.123	43.469	43.248	44.172	44.707	ESDMR_DF_R0; 2025-2-6
B34	326.964	222.453	539.490	392.356	42.284	86.757	39.981	42.284	36.945	39.415	41.730	ESDMR_DF_R0; 2025-2-6
B38	95.485	44.137	157.550	114.582	7.401	17.213	6.625	7.401	5.904	6.553	7.047	ESDMR_DF_R0; 2025-2-6
B39	258.370	113.534	426.310	310.043	29.479	44.278	27.349	29.479	25.596	27.085	28.851	ESDMR_DF_R0; 2025-2-6
C100	969.095	405.270	1,599.007	1,162.914	104.034	158.055	98.857	101.855	95.673	100.383	104.034	ESDMR_DF_R0; 2025-2-6
C101	1,013.515	413.752	1,672.300	1,216.218	99.437	161.363	95.258	96.620	91.938	95.854	99.437	ESDMR_DF_R0; 2025-2-6
C60	964.381	269.928	1,591.228	1,157.257	42.811	105.272	42.213	40.193	40.535	42.811	42.734	ESDMR_DF_R0; 2025-2-6
C72	926.880	360.926	1,529.352	1,112.256	79.996	140.761	76.806	79.477	73.383	78.916	79.996	ESDMR_DF_R0; 2025-2-6
C73	833.322	250.825	1,374.982	999.987	53.042	97.822	50.273	50.574	48.687	51.271	53.042	ESDMR_DF_R0; 2025-2-6
C75	168.644	100.969	278.263	202.373	17.145	39.378	16.673	16.253	16.110	17.145	17.105	ESDMR_DF_R0; 2025-2-6
C79	321.300	176.168	530.145	385.560	31.213	68.706	31.032	30.408	29.106	30.393	31.213	ESDMR_DF_R0; 2025-2-6
C80	336.437	191.991	555.121	403.725	37.280	74.877	37.280	34.436	35.869	34.232	36.487	ESDMR_DF_R0; 2025-2-6
C99	974.987	374.666	1,608.728	1,169.984	68.321	146.120	66.685	67.767	65.120	67.331	68.321	ESDMR_DF_R0; 2025-2-6
G13	280.507	118.440	462.837	336.609	18.434	46.192	16.887	18.434	15.535	17.523	17.442	ESDMR_DF_R0; 2025-2-6
G90	4,253.684	1,148.076	7,018.579	5,104.421	257.600	447.750	245.208	254.311	237.345	249.917	257.600	ESDMR_DF_R0; 2025-2-6
G61	4,604.778	1,296.335	7,597.883	5,525.733	236.037	505.571	225.584	234.266	209.332	235.355	236.037	ESDMR_DF_R0; 2025-2-6
G63	4,736.184	1,328.829	7,814.704	5,683.421	238.759	518.243	228.513	237.095	211.964	238.261	238.759	ESDMR_DF_R0; 2025-2-6
C114	4,389.579	1,388.742	7,242.806	5,267.495	311.864	541.609	288.344	310.915	284.112	304.731	311.864	ESDMR_DF_R0; 2025-2-6
C115	3,972.563	1,270.540	6,554.729	4,767.076	306.396	495.510	283.660	304.105	277.874	300.188	306.396	ESDMR_DF_R0; 2025-2-6
C119	3,475.588	1,147.630	5,734.720	4,170.705	255.308	447.576	244.279	248.966	241.215	255.308	253.201	ESDMR_DF_R0; 2025-2-6
D64	1,203.858	436.994	1,986.365	1,444.629	67.762	170.428	64.735	61.036	67.762	63.548	55.533	ESDMR_DF_R0; 2025-2-6

Source Id	B24	B25
1-hr Dispersion Factor µg/m³ / g/s	64.15	58.95

1 hour Screening POI

Ingredient ID	Contaminant	CAS #	1 Hour Emission Rate (g/s)	1 hr Facility MAX GLC (µg/m³)	1 Hour POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?		
5	SULPHUR DIOXIDE	7446-09-05	6.15E-01	37.832	100	Schedule 3	Health & Vegetation	37.8%	Stage 1	Significant	19.714	18.118

Source Id	B16	B24
24-hr Dispersion Factor µg/m³ / g/s	116.09	32.37

24 hour Screening POI

Ingredient ID	Contaminant	CAS #	24 Hour Emission Rate (g/s)	Facility MAX GLC (µg/m³)	24 Hour POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?		
368	Chromium Compounds (Di-,Tri-,metallic)	7440-47-3	7.93E-05	0.008	0.5	Schedule 3	Health	1.6%	Stage 1	Significant		4.95E-04
423	HYDROGEN FLUORIDE -GASEOUS-GROWING SEASON GS	7664-39-3	6.41E-03	0.195	0.86	Schedule 3	Vegetation	22.6%	Stage 1	Significant		0.104
421	HYDROGEN CHLORIDE	7647-01-0	4.01E-03	0.122	20	Schedule 3	Health	0.6%	Stage 1	Significant		0.065
512	BENZOYL PEROXIDE	94-36-0	4.45E-03	0.842	25	Screening Level	Health	<Screening Level	Stage 1	Significant		
1367	MAGNESIUM NITRATE	10377-60-3	4.48E-03	0.569	2	Screening Level	Health	<Screening Level	Stage 1	Significant	0.172	
1708	5-Chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	1.19E-03	0.160	0.5	Screening Level	Health	<Screening Level	Stage 1	Significant	0.060	
7553	5-Chloro-2-methyl-2H-isothiazol-3-one	55965-84-9	3.45E-03	0.465	1.35	Screening Level	Health	<Screening Level	Stage 1	Significant	0.172	
1933	2-Methyl-4-Isothiazolin-3-one	2682-20-4	1.19E-03	0.160	0.5	Screening Level	Health	<Screening Level	Stage 1	Significant	0.060	
2159	Sodium acetate	127-09-3	1.20E-02	1.570	15	Screening Level	Health & Particulate	<Screening Level	Stage 1	Significant	0.629	
1706	3-(Triethoxysilyl)propylamine	919-30-2	1.95E-02	2.536	80	Screening Level	Health	<Screening Level	Stage 1	Significant	1.017	
7543	Benzenamine, N-[3-(trimethoxysilyl)propyl]-	3068-76-6	6.72E-03	0.875	1.114	FL/APOIC		<FL/APOIC	Stage 1	Significant	0.351	
3230	Diallyl Phthalate	131-17-9	4.77E-03	0.574	5	Screening Level	Health	<Screening Level	Stage 1	Significant		
3554	Dibromoacetonitrile	3252-43-5	1.45E-03	0.343	1.65	Screening Level	Health	<Screening Level	Stage 1	Significant		
3556	Sodium Bromide	7647-15-6	5.03E-02	5.116	120	Screening Level	Health & Particulate	<Screening Level	Stage 1	Significant		
1698	1-Propanol, 3-(trimethoxysilyl)-, methacrylate	2530-85-0	6.41E-04	0.065	0.5	Screening Level	Health	<Screening Level	Stage 1	Significant		
1808	Polyethylene glycol	25322-68-3	1.80E-02	1.822	40	Screening Level	Health	<Screening Level	Stage 1	Significant		
3555	2,2-dibromo-3-nitrilopropionamide	10222-01-2	6.01E-03	0.607	1	Screening Level	Health	<Screening Level	Stage 1	Significant		

24 hour Screening POI

			B25	B33	B34	B38	B39	C100	C101	C60	C72	C73	C75	C79	C80	C99
			28.33	214.63	222.45	44.14	113.53	405.27	413.75	269.93	360.93	250.83	100.97	176.17	191.99	374.67
Ingredient ID	Contaminant	CAS #														
368	Chromium Compounds (Di-,Tri-,metallic)	7440-47-3	0.001	0.001	0.004	4.06E-04								0.001	0.001	
423	HYDROGEN FLUORIDE -GASEOUS-GROWING SEASON GS	7664-39-3	0.091													
421	HYDROGEN CHLORIDE	7647-01-0	0.057													
512	BENZOYL PEROXIDE	94-36-0										0.656	0.186			
1367	MAGNESIUM NITRATE	10377-60-3					0.169			0.121			0.107			
1708	5-Chloro-2-methyl-4-isothiazolin-3-one	26172-55-4					0.059			0.041			0.001			
7553	5-Chloro-2-methyl-2H-isothiazol-3-one	55965-84-9					0.169			0.121			0.003			
1933	2-Methyl-4-Isothiazolin-3-one	2682-20-4					0.059			0.041			0.001			
2159	Sodium acetate	127-09-3					0.616			0.325						
1706	3-(Triethoxysilyl)propylamine	919-30-2					0.994			0.525						
7543	Benzenamine, N-[3-(trimethoxysilyl)propyl]-	3068-76-6					0.343			0.181						
3230	Diallyl Phthalate	131-17-9								0.148			0.426			
3554	Dibromoacetonitrile	3252-43-5						0.003	0.003	0.301	0.003		0.030			0.003
3556	Sodium Bromide	7647-15-6						0.015	0.015		0.013		5.060			0.013
1698	1-Propanol, 3-(trimethoxysilyl)-, methacrylate	2530-85-0											0.065			
1808	Polyethylene glycol	25322-68-3											1.822			
3555	2,2-dibromo-3-nitrilopropionamide	10222-01-2											0.607			

Source Id	B24	B25
30 Day Dispersion Factor µg/m³ / g/s	12.62	11.05

30 Day Screening POI

Ingredient ID	Contaminant	CAS #	30 Day Emission Rate (g/s)	Facility MAX GLC (µg/m³)	30 Day POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?		
423	HYDROGEN FLUORIDE -GASEOUS-GROWING SEASON GS	7664-39-3	6.41E-03	0.076	0.34	Schedule 3	Health	22.3%	Stage 1	Significant	0.040	0.035

Source Id	B24	B25
Annual Dispersion Factor µg/m³ / g/s	3.70	3.24

Annual Screening POI

Ingredient ID	Contaminant	CAS #	Annual Emission Rate (g/s)	Facility MAX GLC (µg/m³)	Annual POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?		
5	SULPHUR DIOXIDE	7446-09-05	6.15E-01	2.134	10	Schedule 3	Health & Vegetation	21.3%	Stage 1	Significant	1.138	0.996

Control Pathway

Dispersion Options

Titles

OC Guelph
March 2025 SSS ESDMR Dispersion Factors

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

- ☒ Elevated Terrain
- ☐ No Stack-Tip Downwash (NOSTD)
- ☐ Run in Screening Mode
- ☐ Conversion of NOx to NO2 (OLM or PVMRM)
- ☐ No Checks for Non-Sequential Met Data
- ☐ Fast All Sources (FASTALL)
- ☐ Fast Area Sources (FASTAREA)
- ☐ Optimized Area Source Plume Depletion
- ☐ Gas Deposition

BETA Options:

- ☒ Capped and Horizontal Stack Releases
- ☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
- ☐ Low Wind Options

- ☐ SCIM (Sampled Chronological Input Model)
- ☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

- ☒ Concentration
- ☐ Total Deposition (Dry & Wet)
- ☐ Dry Deposition
- ☐ Wet Deposition

Plume Depletion

- ☐ Dry Removal
- ☐ Wet Removal

Output Warnings

- ☐ No Output Warnings
- ☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - DF

Averaging Time Options

Hours	1	2	3	4	6	8	12	24
	☒	☐	☐	☐	☐	☐	☐	☒

☐ Month ☐ Period ☒ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	A06	562070.66	4821568.60	313.00	18.30	1.00000	298.00	10.21	2.97
		Cooling Tower #1							
POINT	A58	562065.14	4821562.94	313.00	18.30	1.00000	298.00	10.21	2.97
		Cooling Tower #4							
POINT	A61	562087.10	4821572.11	313.00	16.30	1.00000	639.00	26.14	0.20
		NG Generator #1 Exhaust							
POINT	A62_1	562042.61	4821513.26	312.15	15.24	1.00000	687.00	31.28	0.15
		Generac SG500 Natural Gas Generator Exhaust 1							
POINT	A62_2	562044.72	4821515.44	312.24	15.24	1.00000	687.00	31.28	0.15
		Generac SG500 Natural Gas Generator Exhaust 2							
POINT	B16	562027.68	4821535.89	313.00	17.47	1.00000	300.00	8.88	1.54
		107B Forming Scrap Tunnel Exhaust							
POINT	B24	562052.59	4821531.65	312.94	35.09	1.00000	561.00	18.09	0.33
		105 Furnace Stack (West)							
POINT	B25	562057.67	4821536.90	313.00	35.09	1.00000	556.00	16.77	0.33
		105 Furnace Stack (East)							
POINT	B33	562055.21	4821536.35	313.00	18.02	1.00000	315.00	11.78	1.41
		General Ventilation above T107 Furnace							
POINT	B34	562039.70	4821535.65	313.00	18.02	1.00000	315.00	11.27	1.41
		General Exhaust Above T107A F/H							
POINT	B38	562043.48	4821544.79	313.00	28.00	1.00000	391.00	8.22	0.75
		105 Forehearth Stack							
POINT	B39	562031.90	4821541.35	313.00	17.80	1.00000	300.00	13.74	1.14
		107A Forming Scrap Tunnel Exhaust							

Source Pathway - Source Inputs

AERMOD

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	C100	562030.95 CFM Forming Tunnel (South-West)	4821551.64	313.00	14.40	1.00000	298.00	2.68	1.06
POINT	C101	562036.05 CFM Forming Tunnel (South-East)	4821557.02	313.00	14.40	1.00000	298.00	2.68	1.06
POINT	C60	562071.97 Binder Circ. Tank Exhaust	4821582.38	313.11	22.80	1.00000	301.00	4.80	0.51
POINT	C72	562025.84 CFM Forming Tunnel (North-West)	4821557.04	313.03	14.40	1.00000	298.00	2.68	1.06
POINT	C73	562006.91 CFM Binder Cyclone	4821571.42	313.68	13.06	1.00000	294.00	10.70	0.50
POINT	C75	561985.43 CFM RTO - Oven	4821572.55	313.74	14.60	1.00000	518.00	38.90	0.60
POINT	C79	562023.15 General Exhaust West CFM F/H	4821559.58	313.12	11.50	1.00000	315.00	11.02	1.41
POINT	C80	562028.25 General Exhaust East CFM F/H	4821564.97	313.19	11.50	1.00000	315.00	9.48	1.41
POINT	C99	562030.88 CFM Forming Tunnel (North - East)	4821562.25	313.09	14.40	1.00000	298.00	2.68	1.06
POINT	G13	562170.00 NGF Tire Cord Line #1 RTO	4821714.00	313.75	18.00	1.00000	858.00	22.18	0.83
POINT	G90	562171.50 D/C Exhaust - Bad Batch Bin	4821671.40	313.00	5.80	1.00000	288.00	15.60	0.20
POINT	G61	562174.62 D/C Exhaust - Soda Ash Silo (Bin 18)	4821670.66	313.00	21.65	1.00000	288.00	15.59	0.14
POINT	G63	562175.57 D/C Exhaust - Salt Cake Silo (Bin 20)	4821669.84	313.00	21.65	1.00000	288.00	15.59	0.14

Source Pathway - Source Inputs

AERMOD

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	C114	562074.83 DI Boilers	4821589.58	313.30	8.72	1.00000	373.00	0.25	0.15
POINT	C115	562076.02 DI Boilers	4821590.77	313.30	8.72	1.00000	373.00	0.25	0.15
POINT	C119	562078.98 Binder Heater	4821594.01	313.28	9.33	1.00000	373.00	0.25	0.10

Volume Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Length of Side [m]	Building Height [m]	Initial Lateral Dim. [m]	Initial Vertical Dim. [m]
VOLUME	D64	562059.99 Filter Box Louvre Exhaust	4821662.42	314.00	12.05	1.00000	10.11		2.35	4.98

```
                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

** Model Options Selected:
     * Model Allows User-Specified Options
     * Model Is Setup For Calculation of Average CONCentration Values.
     * NO GAS DEPOSITION Data Provided.
     * NO PARTICLE DEPOSITION Data Provided.
     * Model Uses NO DRY DEPLETION. DDPLETE  =  F
     * Model Uses NO WET DEPLETION. WETDPLT  =  F
     * Stack-tip Downwash.
     * Model Accounts for ELEVated Terrain Effects.
     * Use Calms Processing Routine.
     * Use Missing Data Processing Routine.
     * No Exponential Decay.
     * Model Uses RURAL Dispersion Only.
     * Option for Capped & Horiz Stacks Selected With:
         3 Capped Stack(s); and         2 Horizontal Stack(s)
     * ADJ_U*   - Use ADJ_U* option for SBL in AERMET
     * CCVR_Sub - Meteorological data includes CCVR substitutions
     * TEMP_Sub - Meteorological data includes TEMP substitutions
     * Model Accepts FLAGPOLE Receptor . Heights.
     * The User Specified a Pollutant Type of: DF

**Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR
    and Calculates ANNUAL Averages

**This Run Includes:     29 Source(s);      30 Source Group(s); and    2640 Receptor(s)

               with:     28 POINT(s), including
                          3 POINTCAP(s) and      2 POINTHOR(s)
                and:      1 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 RLINE/RLINEXT source(s)
                and:      0 OPENPIT source(s)
                and:      0 BUOYANT LINE source(s) with a total of     0 line(s)
                and:      0 SWPOINT source(s)


**Model Set To Continue RUNning After the Setup Testing.
```

```
**The AERMET Input Meteorological Data Version Date:  22112

**Output Options Selected:
         Model Outputs Tables of ANNUAL Averages by Receptor
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)
         Model Outputs External File(s) of Concurrent Values for Postprocessing (POSTFILE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   325.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                 Emission Units = GRAMS/S                                 ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =     14.0 MB of RAM.

**Input Runstream File:          aermod.inp

**Output Print File:             aermod.out


**File for Summary of Results:   ESDMR_DF_R0.sum

↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                        ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR Dispersion Factors                          ***        13:06:44
                                                                                                                    PAGE   2
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                            *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                               (1=YES; 0=NO)

          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
          1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1

              NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.
```

```
                                    *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                          (METERS/SEC)

                                               1.54,   3.09,   5.14,   8.23,  10.80,
```

```
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                     *** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

   Surface file:   E:\_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC           Met Version:  22112
   Profile file:   E:\_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL
   Surface format: FREE
   Profile format: FREE
   Surface station no.:    61430                  Upper air station no.:    14733
                Name: UNKNOWN                                     Name: BUFFALO/GREATER_BUFFALO_INT'L
                Year:   2016                                      Year:   2016

 First 24 hours of scalar data
 YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS   WD     HT  REF TA     HT
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 16 01 01   1 01  -64.0  0.640 -9.000 -9.000 -999. 1230.    451.0  0.37   0.49   1.00    5.10  251.   10.0  271.4    2.0
 16 01 01   1 02  -64.0  0.640 -9.000 -9.000 -999. 1230.    451.0  0.37   0.49   1.00    5.10  248.   10.0  270.9    2.0
 16 01 01   1 03  -58.4  0.579 -9.000 -9.000 -999. 1063.    368.8  0.37   0.49   1.00    4.60  254.   10.0  270.9    2.0
 16 01 01   1 04  -64.0  0.723 -9.000 -9.000 -999. 1472.    575.1  0.37   0.49   1.00    5.70  253.   10.0  270.9    2.0
 16 01 01   1 05  -58.5  0.579 -9.000 -9.000 -999. 1082.    368.8  0.37   0.49   1.00    4.60  243.   10.0  270.3    2.0
 16 01 01   1 06  -58.5  0.579 -9.000 -9.000 -999. 1058.    368.8  0.37   0.49   1.00    4.60  242.   10.0  270.3    2.0
 16 01 01   1 07  -51.9  0.514 -9.000 -9.000 -999.  888.    290.1  0.37   0.49   1.00    4.10  245.   10.0  270.3    2.0
 16 01 01   1 08  -54.2  0.535 -9.000 -9.000 -999.  938.    314.5  0.30   0.49   1.00    4.60  283.   10.0  269.2    2.0
 16 01 01   1 09  -62.3  0.645 -9.000 -9.000 -999. 1242.    458.0  0.37   0.49   0.78    5.10  257.   10.0  269.8    2.0
 16 01 01   1 10  -15.3  0.547 -9.000 -9.000 -999.  982.    929.6  0.30   0.49   0.62    4.60  271.   10.0  269.2    2.0
 16 01 01   1 11    4.5  0.622  0.333  0.005  283. 1176.  -4620.6  0.37   0.49   0.55    5.10  264.   10.0  268.8    2.0
 16 01 01   1 12    9.0  0.564  0.468  0.005  396. 1021.  -1737.7  0.37   0.49   0.53    4.60  246.   10.0  268.8    2.0
 16 01 01   1 13   16.4  0.566  0.636  0.005  545. 1023.   -962.9  0.37   0.49   0.53    4.60  253.   10.0  268.8    2.0
 16 01 01   1 14   13.8  0.625  0.614  0.005  582. 1185.  -1540.1  0.37   0.49   0.53    5.10  259.   10.0  268.8    2.0
 16 01 01   1 15    7.0  0.474  0.493  0.006  592.  805.  -1314.3  0.30   0.49   0.56    4.10  272.   10.0  269.2    2.0
 16 01 01   1 16  -14.2  0.486 -9.000 -9.000 -999.  812.    703.5  0.30   0.49   0.64    4.10  274.   10.0  268.8    2.0
 16 01 01   1 17  -46.1  0.475 -9.000 -9.000 -999.  785.    247.8  0.30   0.49   0.83    4.10  271.   10.0  268.8    2.0
 16 01 01   1 18  -52.2  0.513 -9.000 -9.000 -999.  882.    290.0  0.37   0.49   1.00    4.10  257.   10.0  268.8    2.0
 16 01 01   1 19  -48.2  0.474 -9.000 -9.000 -999.  786.    247.4  0.30   0.49   1.00    4.10  274.   10.0  268.8    2.0
 16 01 01   1 20  -39.0  0.384 -9.000 -9.000 -999.  577.    161.9  0.37   0.49   1.00    3.10  257.   10.0  268.8    2.0
 16 01 01   1 21  -36.0  0.354 -9.000 -9.000 -999.  507.    138.2  0.30   0.49   1.00    3.10  280.   10.0  268.8    2.0
```

```
 16 01 01   1 22  -48.2  0.474 -9.000 -9.000 -999.  783.    247.4  0.30   0.49   1.00    4.10  272.   10.0  268.8    2.0
 16 01 01   1 23  -52.3  0.513 -9.000 -9.000 -999.  882.    289.9  0.37   0.49   1.00    4.10  250.   10.0  268.1    2.0
 16 01 01   1 24  -36.0  0.354 -9.000 -9.000 -999.  527.    138.2  0.30   0.49   1.00    3.10  280.   10.0  268.8    2.0


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 16 01 01 01   10.0 1  251.    5.10   271.5   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                         ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR Dispersion Factors                          ***        13:06:44
                                                                                                                    PAGE   4
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                   *** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER   5 YEARS ***


                                    ** CONC OF DF       IN MICROGRAMS/M**3                         **

                                                                                                              NETWORK
GROUP ID                       AVERAGE CONC               RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


A06       1ST HIGHEST VALUE IS       6.43708 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          2ND HIGHEST VALUE IS       6.42762 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS       5.82973 AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC
          4TH HIGHEST VALUE IS       5.80349 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
          5TH HIGHEST VALUE IS       5.42727 AT (  562104.35,  4821518.39,   312.00,   312.00,    0.00)  DC
          6TH HIGHEST VALUE IS       5.19197 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          7TH HIGHEST VALUE IS       5.17792 AT (  562077.84,  4821540.29,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS       4.89432 AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS       4.17595 AT (  562104.35,  4821498.39,   312.00,   312.00,    0.00)  DC
         10TH HIGHEST VALUE IS       3.93751 AT (  562084.35,  4821498.39,   312.00,   312.00,    0.00)  DC

A58       1ST HIGHEST VALUE IS       7.41030 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          2ND HIGHEST VALUE IS       7.03990 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS       6.82744 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
          4TH HIGHEST VALUE IS       6.29593 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          5TH HIGHEST VALUE IS       6.02983 AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC
          6TH HIGHEST VALUE IS       5.43567 AT (  562077.84,  4821540.29,   313.00,   313.00,    0.00)  DC
          7TH HIGHEST VALUE IS       5.38573 AT (  562104.35,  4821518.39,   312.00,   312.00,    0.00)  DC
          8TH HIGHEST VALUE IS       5.14345 AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS       4.28096 AT (  562050.10,  4821511.55,   312.07,   312.07,    0.00)  DC
         10TH HIGHEST VALUE IS       4.21064 AT (  562084.35,  4821498.39,   312.00,   312.00,    0.00)  DC
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A61       1ST HIGHEST VALUE IS      45.66208 AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC
          2ND HIGHEST VALUE IS      42.03622 AT (  562098.65,  4821561.84,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS      41.35165 AT (  562104.35,  4821558.39,   313.00,   313.00,    0.00)  DC
          4TH HIGHEST VALUE IS      40.28858 AT (  562124.35,  4821558.39,   312.78,   312.78,    0.00)  DC
          5TH HIGHEST VALUE IS      33.19075 AT (  562112.52,  4821576.21,   313.00,   313.00,    0.00)  DC
          6TH HIGHEST VALUE IS      32.97452 AT (  562144.35,  4821538.39,   312.00,   312.00,    0.00)  DC
          7TH HIGHEST VALUE IS      31.60680 AT (  562124.35,  4821538.39,   312.16,   312.16,    0.00)  DC
          8TH HIGHEST VALUE IS      30.75487 AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC
          9TH HIGHEST VALUE IS      29.06487 AT (  562144.35,  4821558.39,   312.06,   312.06,    0.00)  DC
         10TH HIGHEST VALUE IS      22.50697 AT (  562104.35,  4821538.39,   312.21,   312.21,    0.00)  DC

A62_1     1ST HIGHEST VALUE IS     139.18897 AT (  562050.10,  4821511.55,   312.07,   312.07,    0.00)  DC
          2ND HIGHEST VALUE IS     117.03683 AT (  562056.81,  4821505.08,   312.00,   312.00,    0.00)  DC
          3RD HIGHEST VALUE IS      99.16790 AT (  562063.51,  4821498.60,   312.00,   312.00,    0.00)  DC
          4TH HIGHEST VALUE IS      97.04212 AT (  562064.35,  4821498.39,   312.00,   312.00,    0.00)  DC
          5TH HIGHEST VALUE IS      91.16148 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          6TH HIGHEST VALUE IS      84.01349 AT (  562070.22,  4821492.13,   312.00,   312.00,    0.00)  DC
          7TH HIGHEST VALUE IS      71.71952 AT (  562076.93,  4821485.66,   312.00,   312.00,    0.00)  DC
          8TH HIGHEST VALUE IS      71.08784 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          9TH HIGHEST VALUE IS      69.62649 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
         10TH HIGHEST VALUE IS      61.95497 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                          ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR Dispersion Factors                            ***        13:06:44
                                                                                                                     PAGE   5
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                   *** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER   5 YEARS ***


                                    ** CONC OF DF       IN MICROGRAMS/M**3                         **

                                                                                                          NETWORK
GROUP ID                       AVERAGE CONC              RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

A62_2     1ST HIGHEST VALUE IS     141.76148 AT (  562050.10,  4821511.55,   312.07,   312.07,    0.00)  DC
          2ND HIGHEST VALUE IS     125.49194 AT (  562056.81,  4821505.08,   312.00,   312.00,    0.00)  DC
          3RD HIGHEST VALUE IS     110.71515 AT (  562063.51,  4821498.60,   312.00,   312.00,    0.00)  DC
          4TH HIGHEST VALUE IS     108.68012 AT (  562064.35,  4821498.39,   312.00,   312.00,    0.00)  DC
          5TH HIGHEST VALUE IS      95.47197 AT (  562070.22,  4821492.13,   312.00,   312.00,    0.00)  DC
          6TH HIGHEST VALUE IS      88.86424 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          7TH HIGHEST VALUE IS      80.97761 AT (  562076.93,  4821485.66,   312.00,   312.00,    0.00)  DC
          8TH HIGHEST VALUE IS      68.65170 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
          9TH HIGHEST VALUE IS      67.09629 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
         10TH HIGHEST VALUE IS      62.98979 AT (  562084.35,  4821498.39,   312.00,   312.00,    0.00)  DC
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B16       1ST HIGHEST VALUE IS      26.01990 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
          2ND HIGHEST VALUE IS      24.40970 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          3RD HIGHEST VALUE IS      21.86607 AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC
          4TH HIGHEST VALUE IS      20.71390 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
          5TH HIGHEST VALUE IS      19.87778 AT (  562077.84,  4821540.29,   313.00,   313.00,    0.00)  DC
          6TH HIGHEST VALUE IS      19.20783 AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC
          7TH HIGHEST VALUE IS      17.47414 AT (  562104.35,  4821518.39,   312.00,   312.00,    0.00)  DC
          8TH HIGHEST VALUE IS      16.65386 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          9TH HIGHEST VALUE IS      14.45639 AT (  562084.78,  4821547.47,   313.00,   313.00,    0.00)  DC
         10TH HIGHEST VALUE IS      14.44758 AT (  562104.35,  4821538.39,   312.21,   312.21,    0.00)  DC

B24       1ST HIGHEST VALUE IS       3.48174 AT (  562204.35,  4821618.39,   312.00,   312.00,    0.00)  DC
          2ND HIGHEST VALUE IS       3.47564 AT (  562184.35,  4821598.39,   312.77,   312.77,    0.00)  DC
          3RD HIGHEST VALUE IS       3.42965 AT (  562224.35,  4821618.39,   312.00,   312.00,    0.00)  DC
          4TH HIGHEST VALUE IS       3.42696 AT (  562184.35,  4821618.39,   313.00,   313.00,    0.00)  DC
          5TH HIGHEST VALUE IS       3.37159 AT (  562224.35,  4821638.39,   312.00,   312.00,    0.00)  DC
          6TH HIGHEST VALUE IS       3.34042 AT (  562204.35,  4821598.39,   312.00,   312.00,    0.00)  DC
          7TH HIGHEST VALUE IS       3.33780 AT (  562244.35,  4821638.39,   312.00,   312.00,    0.00)  DC
          8TH HIGHEST VALUE IS       3.29430 AT (  562164.35,  4821598.39,   312.86,   312.86,    0.00)  DC
          9TH HIGHEST VALUE IS       3.28309 AT (  562204.35,  4821638.39,   312.48,   312.48,    0.00)  DC
         10TH HIGHEST VALUE IS       3.26450 AT (  562244.35,  4821618.39,   312.00,   312.00,    0.00)  DC

B25       1ST HIGHEST VALUE IS       3.06870 AT (  562224.35,  4821638.39,   312.00,   312.00,    0.00)  DC
          2ND HIGHEST VALUE IS       3.05856 AT (  562244.35,  4821638.39,   312.00,   312.00,    0.00)  DC
          3RD HIGHEST VALUE IS       3.01878 AT (  562224.35,  4821618.39,   312.00,   312.00,    0.00)  DC
          4TH HIGHEST VALUE IS       3.01482 AT (  562244.35,  4821658.39,   312.00,   312.00,    0.00)  DC
          5TH HIGHEST VALUE IS       2.99431 AT (  562204.35,  4821618.39,   312.00,   312.00,    0.00)  DC
          6TH HIGHEST VALUE IS       2.96236 AT (  562204.35,  4821638.39,   312.48,   312.48,    0.00)  DC
          7TH HIGHEST VALUE IS       2.96155 AT (  562264.35,  4821658.39,   311.60,   311.60,    0.00)  DC
          8TH HIGHEST VALUE IS       2.93096 AT (  562244.35,  4821618.39,   312.00,   312.00,    0.00)  DC
          9TH HIGHEST VALUE IS       2.90091 AT (  562264.35,  4821638.39,   311.41,   311.41,    0.00)  DC
         10TH HIGHEST VALUE IS       2.89589 AT (  562184.35,  4821618.39,   313.00,   313.00,    0.00)  DC
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                            ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR Dispersion Factors                               ***        13:06:44
                                                                                                                       PAGE   6
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                   *** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER   5 YEARS ***


                                    ** CONC OF DF       IN MICROGRAMS/M**3                        **

                                                                                                             NETWORK
GROUP ID                       AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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B33       1ST HIGHEST VALUE IS      44.14382 AT (  562063.97,  4821525.92,    312.69,    312.69,     0.00)  DC
          2ND HIGHEST VALUE IS      42.30121 AT (  562064.35,  4821518.39,    312.36,    312.36,     0.00)  DC
          3RD HIGHEST VALUE IS      37.45078 AT (  562057.04,  4821518.74,    312.38,    312.38,     0.00)  DC
          4TH HIGHEST VALUE IS      33.11001 AT (  562070.91,  4821533.11,    313.00,    313.00,     0.00)  DC
          5TH HIGHEST VALUE IS      32.22440 AT (  562084.35,  4821518.39,    312.35,    312.35,     0.00)  DC
          6TH HIGHEST VALUE IS      22.36058 AT (  562084.35,  4821498.39,    312.00,    312.00,     0.00)  DC
          7TH HIGHEST VALUE IS      22.23781 AT (  562050.10,  4821511.55,    312.07,    312.07,     0.00)  DC
          8TH HIGHEST VALUE IS      19.20594 AT (  562104.35,  4821518.39,    312.00,    312.00,     0.00)  DC
          9TH HIGHEST VALUE IS      16.99134 AT (  562056.81,  4821505.08,    312.00,    312.00,     0.00)  DC
         10TH HIGHEST VALUE IS      15.98708 AT (  562104.35,  4821498.39,    312.00,    312.00,     0.00)  DC

B34       1ST HIGHEST VALUE IS      40.05142 AT (  562063.97,  4821525.92,    312.69,    312.69,     0.00)  DC
          2ND HIGHEST VALUE IS      39.05943 AT (  562070.91,  4821533.11,    313.00,    313.00,     0.00)  DC
          3RD HIGHEST VALUE IS      34.21291 AT (  562064.35,  4821518.39,    312.36,    312.36,     0.00)  DC
          4TH HIGHEST VALUE IS      31.14761 AT (  562084.35,  4821518.39,    312.35,    312.35,     0.00)  DC
          5TH HIGHEST VALUE IS      28.73615 AT (  562057.04,  4821518.74,    312.38,    312.38,     0.00)  DC
          6TH HIGHEST VALUE IS      26.21592 AT (  562084.35,  4821538.39,    313.00,    313.00,     0.00)  DC
          7TH HIGHEST VALUE IS      24.74965 AT (  562077.84,  4821540.29,    313.00,    313.00,     0.00)  DC
          8TH HIGHEST VALUE IS      21.76782 AT (  562104.35,  4821518.39,    312.00,    312.00,     0.00)  DC
          9TH HIGHEST VALUE IS      19.42578 AT (  562104.35,  4821538.39,    312.21,    312.21,     0.00)  DC
         10TH HIGHEST VALUE IS      16.03153 AT (  562050.10,  4821511.55,    312.07,    312.07,     0.00)  DC

B38       1ST HIGHEST VALUE IS       6.65955 AT (  562070.91,  4821533.11,    313.00,    313.00,     0.00)  DC
          2ND HIGHEST VALUE IS       6.57620 AT (  562063.97,  4821525.92,    312.69,    312.69,     0.00)  DC
          3RD HIGHEST VALUE IS       5.48342 AT (  562064.35,  4821518.39,    312.36,    312.36,     0.00)  DC
          4TH HIGHEST VALUE IS       5.20088 AT (  562084.35,  4821538.39,    313.00,    313.00,     0.00)  DC
          5TH HIGHEST VALUE IS       5.10204 AT (  562057.04,  4821518.74,    312.38,    312.38,     0.00)  DC
          6TH HIGHEST VALUE IS       5.09099 AT (  562077.84,  4821540.29,    313.00,    313.00,     0.00)  DC
          7TH HIGHEST VALUE IS       4.70561 AT (  562084.35,  4821518.39,    312.35,    312.35,     0.00)  DC
          8TH HIGHEST VALUE IS       4.20073 AT (  562104.35,  4821538.39,    312.21,    312.21,     0.00)  DC
          9TH HIGHEST VALUE IS       3.64174 AT (  562084.78,  4821547.47,    313.00,    313.00,     0.00)  DC
         10TH HIGHEST VALUE IS       3.58320 AT (  562050.10,  4821511.55,    312.07,    312.07,     0.00)  DC

B39       1ST HIGHEST VALUE IS      27.52301 AT (  562063.97,  4821525.92,    312.69,    312.69,     0.00)  DC
          2ND HIGHEST VALUE IS      27.28216 AT (  562070.91,  4821533.11,    313.00,    313.00,     0.00)  DC
          3RD HIGHEST VALUE IS      23.50373 AT (  562064.35,  4821518.39,    312.36,    312.36,     0.00)  DC
          4TH HIGHEST VALUE IS      21.76605 AT (  562084.35,  4821518.39,    312.35,    312.35,     0.00)  DC
          5TH HIGHEST VALUE IS      19.83287 AT (  562077.84,  4821540.29,    313.00,    313.00,     0.00)  DC
          6TH HIGHEST VALUE IS      19.66800 AT (  562057.04,  4821518.74,    312.38,    312.38,     0.00)  DC
          7TH HIGHEST VALUE IS      18.95679 AT (  562084.35,  4821538.39,    313.00,    313.00,     0.00)  DC
          8TH HIGHEST VALUE IS      15.29812 AT (  562104.35,  4821518.39,    312.00,    312.00,     0.00)  DC
          9TH HIGHEST VALUE IS      14.59536 AT (  562084.78,  4821547.47,    313.00,    313.00,     0.00)  DC
         10TH HIGHEST VALUE IS      14.25426 AT (  562091.71,  4821554.66,    312.98,    312.98,     0.00)  DC
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 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                  *** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER   5 YEARS ***


                                   ** CONC OF DF       IN MICROGRAMS/M**3                         **

                                                                                                            NETWORK
GROUP ID                      AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


C100      1ST HIGHEST VALUE IS     100.16051 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          2ND HIGHEST VALUE IS      93.57568 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS      83.21570 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
          4TH HIGHEST VALUE IS      76.63410 AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC
          5TH HIGHEST VALUE IS      73.63383 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          6TH HIGHEST VALUE IS      67.98920 AT (  562077.84,  4821540.29,   313.00,   313.00,    0.00)  DC
          7TH HIGHEST VALUE IS      61.35850 AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS      52.86853 AT (  562104.35,  4821518.39,   312.00,   312.00,    0.00)  DC
          9TH HIGHEST VALUE IS      52.26702 AT (  562084.78,  4821547.47,   313.00,   313.00,    0.00)  DC
         10TH HIGHEST VALUE IS      46.16355 AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC

C101      1ST HIGHEST VALUE IS      95.82143 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          2ND HIGHEST VALUE IS      88.00705 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS      83.96525 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
          4TH HIGHEST VALUE IS      74.38732 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          5TH HIGHEST VALUE IS      70.40931 AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC
          6TH HIGHEST VALUE IS      65.38864 AT (  562077.84,  4821540.29,   313.00,   313.00,    0.00)  DC
          7TH HIGHEST VALUE IS      59.21036 AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS      53.62965 AT (  562084.78,  4821547.47,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS      48.75324 AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC
         10TH HIGHEST VALUE IS      46.75339 AT (  562104.35,  4821558.39,   313.00,   313.00,    0.00)  DC

C114      1ST HIGHEST VALUE IS     299.32870 AT (  562112.52,  4821576.21,   313.00,   313.00,    0.00)  DC
          2ND HIGHEST VALUE IS     297.72387 AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS     223.32120 AT (  562098.65,  4821561.84,   313.00,   313.00,    0.00)  DC
          4TH HIGHEST VALUE IS     211.08315 AT (  562119.46,  4821583.40,   313.00,   313.00,    0.00)  DC
          5TH HIGHEST VALUE IS     187.64323 AT (  562104.35,  4821558.39,   313.00,   313.00,    0.00)  DC
          6TH HIGHEST VALUE IS     187.32371 AT (  562124.35,  4821578.39,   312.98,   312.98,    0.00)  DC
          7TH HIGHEST VALUE IS     172.25885 AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC
          8TH HIGHEST VALUE IS     158.89001 AT (  562124.35,  4821558.39,   312.78,   312.78,    0.00)  DC
          9TH HIGHEST VALUE IS     155.20612 AT (  562126.39,  4821590.58,   313.00,   313.00,    0.00)  DC
         10TH HIGHEST VALUE IS     127.29176 AT (  562084.78,  4821547.47,   313.00,   313.00,    0.00)  DC

C115      1ST HIGHEST VALUE IS     294.44469 AT (  562112.52,  4821576.21,   313.00,   313.00,    0.00)  DC
          2ND HIGHEST VALUE IS     287.75478 AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC
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          3RD HIGHEST VALUE IS     220.93550 AT (  562119.46,  4821583.40,   313.00,   313.00,    0.00)  DC
          4TH HIGHEST VALUE IS     212.29302 AT (  562098.65,  4821561.84,   313.00,   313.00,    0.00)  DC
          5TH HIGHEST VALUE IS     193.87668 AT (  562124.35,  4821578.39,   312.98,   312.98,    0.00)  DC
          6TH HIGHEST VALUE IS     177.09176 AT (  562104.35,  4821558.39,   313.00,   313.00,    0.00)  DC
          7TH HIGHEST VALUE IS     172.64214 AT (  562126.39,  4821590.58,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS     159.02105 AT (  562124.35,  4821558.39,   312.78,   312.78,    0.00)  DC
          9TH HIGHEST VALUE IS     155.91760 AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC
         10TH HIGHEST VALUE IS     144.10656 AT (  562133.33,  4821597.76,   313.00,   313.00,    0.00)  DC
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 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                   *** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER   5 YEARS ***


                                    ** CONC OF DF       IN MICROGRAMS/M**3                         **

                                                                                                              NETWORK
GROUP ID                        AVERAGE CONC               RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -


C119      1ST HIGHEST VALUE IS     248.59368 AT (  562112.52,  4821576.21,   313.00,   313.00,    0.00)  DC
          2ND HIGHEST VALUE IS     239.43744 AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS     220.02662 AT (  562119.46,  4821583.40,   313.00,   313.00,    0.00)  DC
          4TH HIGHEST VALUE IS     195.82698 AT (  562124.35,  4821578.39,   312.98,   312.98,    0.00)  DC
          5TH HIGHEST VALUE IS     189.88817 AT (  562126.39,  4821590.58,   313.00,   313.00,    0.00)  DC
          6TH HIGHEST VALUE IS     186.33513 AT (  562098.65,  4821561.84,   313.00,   313.00,    0.00)  DC
          7TH HIGHEST VALUE IS     164.91345 AT (  562133.33,  4821597.76,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS     158.28535 AT (  562104.35,  4821558.39,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS     153.14769 AT (  562124.35,  4821558.39,   312.78,   312.78,    0.00)  DC
         10TH HIGHEST VALUE IS     144.15373 AT (  562140.26,  4821604.95,   313.00,   313.00,    0.00)  DC

C60       1ST HIGHEST VALUE IS      41.69732 AT (  562098.65,  4821561.84,   313.00,   313.00,    0.00)  DC
          2ND HIGHEST VALUE IS      40.11393 AT (  562104.35,  4821558.39,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS      39.49529 AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC
          4TH HIGHEST VALUE IS      37.38687 AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC
          5TH HIGHEST VALUE IS      33.90886 AT (  562112.52,  4821576.21,   313.00,   313.00,    0.00)  DC
          6TH HIGHEST VALUE IS      33.24984 AT (  562124.35,  4821558.39,   312.78,   312.78,    0.00)  DC
          7TH HIGHEST VALUE IS      28.62441 AT (  562119.46,  4821583.40,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS      28.02285 AT (  562124.35,  4821578.39,   312.98,   312.98,    0.00)  DC
          9TH HIGHEST VALUE IS      27.98319 AT (  562124.35,  4821538.39,   312.16,   312.16,    0.00)  DC
         10TH HIGHEST VALUE IS      27.72720 AT (  562104.35,  4821538.39,   312.21,   312.21,    0.00)  DC

C72       1ST HIGHEST VALUE IS      77.71568 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          2ND HIGHEST VALUE IS      70.67494 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
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          3RD HIGHEST VALUE IS      70.61860 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
          4TH HIGHEST VALUE IS      65.09787 AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC
          5TH HIGHEST VALUE IS      57.92136 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          6TH HIGHEST VALUE IS      47.79088 AT (  562077.84,  4821540.29,   313.00,   313.00,    0.00)  DC
          7TH HIGHEST VALUE IS      44.52360 AT (  562104.35,  4821518.39,   312.00,   312.00,    0.00)  DC
          8TH HIGHEST VALUE IS      44.19799 AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS      38.73760 AT (  562084.35,  4821498.39,   312.00,   312.00,    0.00)  DC
         10TH HIGHEST VALUE IS      35.79787 AT (  562084.78,  4821547.47,   313.00,   313.00,    0.00)  DC

C73       1ST HIGHEST VALUE IS      50.76942 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          2ND HIGHEST VALUE IS      49.02829 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS      45.46513 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          4TH HIGHEST VALUE IS      43.79291 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
          5TH HIGHEST VALUE IS      37.62050 AT (  562077.84,  4821540.29,   313.00,   313.00,    0.00)  DC
          6TH HIGHEST VALUE IS      37.47996 AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC
          7TH HIGHEST VALUE IS      37.46936 AT (  562050.10,  4821511.55,   312.07,   312.07,    0.00)  DC
          8TH HIGHEST VALUE IS      34.41659 AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS      32.18301 AT (  562056.81,  4821505.08,   312.00,   312.00,    0.00)  DC
         10TH HIGHEST VALUE IS      31.35920 AT (  562084.35,  4821498.39,   312.00,   312.00,    0.00)  DC
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 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                   *** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER   5 YEARS ***


                                    ** CONC OF DF       IN MICROGRAMS/M**3                         **

                                                                                                      NETWORK
GROUP ID                       AVERAGE CONC               RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

C75       1ST HIGHEST VALUE IS      16.63320 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          2ND HIGHEST VALUE IS      16.37930 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS      15.61046 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          4TH HIGHEST VALUE IS      14.02191 AT (  562050.10,  4821511.55,   312.07,   312.07,    0.00)  DC
          5TH HIGHEST VALUE IS      13.94846 AT (  562077.84,  4821540.29,   313.00,   313.00,    0.00)  DC
          6TH HIGHEST VALUE IS      13.40677 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
          7TH HIGHEST VALUE IS       9.74697 AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS       9.65250 AT (  562084.78,  4821547.47,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS       9.60941 AT (  562056.81,  4821505.08,   312.00,   312.00,    0.00)  DC
         10TH HIGHEST VALUE IS       8.86185 AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC

C79       1ST HIGHEST VALUE IS      30.43038 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          2ND HIGHEST VALUE IS      28.87599 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
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          3RD HIGHEST VALUE IS      27.52259 AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC
          4TH HIGHEST VALUE IS      27.31432 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
          5TH HIGHEST VALUE IS      21.93222 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          6TH HIGHEST VALUE IS      19.14065 AT (  562104.35,  4821518.39,   312.00,   312.00,    0.00)  DC
          7TH HIGHEST VALUE IS      16.86726 AT (  562077.84,  4821540.29,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS      16.61144 AT (  562084.35,  4821498.39,   312.00,   312.00,    0.00)  DC
          9TH HIGHEST VALUE IS      15.96809 AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC
         10TH HIGHEST VALUE IS      15.19085 AT (  562104.35,  4821498.39,   312.00,   312.00,    0.00)  DC

C80       1ST HIGHEST VALUE IS      35.66078 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
          2ND HIGHEST VALUE IS      34.82224 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          3RD HIGHEST VALUE IS      29.32147 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          4TH HIGHEST VALUE IS      28.88523 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
          5TH HIGHEST VALUE IS      27.58802 AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC
          6TH HIGHEST VALUE IS      21.05341 AT (  562084.35,  4821498.39,   312.00,   312.00,    0.00)  DC
          7TH HIGHEST VALUE IS      17.96650 AT (  562077.84,  4821540.29,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS      17.61154 AT (  562104.35,  4821518.39,   312.00,   312.00,    0.00)  DC
          9TH HIGHEST VALUE IS      16.80186 AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC
         10TH HIGHEST VALUE IS      16.59197 AT (  562050.10,  4821511.55,   312.07,   312.07,    0.00)  DC

C99       1ST HIGHEST VALUE IS      67.04479 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          2ND HIGHEST VALUE IS      65.05277 AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
          3RD HIGHEST VALUE IS      56.09686 AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC
          4TH HIGHEST VALUE IS      54.28716 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
          5TH HIGHEST VALUE IS      52.76253 AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC
          6TH HIGHEST VALUE IS      41.53846 AT (  562084.35,  4821498.39,   312.00,   312.00,    0.00)  DC
          7TH HIGHEST VALUE IS      33.69832 AT (  562104.35,  4821518.39,   312.00,   312.00,    0.00)  DC
          8TH HIGHEST VALUE IS      32.45897 AT (  562077.84,  4821540.29,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS      32.02462 AT (  562050.10,  4821511.55,   312.07,   312.07,    0.00)  DC
         10TH HIGHEST VALUE IS      31.54100 AT (  562104.35,  4821498.39,   312.00,   312.00,    0.00)  DC
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                         ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR Dispersion Factors                           ***        13:06:44
                                                                                                                    PAGE  10
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                   *** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER   5 YEARS ***


                                    ** CONC OF DF       IN MICROGRAMS/M**3                         **

                                                                                                          NETWORK
GROUP ID                       AVERAGE CONC               RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - 

D64       1ST HIGHEST VALUE IS      62.23985 AT (  561987.16,  4821658.14,   314.43,   314.43,    0.00)  DC
          2ND HIGHEST VALUE IS      62.08626 AT (  561994.02,  4821665.25,   314.74,   314.74,    0.00)  DC
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          3RD HIGHEST VALUE IS      60.68669 AT (  561984.35,  4821658.39,   314.46,   314.46,    0.00)  DC
          4TH HIGHEST VALUE IS      59.86309 AT (  562000.89,  4821672.36,   315.00,   315.00,    0.00)  DC
          5TH HIGHEST VALUE IS      59.34121 AT (  561980.29,  4821651.03,   314.37,   314.37,    0.00)  DC
          6TH HIGHEST VALUE IS      57.52637 AT (  562007.75,  4821679.47,   315.00,   315.00,    0.00)  DC
          7TH HIGHEST VALUE IS      57.10343 AT (  562004.35,  4821678.39,   315.00,   315.00,    0.00)  DC
          8TH HIGHEST VALUE IS      55.08649 AT (  561973.42,  4821643.92,   314.57,   314.57,    0.00)  DC
          9TH HIGHEST VALUE IS      54.52649 AT (  562014.62,  4821686.59,   315.00,   315.00,    0.00)  DC
         10TH HIGHEST VALUE IS      51.29867 AT (  562021.48,  4821693.70,   315.00,   315.00,    0.00)  DC

G13       1ST HIGHEST VALUE IS      17.16424 AT (  562181.28,  4821718.03,   313.28,   313.28,    0.00)  DC
          2ND HIGHEST VALUE IS      15.94839 AT (  562184.35,  4821718.39,   313.11,   313.11,    0.00)  DC
          3RD HIGHEST VALUE IS      15.48865 AT (  562188.33,  4821711.22,   313.00,   313.00,    0.00)  DC
          4TH HIGHEST VALUE IS      15.42737 AT (  562174.22,  4821724.84,   313.78,   313.78,    0.00)  DC
          5TH HIGHEST VALUE IS      13.85415 AT (  562195.39,  4821704.41,   313.00,   313.00,    0.00)  DC
          6TH HIGHEST VALUE IS      12.34130 AT (  562204.35,  4821698.39,   313.00,   313.00,    0.00)  DC
          7TH HIGHEST VALUE IS      12.21718 AT (  562202.44,  4821697.60,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS      11.96757 AT (  562204.35,  4821718.39,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS      11.89977 AT (  562224.35,  4821698.39,   312.75,   312.75,    0.00)  DC
         10TH HIGHEST VALUE IS      11.26285 AT (  562209.50,  4821690.78,   312.91,   312.91,    0.00)  DC

G61       1ST HIGHEST VALUE IS     228.11451 AT (  562195.75,  4821662.42,   313.00,   313.00,    0.00)  DC
          2ND HIGHEST VALUE IS     195.96438 AT (  562202.68,  4821669.60,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS     149.91266 AT (  562209.62,  4821676.79,   312.69,   312.69,    0.00)  DC
          4TH HIGHEST VALUE IS     142.13253 AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC
          5TH HIGHEST VALUE IS     140.25259 AT (  562204.35,  4821658.39,   312.96,   312.96,    0.00)  DC
          6TH HIGHEST VALUE IS     138.50925 AT (  562209.50,  4821690.78,   312.91,   312.91,    0.00)  DC
          7TH HIGHEST VALUE IS     126.42904 AT (  562202.44,  4821697.60,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS     110.35050 AT (  562204.35,  4821698.39,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS      94.94089 AT (  562216.56,  4821683.97,   312.58,   312.58,    0.00)  DC
         10TH HIGHEST VALUE IS      85.63269 AT (  562195.39,  4821704.41,   313.00,   313.00,    0.00)  DC

G63       1ST HIGHEST VALUE IS     230.91834 AT (  562195.75,  4821662.42,   313.00,   313.00,    0.00)  DC
          2ND HIGHEST VALUE IS     196.64178 AT (  562202.68,  4821669.60,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS     150.32981 AT (  562209.62,  4821676.79,   312.69,   312.69,    0.00)  DC
          4TH HIGHEST VALUE IS     144.51677 AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC
          5TH HIGHEST VALUE IS     141.87107 AT (  562204.35,  4821658.39,   312.96,   312.96,    0.00)  DC
          6TH HIGHEST VALUE IS     138.86222 AT (  562209.50,  4821690.78,   312.91,   312.91,    0.00)  DC
          7TH HIGHEST VALUE IS     126.63397 AT (  562202.44,  4821697.60,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS     110.46660 AT (  562204.35,  4821698.39,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS      95.50868 AT (  562216.56,  4821683.97,   312.58,   312.58,    0.00)  DC
         10TH HIGHEST VALUE IS      85.65769 AT (  562195.39,  4821704.41,   313.00,   313.00,    0.00)  DC
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                          ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR Dispersion Factors                            ***        13:06:44
                                                                                                                     PAGE  11
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*
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                                   *** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER   5 YEARS ***

                                    ** CONC OF DF       IN MICROGRAMS/M**3                         **

                                                                                                             NETWORK
GROUP ID                       AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

G90       1ST HIGHEST VALUE IS     248.87624 AT (  562195.75,  4821662.42,   313.00,   313.00,    0.00)  DC
          2ND HIGHEST VALUE IS     229.91193 AT (  562202.68,  4821669.60,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS     183.79160 AT (  562209.62,  4821676.79,   312.69,   312.69,    0.00)  DC
          4TH HIGHEST VALUE IS     172.43300 AT (  562209.50,  4821690.78,   312.91,   312.91,    0.00)  DC
          5TH HIGHEST VALUE IS     171.83205 AT (  562204.35,  4821658.39,   312.96,   312.96,    0.00)  DC
          6TH HIGHEST VALUE IS     160.34020 AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC
          7TH HIGHEST VALUE IS     158.69753 AT (  562202.44,  4821697.60,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS     144.61104 AT (  562204.35,  4821698.39,   313.00,   313.00,    0.00)  DC
          9TH HIGHEST VALUE IS     131.81308 AT (  562216.56,  4821683.97,   312.58,   312.58,    0.00)  DC
         10TH HIGHEST VALUE IS     120.08347 AT (  562195.39,  4821704.41,   313.00,   313.00,    0.00)  DC

ALL       1ST HIGHEST VALUE IS    1247.86943 AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC
          2ND HIGHEST VALUE IS    1215.20381 AT (  562112.52,  4821576.21,   313.00,   313.00,    0.00)  DC
          3RD HIGHEST VALUE IS    1048.16607 AT (  562098.65,  4821561.84,   313.00,   313.00,    0.00)  DC
          4TH HIGHEST VALUE IS    1019.49622 AT (  562195.75,  4821662.42,   313.00,   313.00,    0.00)  DC
          5TH HIGHEST VALUE IS     997.10475 AT (  562119.46,  4821583.40,   313.00,   313.00,    0.00)  DC
          6TH HIGHEST VALUE IS     985.05654 AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
          7TH HIGHEST VALUE IS     947.57855 AT (  562104.35,  4821558.39,   313.00,   313.00,    0.00)  DC
          8TH HIGHEST VALUE IS     919.86530 AT (  562124.35,  4821578.39,   312.98,   312.98,    0.00)  DC
          9TH HIGHEST VALUE IS     917.41026 AT (  562202.68,  4821669.60,   313.00,   313.00,    0.00)  DC
         10TH HIGHEST VALUE IS     909.37772 AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                        ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR Dispersion Factors                         ***        13:06:44
                                                                                                                  PAGE  12
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                                *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***


                                    ** CONC OF DF       IN MICROGRAMS/M**3                         **
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                                                    DATE
NETWORK
GROUP ID                         AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE
GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

A06      HIGH   1ST HIGH VALUE IS     236.61797  ON 17092318: AT (  562124.35,  4821458.39,   311.61,   311.61,    0.00)  DC


A58      HIGH   1ST HIGH VALUE IS     240.04840  ON 17092318: AT (  562124.35,  4821458.39,   311.61,   311.61,    0.00)  DC


A61      HIGH   1ST HIGH VALUE IS     439.25087  ON 16041809: AT (  562124.35,  4821558.39,   312.78,   312.78,    0.00)  DC


A62_1    HIGH   1ST HIGH VALUE IS    1359.99430  ON 20041713: AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC


A62_2    HIGH   1ST HIGH VALUE IS    1393.82684  ON 17082210: AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC


B16      HIGH   1ST HIGH VALUE IS     322.96979  ON 20072509: AT (  562104.35,  4821538.39,   312.21,   312.21,    0.00)  DC


B24      HIGH   1ST HIGH VALUE IS      64.14511  ON 16100611: AT (  562104.35,  4821538.39,   312.21,   312.21,    0.00)  DC


B25      HIGH   1ST HIGH VALUE IS      58.95193  ON 19020403: AT (  562364.35,  4821678.39,   311.09,   311.09,    0.00)  DC


B33      HIGH   1ST HIGH VALUE IS     369.30076  ON 17072211: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


B34      HIGH   1ST HIGH VALUE IS     326.96370  ON 16081013: AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC


B38      HIGH   1ST HIGH VALUE IS      95.48479  ON 20062508: AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC


B39      HIGH   1ST HIGH VALUE IS     258.36951  ON 20072509: AT (  562104.35,  4821538.39,   312.21,   312.21,    0.00)  DC


C100     HIGH   1ST HIGH VALUE IS     969.09516  ON 17092408: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC
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C101      HIGH   1ST HIGH VALUE IS    1013.51488  ON 17092318: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC

C114      HIGH   1ST HIGH VALUE IS    4389.57924  ON 16011012: AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC

C115      HIGH   1ST HIGH VALUE IS    3972.56301  ON 16011012: AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC

C119      HIGH   1ST HIGH VALUE IS    3475.58783  ON 20102609: AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC

C60       HIGH   1ST HIGH VALUE IS     964.38082  ON 16061808: AT (  562104.35,  4821518.39,   312.00,   312.00,    0.00)  DC

C72       HIGH   1ST HIGH VALUE IS     926.87989  ON 17092408: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC

C73       HIGH   1ST HIGH VALUE IS     833.32217  ON 18080702: AT (  562184.35,  4821598.39,   312.77,   312.77,    0.00)  DC

C75       HIGH   1ST HIGH VALUE IS     168.64443  ON 16101219: AT (  561980.29,  4821651.03,   314.37,   314.37,    0.00)  DC

C79       HIGH   1ST HIGH VALUE IS     321.30023  ON 16070624: AT (  562168.01,  4821633.68,   313.00,   313.00,    0.00)  DC

C80       HIGH   1ST HIGH VALUE IS     336.43714  ON 16070624: AT (  562168.01,  4821633.68,   313.00,   313.00,    0.00)  DC

C99       HIGH   1ST HIGH VALUE IS     974.98650  ON 17092318: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC

D64       HIGH   1ST HIGH VALUE IS    1203.85765  ON 17012111: AT (  561994.02,  4821665.25,   314.74,   314.74,    0.00)  DC
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                        ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR Dispersion Factors                           ***        13:06:44
                                                                                                                    PAGE  13
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                                 *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***

                                       ** CONC OF DF       IN MICROGRAMS/M**3                          **

                                                     DATE
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NETWORK
GROUP ID                         AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE
GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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G13      HIGH   1ST HIGH VALUE IS     280.50736  ON 16100308: AT (  562181.88,  4821648.05,   313.00,   313.00,    0.00)  DC


G61      HIGH   1ST HIGH VALUE IS    4604.77753  ON 17052707: AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC


G63      HIGH   1ST HIGH VALUE IS    4736.18421  ON 17052707: AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC


G90      HIGH   1ST HIGH VALUE IS    4253.68411  ON 16061807: AT (  562195.75,  4821662.42,   313.00,   313.00,    0.00)  DC


ALL      HIGH   1ST HIGH VALUE IS   13463.31467  ON 17052707: AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC



 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                       ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR Dispersion Factors                        ***        13:06:44
                                                                                                                 PAGE  14
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                                *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***


                                  ** CONC OF DF       IN MICROGRAMS/M**3                         **

                                                     DATE
NETWORK
GROUP ID                         AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE
GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
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A06      HIGH   1ST HIGH VALUE IS      58.66177  ON 18112724: AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC
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A58      HIGH   1ST HIGH VALUE IS      65.94431  ON 18030224: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC

A61      HIGH   1ST HIGH VALUE IS     272.10127  ON 16021024: AT (  562124.35,  4821558.39,   312.78,   312.78,    0.00)  DC

A62_1    HIGH   1ST HIGH VALUE IS     707.16569  ON 20010224: AT (  562050.10,  4821511.55,   312.07,   312.07,    0.00)  DC

A62_2    HIGH   1ST HIGH VALUE IS     695.20709  ON 20010224: AT (  562050.10,  4821511.55,   312.07,   312.07,    0.00)  DC

B16      HIGH   1ST HIGH VALUE IS     116.09340  ON 18112724: AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC

B24      HIGH   1ST HIGH VALUE IS      32.37057m ON 20112724: AT (  562244.35,  4821638.39,   312.00,   312.00,    0.00)  DC

B25      HIGH   1ST HIGH VALUE IS      28.33458m ON 20112724: AT (  562264.35,  4821658.39,   311.60,   311.60,    0.00)  DC

B33      HIGH   1ST HIGH VALUE IS     214.62639  ON 18071724: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC

B34      HIGH   1ST HIGH VALUE IS     222.45281  ON 17012724: AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC

B38      HIGH   1ST HIGH VALUE IS      44.13669  ON 17012724: AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC

B39      HIGH   1ST HIGH VALUE IS     113.53351  ON 17012724: AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC

C100     HIGH   1ST HIGH VALUE IS     405.27047  ON 19070224: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC

C101     HIGH   1ST HIGH VALUE IS     413.75217  ON 16081824: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC

C114     HIGH   1ST HIGH VALUE IS    1388.74154  ON 17111324: AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC

C115     HIGH   1ST HIGH VALUE IS    1270.53958  ON 17111324: AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC

C119     HIGH   1ST HIGH VALUE IS    1147.63038  ON 19062124: AT (  562098.65,  4821561.84,   313.00,   313.00,    0.00)  DC
```

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C60      HIGH   1ST HIGH VALUE IS     269.92822  ON 16081824: AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC


C72      HIGH   1ST HIGH VALUE IS     360.92598  ON 19070224: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


C73      HIGH   1ST HIGH VALUE IS     250.82544  ON 19062124: AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC


C75      HIGH   1ST HIGH VALUE IS     100.96914  ON 18112724: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


C79      HIGH   1ST HIGH VALUE IS     176.16804  ON 19101724: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


C80      HIGH   1ST HIGH VALUE IS     191.99132  ON 17050624: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


C99      HIGH   1ST HIGH VALUE IS     374.66634  ON 18071724: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


D64      HIGH   1ST HIGH VALUE IS     436.99391m ON 16032424: AT (  561994.02,  4821665.25,   314.74,   314.74,    0.00)  DC
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                            ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR Dispersion Factors                              ***        13:06:44
                                                                                                                       PAGE  15
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                                *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***


                                    ** CONC OF DF       IN MICROGRAMS/M**3                          **

                                                      DATE
NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)             RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE
GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

G13      HIGH   1ST HIGH VALUE IS     118.43999  ON 17050624: AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC


G61      HIGH   1ST HIGH VALUE IS    1296.33485  ON 19062124: AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC
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G63      HIGH   1ST HIGH VALUE IS    1328.82924  ON 19062124: AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC


G90      HIGH   1ST HIGH VALUE IS    1148.07649  ON 19062124: AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC


ALL      HIGH   1ST HIGH VALUE IS    4211.08733  ON 20110624: AT (  562209.50,  4821690.78,   312.91,   312.91,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                       ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR Dispersion Factors                         ***        13:06:44
                                                                                                                  PAGE  16
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of           0 Fatal Error Message(s)
 A Total of          51 Warning Message(s)
 A Total of         503 Informational Message(s)

 A Total of       43848 Hours Were Processed

 A Total of           0 Calm Hours Identified

 A Total of         503 Missing Hours Identified (  1.15 Percent)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W187    1160       MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET
 OU W565    1245       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
 OU W565    1246       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
 OU W565    1247       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
 OU W565    1248       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
```

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OU W565    1249       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1250       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1251       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1252       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1253       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1254       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1255       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1256       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1257       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1258       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1259       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1260       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1261       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1262       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1263       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1264       OUPLOT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1265       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1266       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1267       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1268       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1269       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1270       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1271       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1272       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1273       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1274       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1275       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1276       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1277       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1278       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1279       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1280       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1281       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1282       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1283       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1284       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1285       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1286       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1287       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1288       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1289       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1290       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1291       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1292       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1293       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
OU W565    1294       PERPLT: Possible Conflict With Dynamically Allocated FUNIT     PLOTFILE
```

APPENDIX Q
Stage 2 – All Other Contaminants

1 hour Stage 2 POI

Ingredient ID	Contaminant	CAS #	1 Hour Emission Rate (g/s)	1 hr Facility MAX GLC (µg/m³)	1 Hour POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
4	NITROGEN OXIDES (EXPRESSED AS NO2)	10102-44-0	1.16E+00	66.136	400	Schedule 3	Health	16.5%	Stage 2	Significant

24 hour Stage 2 POI

Ingredient ID	Contaminant	CAS #	24 Hour Emission Rate (g/s)	Facility MAX GLC (µg/m³)	24 Hour POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.37E-04	0.006	0.07	URT	Health	<URT	Stage 2	Significant
1	PM - PARTICULATE MATTER	N/A - M08	4.52E-01	85.908	120	Schedule 3	Visibility	71.6%	Stage 2	Significant
4	NITROGEN OXIDES (EXPRESSED AS NO2)	10102-44-0	1.16E+00	37.715	200	Schedule 3	Health	18.9%	Stage 2	Significant
7917	Acid Solubilized Fatty Acid Amide (Prop1)	0	2.79E-02	7.974	8.261	FL/APOIC		<FL/APOIC	Stage 2	Significant
7918	Acid Solubilized Fatty Acid Amide (Prop2)	0	1.24E-02	3.544	3.672	FL/APOIC		<FL/APOIC	Stage 2	Significant

Annual Stage 2 POI

Ingredient ID	Contaminant	CAS #	Annual Emission Rate (g/s)	Facility MAX GLC (µg/m³)	Annual POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria	Model Stage	Significant?
205	CHROMIUM (VI) COMPOUNDS	18540-29-9	1.37E-04	0.001	0.0024	SSS	Health	55.5%	Stage 2	Significant

APPENDIX Q
Particulate Matter (PM) – 24 hour

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	A06	562070.66 Cooling Tower #1	4821568.60	313.00	18.30	0.00218	298.00	10.21	2.97
POINT	A58	562065.14 Cooling Tower #4	4821562.94	313.00	18.30	0.00218	298.00	10.21	2.97
POINT	B16	562027.68 107B Forming Scrap Tunnel Exhaust	4821535.89	313.00	17.47	0.02313	300.00	8.88	1.54
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.02063	561.00	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.02063	556.00	16.77	0.33
POINT	B39	562031.90 107A Forming Scrap Tunnel Exhaust	4821541.35	313.00	17.80	0.02313	300.00	13.74	1.14
POINT	C100	562030.95 CFM Forming Tunnel (South-West)	4821551.64	313.00	14.40	0.03602	298.00	2.68	1.06
POINT	C101	562036.05 CFM Forming Tunnel (South-East)	4821557.02	313.00	14.40	0.03602	298.00	2.68	1.06
POINT	C72	562025.84 CFM Forming Tunnel (North-West)	4821557.04	313.03	14.40	0.03602	298.00	2.68	1.06
POINT	C73	562006.91 CFM Binder Cyclone	4821571.42	313.68	13.06	0.14406	294.00	10.70	0.50
POINT	C75	561985.43 CFM RTO - Oven	4821572.55	313.74	14.60	0.06944	518.00	38.90	0.60
POINT	C99	562030.88 CFM Forming Tunnel (North - East)	4821562.25	313.09	14.40	0.03602	298.00	2.68	1.06

Source Pathway - Source Inputs

AERMOD

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	G90	562171.50	4821671.40	313.00	5.80	0.00008	288.00	15.60	0.20
		D/C Exhaust - Bad Batch Bin							
POINT	G61	562174.62	4821670.66	313.00	21.65	0.00043	288.00	15.59	0.14
		D/C Exhaust - Soda Ash Silo (Bin 18)							
POINT	G63	562175.57	4821669.84	313.00	21.65	0.00002	288.00	15.59	0.14
		D/C Exhaust - Salt Cake Silo (Bin 20)							

Volume Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Length of Side [m]	Building Height [m]	Initial Lateral Dim. [m]	Initial Vertical Dim. [m]
VOLUME	D64	562059.99	4821662.42	314.00	12.05	0.00209	10.11		2.35	4.98
		Filter Box Louvre Exhaust								

Control Pathway

Dispersion Options

Titles

OC Guelph
March 2025 SSS ESDMR PM

Dispersion Options

☐ Regulatory Default ☑ Non-Default Options

- ☑ Elevated Terrain
- ☐ No Stack-Tip Downwash (NOSTD)
- ☐ Run in Screening Mode
- ☐ Conversion of NOx to NO2 (OLM or PVMRM)
- ☐ No Checks for Non-Sequential Met Data
- ☐ Fast All Sources (FASTALL)
- ☐ Fast Area Sources (FASTAREA)
- ☐ Optimized Area Source Plume Depletion
- ☐ Gas Deposition

BETA Options:

- ☑ Capped and Horizontal Stack Releases
- ☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
- ☐ Low Wind Options

- ☐ SCIM (Sampled Chronological Input Model)
- ☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

- ☑ Concentration
- ☐ Total Deposition (Dry & Wet)
- ☐ Dry Deposition
- ☐ Wet Deposition

Plume Depletion

- ☐ Dry Removal
- ☐ Wet Removal

Output Warnings

- ☐ No Output Warnings
- ☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - PM

Averaging Time Options

Hours ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 6 ☐ 8 ☐ 12 ☑ 24

☐ Month ☐ Period ☐ Annual

Exponential Decay

☐ Yes ☑ No

Terrain Height Options

☐ Flat ☑ Elevated

SO: Meters

RE: Meters
TG: Meters

Flagpole Receptors

☑ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Particulate Matter - 24 Hour Averaging Period

*** THE MAXIMUM 1000 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL   ***

RANK BY YEAR	YEAR	RANK	CONC	YYYYMMDDHH	XR	YR	TYPE	Ontario Reg. 419/05
1	2020	1	89.60066	2020012824	562063.97	4821525.92	DC	Discarded
1	2018	2	86.1835	2018071724	562063.97	4821525.92	DC	Discarded
2	2020	3	85.90848	2020071324	562063.97	4821525.92	DC	Highest

```
*** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                          ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

** Model Options Selected:
     * Model Allows User-Specified Options
     * Model Is Setup For Calculation of Average CONCentration Values.
     * NO GAS DEPOSITION Data Provided.
     * NO PARTICLE DEPOSITION Data Provided.
     * Model Uses NO DRY DEPLETION. DDPLETE  =  F
     * Model Uses NO WET DEPLETION. WETDPLT  =  F
     * Stack-tip Downwash.
     * Model Accounts for ELEVated Terrain Effects.
     * Use Calms Processing Routine.
     * Use Missing Data Processing Routine.
     * No Exponential Decay.
     * Model Uses RURAL Dispersion Only.
     * Option for Capped & Horiz Stacks Selected With:
         0 Capped Stack(s); and         2 Horizontal Stack(s)
     * ADJ_U*   - Use ADJ_U* option for SBL in AERMET
     * CCVR_Sub - Meteorological data includes CCVR substitutions
     * TEMP_Sub - Meteorological data includes TEMP substitutions
     * Model Accepts FLAGPOLE Receptor . Heights.
     * The User Specified a Pollutant Type of: PM

**Model Calculates  1 Short Term Average(s) of:  24-HR

**This Run Includes:     16 Source(s);      17 Source Group(s); and    2640 Receptor(s)

               with:     15 POINT(s), including
                          0 POINTCAP(s) and      2 POINTHOR(s)
                and:      1 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 RLINE/RLINEXT source(s)
                and:      0 OPENPIT source(s)
                and:      0 BUOYANT LINE source(s) with a total of     0 line(s)
                and:      0 SWPOINT source(s)


**Model Set To Continue RUNning After the Setup Testing.
```

```
**The AERMET Input Meteorological Data Version Date:  22112

**Output Options Selected:
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   325.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                 Emission Units = GRAMS/S                                  ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =      6.0 MB of RAM.

**Input Runstream File:          aermod.inp

**Output Print File:             aermod.out


**File for Summary of Results:   ESDMR_PM_R0.sum

↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                        ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR PM                                            ***        15:13:10
                                                                                                                     PAGE   2
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                            *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                               (1=YES; 0=NO)

           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1

               NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.
```

```
                              *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                         (METERS/SEC)

                                                 1.54,   3.09,   5.14,   8.23,  10.80,
```

```
                                  *** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

  Surface file:   E:\_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC          Met Version:  22112
  Profile file:   E:\_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL
  Surface format: FREE
  Profile format: FREE
  Surface station no.:    61430                 Upper air station no.:    14733
                Name: UNKNOWN                                Name: BUFFALO/GREATER_BUFFALO_INT'L
                Year:   2016                                 Year:   2016

 First 24 hours of scalar data
 YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS   WD     HT  REF TA     HT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 16 01 01   1 01  -64.0  0.640 -9.000 -9.000 -999. 1230.    451.0  0.37   0.49   1.00    5.10  251.   10.0  271.4    2.0
 16 01 01   1 02  -64.0  0.640 -9.000 -9.000 -999. 1230.    451.0  0.37   0.49   1.00    5.10  248.   10.0  270.9    2.0
 16 01 01   1 03  -58.4  0.579 -9.000 -9.000 -999. 1063.    368.8  0.37   0.49   1.00    4.60  254.   10.0  270.9    2.0
 16 01 01   1 04  -64.0  0.723 -9.000 -9.000 -999. 1472.    575.1  0.37   0.49   1.00    5.70  253.   10.0  270.9    2.0
 16 01 01   1 05  -58.5  0.579 -9.000 -9.000 -999. 1082.    368.8  0.37   0.49   1.00    4.60  243.   10.0  270.3    2.0
 16 01 01   1 06  -58.5  0.579 -9.000 -9.000 -999. 1058.    368.8  0.37   0.49   1.00    4.60  242.   10.0  270.3    2.0
 16 01 01   1 07  -51.9  0.514 -9.000 -9.000 -999.  888.    290.1  0.37   0.49   1.00    4.10  245.   10.0  270.3    2.0
 16 01 01   1 08  -54.2  0.535 -9.000 -9.000 -999.  938.    314.5  0.30   0.49   1.00    4.60  283.   10.0  269.2    2.0
 16 01 01   1 09  -62.3  0.645 -9.000 -9.000 -999. 1242.    458.0  0.37   0.49   0.78    5.10  257.   10.0  269.8    2.0
 16 01 01   1 10  -15.3  0.547 -9.000 -9.000 -999.  982.    929.6  0.30   0.49   0.62    4.60  271.   10.0  269.2    2.0
 16 01 01   1 11    4.5  0.622  0.333  0.005  283. 1176.  -4620.6  0.37   0.49   0.55    5.10  264.   10.0  268.8    2.0
 16 01 01   1 12    9.0  0.564  0.468  0.005  396. 1021.  -1737.7  0.37   0.49   0.53    4.60  246.   10.0  268.8    2.0
 16 01 01   1 13   16.4  0.566  0.636  0.005  545. 1023.   -962.9  0.37   0.49   0.53    4.60  253.   10.0  268.8    2.0
 16 01 01   1 14   13.8  0.625  0.614  0.005  582. 1185.  -1540.1  0.37   0.49   0.53    5.10  259.   10.0  268.8    2.0
 16 01 01   1 15    7.0  0.474  0.493  0.006  592.  805.  -1314.3  0.30   0.49   0.56    4.10  272.   10.0  269.2    2.0
 16 01 01   1 16  -14.2  0.486 -9.000 -9.000 -999.  812.    703.5  0.30   0.49   0.64    4.10  274.   10.0  268.8    2.0
 16 01 01   1 17  -46.1  0.475 -9.000 -9.000 -999.  785.    247.8  0.30   0.49   0.83    4.10  271.   10.0  268.8    2.0
 16 01 01   1 18  -52.2  0.513 -9.000 -9.000 -999.  882.    290.0  0.37   0.49   1.00    4.10  257.   10.0  268.8    2.0
 16 01 01   1 19  -48.2  0.474 -9.000 -9.000 -999.  786.    247.4  0.30   0.49   1.00    4.10  274.   10.0  268.8    2.0
 16 01 01   1 20  -39.0  0.384 -9.000 -9.000 -999.  577.    161.9  0.37   0.49   1.00    3.10  257.   10.0  268.8    2.0
 16 01 01   1 21  -36.0  0.354 -9.000 -9.000 -999.  507.    138.2  0.30   0.49   1.00    3.10  280.   10.0  268.8    2.0
 16 01 01   1 22  -48.2  0.474 -9.000 -9.000 -999.  783.    247.4  0.30   0.49   1.00    4.10  272.   10.0  268.8    2.0
 16 01 01   1 23  -52.3  0.513 -9.000 -9.000 -999.  882.    289.9  0.37   0.49   1.00    4.10  250.   10.0  268.1    2.0
 16 01 01   1 24  -36.0  0.354 -9.000 -9.000 -999.  527.    138.2  0.30   0.49   1.00    3.10  280.   10.0  268.8    2.0
```

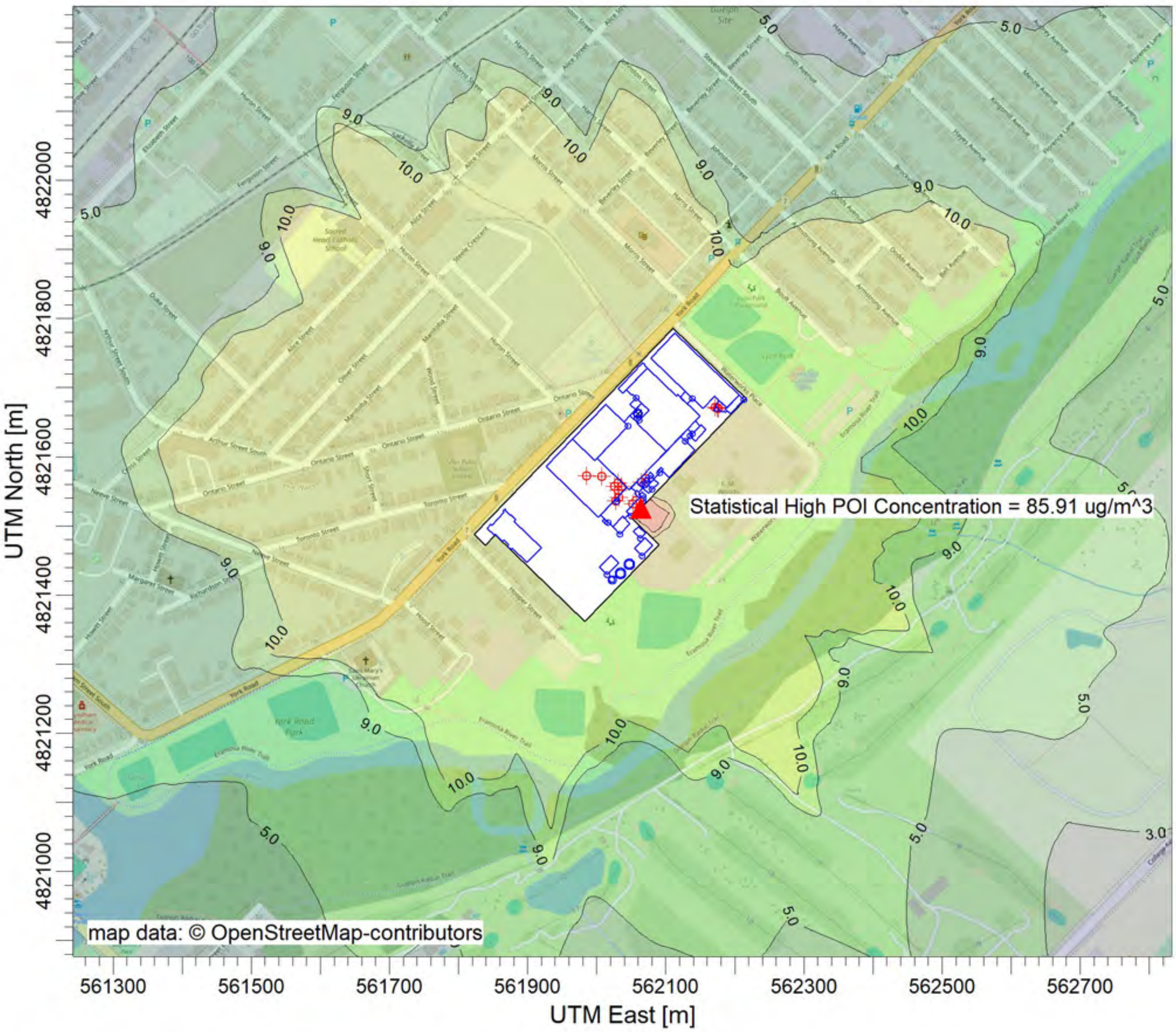
```
 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 16 01 01 01   10.0 1  251.    5.10   271.5   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                     ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR PM                                       ***        15:13:10
                                                                                                                PAGE   4
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                               *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***


                                   ** CONC OF PM       IN MICROGRAMS/M**3                          **

                                                    DATE
NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE
GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

A06      HIGH   1ST HIGH VALUE IS       0.12789  ON 18112724: AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC


A58      HIGH   1ST HIGH VALUE IS       0.14377  ON 18030224: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


B16      HIGH   1ST HIGH VALUE IS       2.68466  ON 18112724: AT (  562084.35,  4821518.39,   312.35,   312.35,    0.00)  DC


B24      HIGH   1ST HIGH VALUE IS       0.66764m ON 20112724: AT (  562244.35,  4821638.39,   312.00,   312.00,    0.00)  DC


B25      HIGH   1ST HIGH VALUE IS       0.58440m ON 20112724: AT (  562264.35,  4821658.39,   311.60,   311.60,    0.00)  DC


B39      HIGH   1ST HIGH VALUE IS       2.62546  ON 17012724: AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC


C100     HIGH   1ST HIGH VALUE IS      14.59607  ON 19070224: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


C101     HIGH   1ST HIGH VALUE IS      14.90154  ON 16081824: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC
```

```
C72      HIGH   1ST HIGH VALUE IS      12.99897  ON 19070224: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


C73      HIGH   1ST HIGH VALUE IS      36.13339  ON 19062124: AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC


C75      HIGH   1ST HIGH VALUE IS       7.01175  ON 18112724: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


C99      HIGH   1ST HIGH VALUE IS      13.49384  ON 18071724: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


D64      HIGH   1ST HIGH VALUE IS       0.91456m ON 16032424: AT (  561994.02,  4821665.25,   314.74,   314.74,    0.00)  DC


G61      HIGH   1ST HIGH VALUE IS       0.56265  ON 19062124: AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC


G63      HIGH   1ST HIGH VALUE IS       0.03230  ON 19062124: AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC


G90      HIGH   1ST HIGH VALUE IS       0.09495  ON 19062124: AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC


ALL      HIGH   1ST HIGH VALUE IS      89.60066  ON 20012824: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                          ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR PM                                             ***        15:13:10
                                                                                                                      PAGE   5
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            1 Warning Message(s)
 A Total of          503 Informational Message(s)
```

```
A Total of        43848 Hours Were Processed

A Total of            0 Calm Hours Identified

A Total of          503 Missing Hours Identified (  1.15 Percent)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
ME W187     653       MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET
```

PROJECT TITLE:

OC Guelph Glass Plant
24 Hour Particulate Matter Emissions



Statistical High POI Concentration = 85.91 ug/m^3

map data: © OpenStreetMap-contributors

PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

MICROGRAMS/M**3

Max: 89.6 [MICROGRAMS/M**3] at (562063.97, 4821525.92)

0.9 1.0 3.0 5.0 9.0 10.0 50.0 60.0 85.0

COMMENTS:

Statistical High: 85.908 ug/m^3

SOURCES:

16

COMPANY NAME:

Owens Corning Guelph Facility

RECEPTORS:

2768

MODELER:

Montrose Environmental Solutions Canada Inc.

MONTROSE ENVIRONMENTAL

OUTPUT TYPE:

Concentration

SCALE: 1:10,000

0 0.3 km

MAX:

89.6 MICROGRAMS/M3**

DATE:

3/3/2025

PROJECT NO.:

24-035387

APPENDIX Q
Nitrogen Oxides (NOx) – 1 hour and 24 hour

Source Pathway - Source Inputs

AERMOD

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	A61	562087.10 NG Generator #1 Exhaust	4821572.11	313.00	16.30	0.02473	639.00	26.14	0.20
POINT	A62_1	562042.61 Generac SG500 Natural Gas Generator Exhaust 1	4821513.26	312.15	15.24	0.00755	687.00	31.28	0.15
POINT	A62_2	562044.72 Generac SG500 Natural Gas Generator Exhaust 2	4821515.44	312.24	15.24	0.00755	687.00	31.28	0.15
POINT	B24	562052.59 105 Furnace Stack (West)	4821531.65	312.94	35.09	0.17692	561.00	18.09	0.33
POINT	B25	562057.67 105 Furnace Stack (East)	4821536.90	313.00	35.09	0.09528	556.00	16.77	0.33
POINT	B38	562043.48 105 Forehearth Stack	4821544.79	313.00	28.00	0.29561	391.00	8.22	0.75
POINT	C75	561985.43 CFM RTO - Oven	4821572.55	313.74	14.60	0.38293	518.00	38.90	0.60
POINT	G13	562170.00 NGF Tire Cord Line #1 RTO	4821714.00	313.75	18.00	0.14823	858.00	22.18	0.83
POINT	C114	562074.83 DI Boilers	4821589.58	313.30	8.72	0.00618	373.00	0.25	0.15
POINT	C115	562076.02 DI Boilers	4821590.77	313.30	8.72	0.00618	373.00	0.25	0.15
POINT	C119	562078.98 Binder Heater	4821594.01	313.28	9.33	0.00741	373.00	0.25	0.10

Control Pathway

Dispersion Options

Titles

OC Guelph
March 2025 SSS ESDMR NOx

Dispersion Options

☐ Regulatory Default ☑ Non-Default Options

- ☑ Elevated Terrain
- ☐ No Stack-Tip Downwash (NOSTD)
- ☐ Run in Screening Mode
- ☐ Conversion of NOx to NO2 (OLM or PVMRM)
- ☐ No Checks for Non-Sequential Met Data
- ☐ Fast All Sources (FASTALL)
- ☐ Fast Area Sources (FASTAREA)
- ☐ Optimized Area Source Plume Depletion
- ☐ Gas Deposition

BETA Options:

- ☑ Capped and Horizontal Stack Releases
- ☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
- ☐ Low Wind Options

- ☐ SCIM (Sampled Chronological Input Model)
- ☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

- ☑ Concentration
- ☐ Total Deposition (Dry & Wet)
- ☐ Dry Deposition
- ☐ Wet Deposition

Plume Depletion

- ☐ Dry Removal
- ☐ Wet Removal

Output Warnings

- ☐ No Output Warnings
- ☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - NO_X

Averaging Time Options

Hours	1	2	3	4	6	8	12	24
	☑	☐	☐	☐	☐	☐	☐	☑

☐ Month ☐ Period ☐ Annual

Exponential Decay

☐ Yes ☑ No

Terrain Height Options

☐ Flat ☑ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☑ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Nitrogen Oxides - 1 Hour Averaging Period

*** THE MAXIMUM 1000 1-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***

RANK BY YEAR	YEAR	RANK	CONC	YYYYMMDDHH	XR	YR	TYPE	Ontario Reg. 419/05
1	2020	1	71.42163	2020102609	562091.71	4821554.66	DC	Discarded
1	2016	2	70.10639	2016101508	562084.78	4821547.47	DC	Discarded
1	2018	3	69.22696	2018113015	562091.71	4821554.66	DC	Discarded
2	2016	4	69.22552	2016110809	562105.59	4821569.03	DC	Discarded
3	2016	5	68.22852	2016011012	562105.59	4821569.03	DC	Discarded
1	2019	6	67.3507	2019062901	562112.52	4821576.21	DC	Discarded
1	2017	7	67.1139	2017091419	562112.52	4821576.21	DC	Discarded
2	2020	8	67.01801	2020060303	562112.52	4821576.21	DC	Discarded
3	2020	9	66.89227	2020070221	562112.52	4821576.21	DC	Discarded
4	2016	10	66.86282	2016080624	562112.52	4821576.21	DC	Discarded
2	2017	11	66.85805	2017011213	562112.52	4821576.21	DC	Discarded
2	2019	12	66.84338	2019091507	562091.71	4821554.66	DC	Discarded
3	2019	13	66.79604	2019090721	562112.52	4821576.21	DC	Discarded
3	2017	14	66.68033	2017042321	562091.71	4821554.66	DC	Discarded
4	2020	15	66.62488	2020122124	562091.71	4821554.66	DC	Discarded
4	2017	16	66.60788	2017083122	562091.71	4821554.66	DC	Discarded
5	2017	17	66.55402	2017092107	562091.71	4821554.66	DC	Discarded
6	2017	18	66.55124	2017091918	562091.71	4821554.66	DC	Discarded
5	2016	19	66.45608	2016090104	562091.71	4821554.66	DC	Discarded
7	2017	20	66.4461	2017010201	562091.71	4821554.66	DC	Discarded
5	2020	21	66.41438	2020020103	562091.71	4821554.66	DC	Discarded
4	2019	22	66.37477	2019011824	562091.71	4821554.66	DC	Discarded
5	2019	23	66.37456	2019042104	562112.52	4821576.21	DC	Discarded
8	2017	24	66.37212	2017100423	562091.71	4821554.66	DC	Discarded
2	2018	25	66.34519	2018052824	562091.71	4821554.66	DC	Discarded
3	2018	26	66.30059	2018100424	562091.71	4821554.66	DC	Discarded
6	2016	27	66.28178	2016110807	562091.71	4821554.66	DC	Discarded
6	2019	28	66.27024	2019022219	562091.71	4821554.66	DC	Discarded
4	2018	29	66.26517	2018111221	562091.71	4821554.66	DC	Discarded
6	2020	30	66.20211	2020061924	562091.71	4821554.66	DC	Discarded
7	2016	31	66.17238	2016060221	562091.71	4821554.66	DC	Discarded
9	2017	32	66.13605	2017070321	562091.71	4821554.66	DC	Highest

Nitrogen Oxides - 24 Hour Averaging Period

*** THE MAXIMUM 1000 24-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: ALL   ***

RANK BY YEAR	YEAR	RANK	CONC	YYYYMMDDHH	XR	YR	TYPE	Ontario Reg. 419/05
1	2018	1	43.5982	2018112724	562063.97	4821525.92	DC	Discarded
1	2019	2	42.00164	2019031624	562070.91	4821533.11	DC	Discarded
2	2018	3	40.05764	2018112724	562070.91	4821533.11	DC	Discarded
1	2016	4	39.61868	2016060824	562063.97	4821525.92	DC	Discarded
2	2019	5	38.8547	2019031624	562063.97	4821525.92	DC	Discarded
3	2018	6	38.24422	2018112724	562057.04	4821518.74	DC	Discarded
2	2016	7	38.24094	2016060824	562070.91	4821533.11	DC	Discarded
3	2019	8	37.71477	2019010924	562063.97	4821525.92	DC	Highest

```
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

 ** Model Options Selected:
      * Model Allows User-Specified Options
      * Model Is Setup For Calculation of Average CONCentration Values.
      * NO GAS DEPOSITION Data Provided.
      * NO PARTICLE DEPOSITION Data Provided.
      * Model Uses NO DRY DEPLETION. DDPLETE  =  F
      * Model Uses NO WET DEPLETION. WETDPLT  =  F
      * Stack-tip Downwash.
      * Model Accounts for ELEVated Terrain Effects.
      * Use Calms Processing Routine.
      * Use Missing Data Processing Routine.
      * No Exponential Decay.
      * Model Uses RURAL Dispersion Only.
      * Option for Capped & Horiz Stacks Selected With:
          3 Capped Stack(s); and         0 Horizontal Stack(s)
      * ADJ_U*   - Use ADJ_U* option for SBL in AERMET
      * CCVR_Sub - Meteorological data includes CCVR substitutions
      * TEMP_Sub - Meteorological data includes TEMP substitutions
      * Model Accepts FLAGPOLE Receptor . Heights.
      * The User Specified a Pollutant Type of: NO_X

 **Model Calculates  2 Short Term Average(s) of:   1-HR  24-HR

 **This Run Includes:     11 Source(s);      12 Source Group(s); and    2640 Receptor(s)

                with:     11 POINT(s), including
                           3 POINTCAP(s) and      0 POINTHOR(s)
                 and:      0 VOLUME source(s)
                 and:      0 AREA type source(s)
                 and:      0 LINE source(s)
                 and:      0 RLINE/RLINEXT source(s)
                 and:      0 OPENPIT source(s)
                 and:      0 BUOYANT LINE source(s) with a total of     0 line(s)
                 and:      0 SWPOINT source(s)


 **Model Set To Continue RUNning After the Setup Testing.
```

```
**The AERMET Input Meteorological Data Version Date:  22112

**Output Options Selected:
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   325.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                 Emission Units = GRAMS/S                                  ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =      6.2 MB of RAM.

**Input Runstream File:          aermod.inp

**Output Print File:             aermod.out


**File for Summary of Results:   ESDMR_NOx_R0.sum

↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                          ***        02/06/25
*** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR NOx                                             ***        16:18:38
                                                                                                                      PAGE   2
*** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                           *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                              (1=YES; 0=NO)

           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1

               NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.
```

```
                                       *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                                  (METERS/SEC)

                                                         1.54,   3.09,   5.14,   8.23,  10.80,
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                            ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR NOx                                             ***        16:18:38
                                                                                                                      PAGE   3
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                         *** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

   Surface file:   E:\_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC          Met Version:  22112
   Profile file:   E:\_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL
   Surface format: FREE
   Profile format: FREE
   Surface station no.:    61430                  Upper air station no.:    14733
                 Name: UNKNOWN                                    Name: BUFFALO/GREATER_BUFFALO_INT'L
                 Year:   2016                                     Year:   2016

 First 24 hours of scalar data
 YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS   WD     HT  REF TA     HT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 16 01 01   1 01  -64.0  0.640 -9.000 -9.000 -999. 1230.    451.0  0.37   0.49   1.00    5.10  251.   10.0  271.4    2.0
 16 01 01   1 02  -64.0  0.640 -9.000 -9.000 -999. 1230.    451.0  0.37   0.49   1.00    5.10  248.   10.0  270.9    2.0
 16 01 01   1 03  -58.4  0.579 -9.000 -9.000 -999. 1063.    368.8  0.37   0.49   1.00    4.60  254.   10.0  270.9    2.0
 16 01 01   1 04  -64.0  0.723 -9.000 -9.000 -999. 1472.    575.1  0.37   0.49   1.00    5.70  253.   10.0  270.9    2.0
 16 01 01   1 05  -58.5  0.579 -9.000 -9.000 -999. 1082.    368.8  0.37   0.49   1.00    4.60  243.   10.0  270.3    2.0
 16 01 01   1 06  -58.5  0.579 -9.000 -9.000 -999. 1058.    368.8  0.37   0.49   1.00    4.60  242.   10.0  270.3    2.0
 16 01 01   1 07  -51.9  0.514 -9.000 -9.000 -999.  888.    290.1  0.37   0.49   1.00    4.10  245.   10.0  270.3    2.0
 16 01 01   1 08  -54.2  0.535 -9.000 -9.000 -999.  938.    314.5  0.30   0.49   1.00    4.60  283.   10.0  269.2    2.0
 16 01 01   1 09  -62.3  0.645 -9.000 -9.000 -999. 1242.    458.0  0.37   0.49   0.78    5.10  257.   10.0  269.8    2.0
 16 01 01   1 10  -15.3  0.547 -9.000 -9.000 -999.  982.    929.6  0.30   0.49   0.62    4.60  271.   10.0  269.2    2.0
 16 01 01   1 11    4.5  0.622  0.333  0.005  283. 1176.  -4620.6  0.37   0.49   0.55    5.10  264.   10.0  268.8    2.0
 16 01 01   1 12    9.0  0.564  0.468  0.005  396. 1021.  -1737.7  0.37   0.49   0.53    4.60  246.   10.0  268.8    2.0
 16 01 01   1 13   16.4  0.566  0.636  0.005  545. 1023.   -962.9  0.37   0.49   0.53    4.60  253.   10.0  268.8    2.0
 16 01 01   1 14   13.8  0.625  0.614  0.005  582. 1185.  -1540.1  0.37   0.49   0.53    5.10  259.   10.0  268.8    2.0
 16 01 01   1 15    7.0  0.474  0.493  0.006  592.  805.  -1314.3  0.30   0.49   0.56    4.10  272.   10.0  269.2    2.0
 16 01 01   1 16  -14.2  0.486 -9.000 -9.000 -999.  812.    703.5  0.30   0.49   0.64    4.10  274.   10.0  268.8    2.0
 16 01 01   1 17  -46.1  0.475 -9.000 -9.000 -999.  785.    247.8  0.30   0.49   0.83    4.10  271.   10.0  268.8    2.0
 16 01 01   1 18  -52.2  0.513 -9.000 -9.000 -999.  882.    290.0  0.37   0.49   1.00    4.10  257.   10.0  268.8    2.0
 16 01 01   1 19  -48.2  0.474 -9.000 -9.000 -999.  786.    247.4  0.30   0.49   1.00    4.10  274.   10.0  268.8    2.0
 16 01 01   1 20  -39.0  0.384 -9.000 -9.000 -999.  577.    161.9  0.37   0.49   1.00    3.10  257.   10.0  268.8    2.0
 16 01 01   1 21  -36.0  0.354 -9.000 -9.000 -999.  507.    138.2  0.30   0.49   1.00    3.10  280.   10.0  268.8    2.0
 16 01 01   1 22  -48.2  0.474 -9.000 -9.000 -999.  783.    247.4  0.30   0.49   1.00    4.10  272.   10.0  268.8    2.0
 16 01 01   1 23  -52.3  0.513 -9.000 -9.000 -999.  882.    289.9  0.37   0.49   1.00    4.10  250.   10.0  268.1    2.0
 16 01 01   1 24  -36.0  0.354 -9.000 -9.000 -999.  527.    138.2  0.30   0.49   1.00    3.10  280.   10.0  268.8    2.0
```

```
 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 16 01 01 01   10.0 1  251.    5.10   271.5   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                         ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR NOx                                           ***        16:18:38
                                                                                                                     PAGE   4
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                                             *** THE SUMMARY OF HIGHEST  1-HR RESULTS ***


                                                 ** CONC OF NO_X     IN MICROGRAMS/M**3                         **

                                                                    DATE
NETWORK
GROUP ID                                  AVERAGE CONC     (YYMMDDHH)             RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE
GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

A61      HIGH   1ST HIGH VALUE IS      10.86414  ON 16041809: AT (  562124.35,  4821558.39,   312.78,   312.78,    0.00)  DC


A62_1    HIGH   1ST HIGH VALUE IS      10.27362  ON 20041713: AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC


A62_2    HIGH   1ST HIGH VALUE IS      10.52920  ON 17082210: AT (  562057.04,  4821518.74,   312.38,   312.38,    0.00)  DC


B24      HIGH   1ST HIGH VALUE IS      11.34846  ON 16100611: AT (  562104.35,  4821538.39,   312.21,   312.21,    0.00)  DC


B25      HIGH   1ST HIGH VALUE IS       5.61718  ON 19020403: AT (  562364.35,  4821678.39,   311.09,   311.09,    0.00)  DC


B38      HIGH   1ST HIGH VALUE IS      28.22587  ON 20062508: AT (  562084.35,  4821538.39,   313.00,   313.00,    0.00)  DC


C114     HIGH   1ST HIGH VALUE IS      27.11165  ON 16011012: AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC


C115     HIGH   1ST HIGH VALUE IS      24.53601  ON 16011012: AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC
```

```
C119     HIGH   1ST HIGH VALUE IS      25.75981  ON 20102609: AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC


C75      HIGH   1ST HIGH VALUE IS      64.57981  ON 16101219: AT (  561980.29,  4821651.03,   314.37,   314.37,    0.00)  DC


G13      HIGH   1ST HIGH VALUE IS      41.58039  ON 16100308: AT (  562181.88,  4821648.05,   313.00,   313.00,    0.00)  DC


ALL      HIGH   1ST HIGH VALUE IS      71.42163  ON 20102609: AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC



 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                            ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR NOx                                             ***        16:18:38
                                                                                                                       PAGE   5
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                                *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***


                                    ** CONC OF NO_X     IN MICROGRAMS/M**3                          **

                                                      DATE
NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)             RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE
GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

A61      HIGH   1ST HIGH VALUE IS       6.72997  ON 16021024: AT (  562124.35,  4821558.39,   312.78,   312.78,    0.00)  DC


A62_1    HIGH   1ST HIGH VALUE IS       5.34205  ON 20010224: AT (  562050.10,  4821511.55,   312.07,   312.07,    0.00)  DC


A62_2    HIGH   1ST HIGH VALUE IS       5.25171  ON 20010224: AT (  562050.10,  4821511.55,   312.07,   312.07,    0.00)  DC


B24      HIGH   1ST HIGH VALUE IS       5.72695m ON 20112724: AT (  562244.35,  4821638.39,   312.00,   312.00,    0.00)  DC
```

```
B25      HIGH   1ST HIGH VALUE IS       2.69984m ON 20112724: AT (  562264.35,  4821658.39,   311.60,   311.60,    0.00)  DC

B38      HIGH   1ST HIGH VALUE IS      13.04707  ON 17012724: AT (  562070.91,  4821533.11,   313.00,   313.00,    0.00)  DC

C114     HIGH   1ST HIGH VALUE IS       8.57738  ON 17111324: AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC

C115     HIGH   1ST HIGH VALUE IS       7.84732  ON 17111324: AT (  562105.59,  4821569.03,   313.00,   313.00,    0.00)  DC

C119     HIGH   1ST HIGH VALUE IS       8.50582  ON 19062124: AT (  562098.65,  4821561.84,   313.00,   313.00,    0.00)  DC

C75      HIGH   1ST HIGH VALUE IS      38.66459  ON 18112724: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC

G13      HIGH   1ST HIGH VALUE IS      17.55669  ON 17050624: AT (  562188.81,  4821655.24,   313.00,   313.00,    0.00)  DC

ALL      HIGH   1ST HIGH VALUE IS      43.59820  ON 18112724: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                             ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR NOx                                              ***        16:18:38
                                                                                                                         PAGE   6
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of             0 Fatal Error Message(s)
 A Total of             1 Warning Message(s)
 A Total of           503 Informational Message(s)

 A Total of         43848 Hours Were Processed
```

```
A Total of            0 Calm Hours Identified

A Total of          503 Missing Hours Identified (  1.15 Percent)


   ******** FATAL ERROR MESSAGES ********
              ***  NONE  ***


   ********   WARNING MESSAGES   ********
ME W187     493       MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET
```

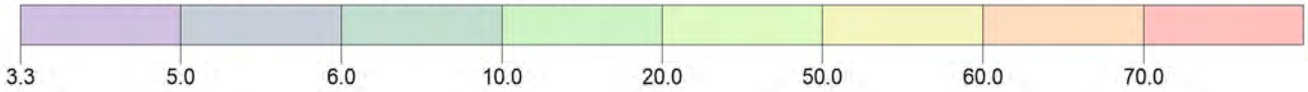
PROJECT TITLE:

OC Guelph Glass Plant
1 Hour NOx Emissions

PLOT FILE OF HIGH 1ST HIGH 1-HR VALUES FOR SOURCE GROUP: ALL

MICROGRAMS/M**3

Max: 71.4 [MICROGRAMS/M**3] at (562091.71, 4821554.66)



COMMENTS:

Statistical High = 66.136ug/m^3

SOURCES:

11

COMPANY NAME:

Owens Corning Guelph Facility

RECEPTORS:

2768

MODELER:

Montrose Environmental Solutions Canada Inc.

OUTPUT TYPE:

Concentration

SCALE: 1:10,000

0 0.3 km

MAX:

71.4 MICROGRAMS/M3**

DATE:

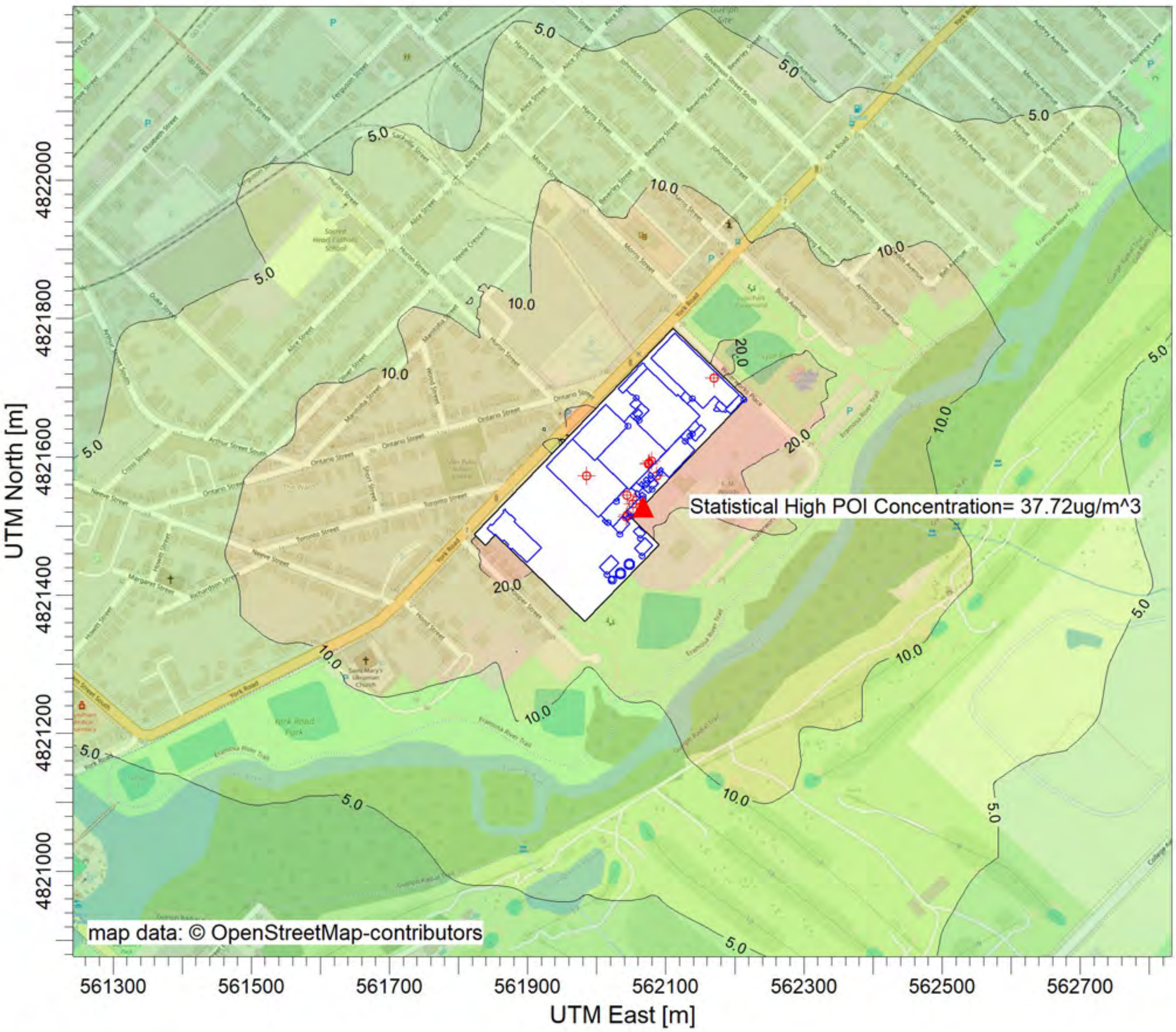
3/3/2025

PROJECT NO.:

24-035387

PROJECT TITLE:

OC Guelph Glass Plant
24 Hour NOx Emissions



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL MICROGRAMS/M**3

Max: 43.6 [MICROGRAMS/M**3] at (562063.97, 4821525.92)

0.4 0.5 0.8 1.0 5.0 10.0 20.0 40.0

COMMENTS: Statistical High = 37.715ug/m^3	SOURCES: **11**	COMPANY NAME: **Owens Corning Guelph Facility**	
	RECEPTORS: **2768**	MODELER: **Montrose Environmental Solutions Canada Inc.**	MONTROSE ENVIRONMENTAL
	OUTPUT TYPE: **Concentration**	SCALE: 1:10,000 0 0.3 km	
	MAX: **43.6 MICROGRAMS/M**3**	DATE: **3/3/2025**	PROJECT NO.: **24-035387**

APPENDIX Q
Acid Solubilized Fatty Acid Amide (Prop1) – 24 hour

Source Pathway - Source Inputs

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	C100	562030.95	4821551.64	313.00	14.40	0.00569	298.00	2.68	1.06
		CFM Forming Tunnel (South-West)							
POINT	C101	562036.05	4821557.02	313.00	14.40	0.00569	298.00	2.68	1.06
		CFM Forming Tunnel (South-East)							
POINT	C60	562071.97	4821582.38	313.11	22.80	0.00456	301.00	4.80	0.51
		Binder Circ. Tank Exhaust							
POINT	C72	562025.84	4821557.04	313.03	14.40	0.00569	298.00	2.68	1.06
		CFM Forming Tunnel (North-West)							
POINT	C75	561985.43	4821572.55	313.74	14.60	0.00055	518.00	38.90	0.60
		CFM RTO - Oven							
POINT	C99	562030.88	4821562.25	313.09	14.40	0.00569	298.00	2.68	1.06
		CFM Forming Tunnel (North - East)							

Control Pathway

Dispersion Options

Titles

OC Guelph
March 2025 SSS ESDMR PROP1

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

- ☒ Elevated Terrain
- ☐ No Stack-Tip Downwash (NOSTD)
- ☐ Run in Screening Mode
- ☐ Conversion of NOx to NO2 (OLM or PVMRM)
- ☐ No Checks for Non-Sequential Met Data
- ☐ Fast All Sources (FASTALL)
- ☐ Fast Area Sources (FASTAREA)
- ☐ Optimized Area Source Plume Depletion
- ☐ Gas Deposition

BETA Options:

- ☒ Capped and Horizontal Stack Releases
- ☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
- ☐ Low Wind Options

- ☐ SCIM (Sampled Chronological Input Model)
- ☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

- ☒ Concentration
- ☐ Total Deposition (Dry & Wet)
- ☐ Dry Deposition
- ☐ Wet Deposition

Plume Depletion

- ☐ Dry Removal
- ☐ Wet Removal

Output Warnings

- ☐ No Output Warnings
- ☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - PROP1

Averaging Time Options

Hours	☐	☐	☐	☐	☐	☐	☐	☒
	1	2	3	4	6	8	12	24

☐ Month ☐ Period ☐ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Acid Solubilized Fatty Acid Amide (Prop1) - 24 Hour Averaging Period

*** THE MAXIMUM 1000 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***

RANK BY YEAR	YEAR	RANK	CONC	YYYYMMDDHH	XR	YR	TYPE	Ontario Reg. 419/05
1	2020	1	8.17973	2020012824	562064.35	4821518.39	DC	Discarded
1	2018	2	8.02021	2018071724	562064.35	4821518.39	DC	Discarded
1	2019	3	7.98946	2019070224	562063.97	4821525.92	DC	Discarded
2	2020	4	7.98904	2020012824	562063.97	4821525.92	DC	Discarded
3	2020	5	7.97397	2020071324	562064.35	4821518.39	DC	Highest

```
*** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

** Model Options Selected:
     * Model Allows User-Specified Options
     * Model Is Setup For Calculation of Average CONCentration Values.
     * NO GAS DEPOSITION Data Provided.
     * NO PARTICLE DEPOSITION Data Provided.
     * Model Uses NO DRY DEPLETION. DDPLETE  =  F
     * Model Uses NO WET DEPLETION. WETDPLT  =  F
     * Stack-tip Downwash.
     * Model Accounts for ELEVated Terrain Effects.
     * Use Calms Processing Routine.
     * Use Missing Data Processing Routine.
     * No Exponential Decay.
     * Model Uses RURAL Dispersion Only.
     * ADJ_U*   - Use ADJ_U* option for SBL in AERMET
     * CCVR_Sub - Meteorological data includes CCVR substitutions
     * TEMP_Sub - Meteorological data includes TEMP substitutions
     * Model Accepts FLAGPOLE Receptor . Heights.
     * The User Specified a Pollutant Type of: PROP1

**Model Calculates  1 Short Term Average(s) of:  24-HR

**This Run Includes:      6 Source(s);       7 Source Group(s); and    2640 Receptor(s)

               with:      6 POINT(s), including
                          0 POINTCAP(s) and      0 POINTHOR(s)
                and:      0 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 RLINE/RLINEXT source(s)
                and:      0 OPENPIT source(s)
                and:      0 BUOYANT LINE source(s) with a total of     0 line(s)
                and:      0 SWPOINT source(s)


**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date:  22112
```

```
**Output Options Selected:
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   325.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                 Emission Units = GRAMS/S                                  ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =      4.6 MB of RAM.

**Input Runstream File:          aermod.inp

**Output Print File:             aermod.out


**File for Summary of Results:   ESDMR_PROP1_R0.sum

↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                         ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR PROP1                                        ***        14:06:37
                                                                                                                    PAGE   2
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                         *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                            (1=YES; 0=NO)

           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1

               NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                                 *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                          (METERS/SEC)
```

```
                                          1.54,   3.09,   5.14,   8.23,  10.80,
```

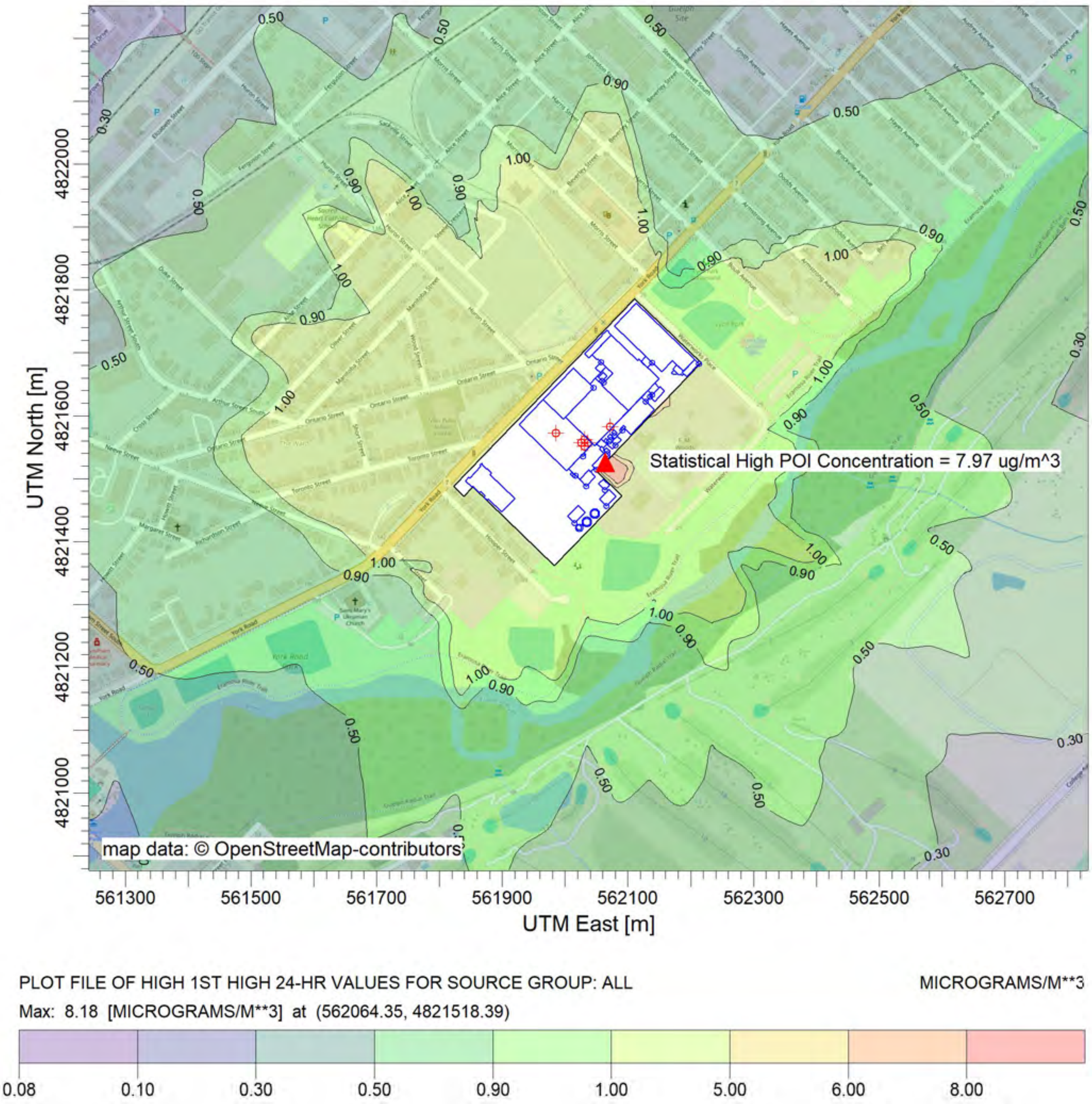
```
*** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                   *** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

  Surface file:   E:\_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC          Met Version:  22112
  Profile file:   E:\_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL
  Surface format: FREE
  Profile format: FREE
  Surface station no.:    61430                  Upper air station no.:    14733
                 Name: UNKNOWN                                    Name: BUFFALO/GREATER_BUFFALO_INT'L
                 Year:   2016                                     Year:   2016

First 24 hours of scalar data
YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS   WD     HT  REF TA     HT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
16 01 01   1 01  -64.0  0.640 -9.000 -9.000 -999. 1230.    451.0  0.37   0.49   1.00    5.10  251.   10.0  271.4    2.0
16 01 01   1 02  -64.0  0.640 -9.000 -9.000 -999. 1230.    451.0  0.37   0.49   1.00    5.10  248.   10.0  270.9    2.0
16 01 01   1 03  -58.4  0.579 -9.000 -9.000 -999. 1063.    368.8  0.37   0.49   1.00    4.60  254.   10.0  270.9    2.0
16 01 01   1 04  -64.0  0.723 -9.000 -9.000 -999. 1472.    575.1  0.37   0.49   1.00    5.70  253.   10.0  270.9    2.0
16 01 01   1 05  -58.5  0.579 -9.000 -9.000 -999. 1082.    368.8  0.37   0.49   1.00    4.60  243.   10.0  270.3    2.0
16 01 01   1 06  -58.5  0.579 -9.000 -9.000 -999. 1058.    368.8  0.37   0.49   1.00    4.60  242.   10.0  270.3    2.0
16 01 01   1 07  -51.9  0.514 -9.000 -9.000 -999.  888.    290.1  0.37   0.49   1.00    4.10  245.   10.0  270.3    2.0
16 01 01   1 08  -54.2  0.535 -9.000 -9.000 -999.  938.    314.5  0.30   0.49   1.00    4.60  283.   10.0  269.2    2.0
16 01 01   1 09  -62.3  0.645 -9.000 -9.000 -999. 1242.    458.0  0.37   0.49   0.78    5.10  257.   10.0  269.8    2.0
16 01 01   1 10  -15.3  0.547 -9.000 -9.000 -999.  982.    929.6  0.30   0.49   0.62    4.60  271.   10.0  269.2    2.0
16 01 01   1 11    4.5  0.622  0.333  0.005  283. 1176.  -4620.6  0.37   0.49   0.55    5.10  264.   10.0  268.8    2.0
16 01 01   1 12    9.0  0.564  0.468  0.005  396. 1021.  -1737.7  0.37   0.49   0.53    4.60  246.   10.0  268.8    2.0
16 01 01   1 13   16.4  0.566  0.636  0.005  545. 1023.   -962.9  0.37   0.49   0.53    4.60  253.   10.0  268.8    2.0
16 01 01   1 14   13.8  0.625  0.614  0.005  582. 1185.  -1540.1  0.37   0.49   0.53    5.10  259.   10.0  268.8    2.0
16 01 01   1 15    7.0  0.474  0.493  0.006  592.  805.  -1314.3  0.30   0.49   0.56    4.10  272.   10.0  269.2    2.0
16 01 01   1 16  -14.2  0.486 -9.000 -9.000 -999.  812.    703.5  0.30   0.49   0.64    4.10  274.   10.0  268.8    2.0
16 01 01   1 17  -46.1  0.475 -9.000 -9.000 -999.  785.    247.8  0.30   0.49   0.83    4.10  271.   10.0  268.8    2.0
16 01 01   1 18  -52.2  0.513 -9.000 -9.000 -999.  882.    290.0  0.37   0.49   1.00    4.10  257.   10.0  268.8    2.0
16 01 01   1 19  -48.2  0.474 -9.000 -9.000 -999.  786.    247.4  0.30   0.49   1.00    4.10  274.   10.0  268.8    2.0
16 01 01   1 20  -39.0  0.384 -9.000 -9.000 -999.  577.    161.9  0.37   0.49   1.00    3.10  257.   10.0  268.8    2.0
16 01 01   1 21  -36.0  0.354 -9.000 -9.000 -999.  507.    138.2  0.30   0.49   1.00    3.10  280.   10.0  268.8    2.0
16 01 01   1 22  -48.2  0.474 -9.000 -9.000 -999.  783.    247.4  0.30   0.49   1.00    4.10  272.   10.0  268.8    2.0
16 01 01   1 23  -52.3  0.513 -9.000 -9.000 -999.  882.    289.9  0.37   0.49   1.00    4.10  250.   10.0  268.1    2.0
16 01 01   1 24  -36.0  0.354 -9.000 -9.000 -999.  527.    138.2  0.30   0.49   1.00    3.10  280.   10.0  268.8    2.0
```

```
 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 16 01 01 01   10.0 1  251.    5.10   271.5   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                     ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR PROP1                                     ***        14:06:37
                                                                                                                 PAGE   4
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                                     *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***


                                           ** CONC OF PROP1    IN MICROGRAMS/M**3                          **

                                                          DATE
NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE
GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

C100     HIGH   1ST HIGH VALUE IS       2.30762  ON 19070224: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


C101     HIGH   1ST HIGH VALUE IS       2.35592  ON 16081824: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


C60      HIGH   1ST HIGH VALUE IS       1.22958  ON 16081824: AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC


C72      HIGH   1ST HIGH VALUE IS       2.05512  ON 19070224: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


C75      HIGH   1ST HIGH VALUE IS       0.05519  ON 18112724: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


C99      HIGH   1ST HIGH VALUE IS       2.13336  ON 18071724: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


ALL      HIGH   1ST HIGH VALUE IS       8.17973  ON 20012824: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
```

```
                    DC = DISCCART
                    DP = DISCPOLR
 *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                               ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR PROP1                                              ***        14:06:37
                                                                                                                          PAGE   5
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of           0 Fatal Error Message(s)
 A Total of           1 Warning Message(s)
 A Total of         503 Informational Message(s)

 A Total of       43848 Hours Were Processed

 A Total of           0 Calm Hours Identified

 A Total of         503 Missing Hours Identified (  1.15 Percent)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W187     298       MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET
```

PROJECT TITLE:

OC Guelph Glass Plant
24 hour Acid Solubilized Fatty Acid Amide (Prop1) Emissions



PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

MICROGRAMS/M**3

Max: 8.18 [MICROGRAMS/M**3] at (562064.35, 4821518.39)

COMMENTS:

Statistical High: 7.974 ug/m^3

SOURCES:

6

COMPANY NAME:

Owens Corning Guelph Facility

RECEPTORS:

2768

MODELER:

Montrose Environmental Solutions Canada Inc.

MONTROSE ENVIRONMENTAL

OUTPUT TYPE:

Concentration

SCALE:

1:10,000

0 0.3 km

MAX:

8.18 MICROGRAMS/M3**

DATE:

3/3/2025

PROJECT NO.:

24-035387

APPENDIX Q
Acid Solubilized Fatty Acid Amide (Prop2) – 24 hour

Source Pathway - Source Inputs

Point Sources

Source Type	Source ID	X Coordinate [m]	Y Coordinate [m]	Base Elevation (Optional)	Release Height [m]	Emission Rate [g/s]	Gas Exit Temp. [K]	Gas Exit Velocity [m/s]	Stack Inside Diameter [m]
POINT	C100	562030.95 CFM Forming Tunnel (South-West)	4821551.64	313.00	14.40	0.00253	298.00	2.68	1.06
POINT	C101	562036.05 CFM Forming Tunnel (South-East)	4821557.02	313.00	14.40	0.00253	298.00	2.68	1.06
POINT	C60	562071.97 Binder Circ. Tank Exhaust	4821582.38	313.11	22.80	0.00202	301.00	4.80	0.51
POINT	C72	562025.84 CFM Forming Tunnel (North-West)	4821557.04	313.03	14.40	0.00253	298.00	2.68	1.06
POINT	C75	561985.43 CFM RTO - Oven	4821572.55	313.74	14.60	0.00024	518.00	38.90	0.60
POINT	C99	562030.88 CFM Forming Tunnel (North - East)	4821562.25	313.09	14.40	0.00253	298.00	2.68	1.06

Control Pathway

Dispersion Options

Titles

OC Guelph
March 2025 SSS ESDMR PROP2

Dispersion Options

☐ Regulatory Default ☒ Non-Default Options

- ☒ Elevated Terrain
- ☐ No Stack-Tip Downwash (NOSTD)
- ☐ Run in Screening Mode
- ☐ Conversion of NOx to NO2 (OLM or PVMRM)
- ☐ No Checks for Non-Sequential Met Data
- ☐ Fast All Sources (FASTALL)
- ☐ Fast Area Sources (FASTAREA)
- ☐ Optimized Area Source Plume Depletion
- ☐ Gas Deposition

BETA Options:

- ☒ Capped and Horizontal Stack Releases
- ☐ Adjusted Friction Velocity (u*) in AERMET (ADJ_U*)
- ☐ Low Wind Options

- ☐ SCIM (Sampled Chronological Input Model)
- ☐ Ignore Urban Night / Daytime Transition (NOURBTRAN)

Dispersion Coefficient

Rural

Output Type

- ☒ Concentration
- ☐ Total Deposition (Dry & Wet)
- ☐ Dry Deposition
- ☐ Wet Deposition

Plume Depletion

- ☐ Dry Removal
- ☐ Wet Removal

Output Warnings

- ☐ No Output Warnings
- ☐ Non-fatal Warnings for Non-sequential Met Data

Pollutant / Averaging Time / Terrain Options

Pollutant Type

OTHER - PROP1

Averaging Time Options

Hours	☐	☐	☐	☐	☐	☐	☐	☒
	1	2	3	4	6	8	12	24

☐ Month ☐ Period ☐ Annual

Exponential Decay

☐ Yes ☒ No

Terrain Height Options

☐ Flat ☒ Elevated

SO: Meters
RE: Meters
TG: Meters

Flagpole Receptors

☒ Yes ☐ No

Default Height = 0.00 m

Meteorology Pathway

AERMOD

Met Input Data

Surface Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC

Format Type: Default AERMET format

Profile Met Data

Filename: E:_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL

Format Type: Default AERMET format

Wind Speed

☐ Wind Speeds are Vector Mean (Not Scalar Means)

Wind Direction

Rotation Adjustment [deg]:

Potential Temperature Profile

Base Elevation above MSL (for Primary Met Tower): 325.00 [m]

Meteorological Station Data

Stations	Station No.	Year	X Coordinate [m]	Y Coordinate [m]	Station Name
Surface		2016			
Upper Air		2016			BUFFALO/GREATER BUFFALO INT'L
On-Site		2016			

Data Period

Data Period to Process

Start Date: 1/1/2016 Start Hour: 1 End Date: 12/31/2020 End Hour: 24

Wind Speed Categories

Stability Category	Wind Speed [m/s]	Stability Category	Wind Speed [m/s]
A	1.54	D	8.23
B	3.09	E	10.8
C	5.14	F	No Upper Bound

Acid Solubilized Fatty Acid Amide (Prop2) - 24 Hour Averaging Period

*** THE MAXIMUM 1000 24-HR AVERAGE CONCENTRATION VALUES FOR SOURCE GROUP: ALL ***

RANK BY YEAR	YEAR	RANK	CONC	YYYYMMDDHH	XR	YR	TYPE	Ontario Reg. 419/05
1	2020	1	3.63544	2020012824	562064.35	4821518.39	DC	Discarded
1	2018	2	3.56454	2018071724	562064.35	4821518.39	DC	Discarded
1	2019	3	3.55087	2019070224	562063.97	4821525.92	DC	Discarded
2	2020	4	3.55068	2020012824	562063.97	4821525.92	DC	Discarded
3	2020	5	3.54399	2020071324	562064.35	4821518.39	DC	Highest

```
                                           ***     MODEL SETUP OPTIONS SUMMARY       ***
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

** Model Options Selected:
     * Model Allows User-Specified Options
     * Model Is Setup For Calculation of Average CONCentration Values.
     * NO GAS DEPOSITION Data Provided.
     * NO PARTICLE DEPOSITION Data Provided.
     * Model Uses NO DRY DEPLETION. DDPLETE  =  F
     * Model Uses NO WET DEPLETION. WETDPLT  =  F
     * Stack-tip Downwash.
     * Model Accounts for ELEVated Terrain Effects.
     * Use Calms Processing Routine.
     * Use Missing Data Processing Routine.
     * No Exponential Decay.
     * Model Uses RURAL Dispersion Only.
     * ADJ_U*   - Use ADJ_U* option for SBL in AERMET
     * CCVR_Sub - Meteorological data includes CCVR substitutions
     * TEMP_Sub - Meteorological data includes TEMP substitutions
     * Model Accepts FLAGPOLE Receptor . Heights.
     * The User Specified a Pollutant Type of: PROP1

**Model Calculates  1 Short Term Average(s) of:  24-HR

**This Run Includes:      6 Source(s);       7 Source Group(s); and    2640 Receptor(s)

               with:      6 POINT(s), including
                          0 POINTCAP(s) and      0 POINTHOR(s)
                and:      0 VOLUME source(s)
                and:      0 AREA type source(s)
                and:      0 LINE source(s)
                and:      0 RLINE/RLINEXT source(s)
                and:      0 OPENPIT source(s)
                and:      0 BUOYANT LINE source(s) with a total of     0 line(s)
                and:      0 SWPOINT source(s)


**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date:  22112
```

```
**Output Options Selected:
         Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
         Model Outputs Tables of Overall Maximum Short Term Values (MAXTABLE Keyword)
         Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
         Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE:  The Following Flags May Appear Following CONC Values:  c for Calm Hours
                                                                m for Missing Hours
                                                                b for Both Calm and Missing Hours

**Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   325.00 ;  Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                 Emission Units = GRAMS/S                                  ;  Emission Rate Unit Factor =   0.10000E+07
                 Output Units   = MICROGRAMS/M**3

**Approximate Storage Requirements of Model =      4.6 MB of RAM.

**Input Runstream File:          aermod.inp

**Output Print File:             aermod.out


**File for Summary of Results:   ESDMR_PROP2_R0.sum

↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                        ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR PROP2                                        ***        14:52:37
                                                                                                                     PAGE   2
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                     *** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
                                                      (1=YES; 0=NO)

           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1  1 1 1 1 1 1

              NOTE:  METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.


                                *** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
                                                         (METERS/SEC)
```

```
                                                      1.54,   3.09,   5.14,   8.23,  10.80,
```

```
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                  *** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

   Surface file:   E:\_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.SFC          Met Version:  22112
   Profile file:   E:\_Site Specific Met\OCGuelph_ONLY\V22112\OwensCorning_Guelph_22112.PFL
   Surface format: FREE
   Profile format: FREE
   Surface station no.:    61430                  Upper air station no.:    14733
                  Name: UNKNOWN                                    Name: BUFFALO/GREATER_BUFFALO_INT'L
                  Year:   2016                                     Year:   2016

 First 24 hours of scalar data
 YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0  BOWEN ALBEDO  REF WS   WD     HT  REF TA     HT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
 16 01 01   1 01  -64.0  0.640 -9.000 -9.000 -999. 1230.    451.0  0.37   0.49   1.00    5.10  251.   10.0  271.4    2.0
 16 01 01   1 02  -64.0  0.640 -9.000 -9.000 -999. 1230.    451.0  0.37   0.49   1.00    5.10  248.   10.0  270.9    2.0
 16 01 01   1 03  -58.4  0.579 -9.000 -9.000 -999. 1063.    368.8  0.37   0.49   1.00    4.60  254.   10.0  270.9    2.0
 16 01 01   1 04  -64.0  0.723 -9.000 -9.000 -999. 1472.    575.1  0.37   0.49   1.00    5.70  253.   10.0  270.9    2.0
 16 01 01   1 05  -58.5  0.579 -9.000 -9.000 -999. 1082.    368.8  0.37   0.49   1.00    4.60  243.   10.0  270.3    2.0
 16 01 01   1 06  -58.5  0.579 -9.000 -9.000 -999. 1058.    368.8  0.37   0.49   1.00    4.60  242.   10.0  270.3    2.0
 16 01 01   1 07  -51.9  0.514 -9.000 -9.000 -999.  888.    290.1  0.37   0.49   1.00    4.10  245.   10.0  270.3    2.0
 16 01 01   1 08  -54.2  0.535 -9.000 -9.000 -999.  938.    314.5  0.30   0.49   1.00    4.60  283.   10.0  269.2    2.0
 16 01 01   1 09  -62.3  0.645 -9.000 -9.000 -999. 1242.    458.0  0.37   0.49   0.78    5.10  257.   10.0  269.8    2.0
 16 01 01   1 10  -15.3  0.547 -9.000 -9.000 -999.  982.    929.6  0.30   0.49   0.62    4.60  271.   10.0  269.2    2.0
 16 01 01   1 11    4.5  0.622  0.333  0.005  283. 1176.  -4620.6  0.37   0.49   0.55    5.10  264.   10.0  268.8    2.0
 16 01 01   1 12    9.0  0.564  0.468  0.005  396. 1021.  -1737.7  0.37   0.49   0.53    4.60  246.   10.0  268.8    2.0
 16 01 01   1 13   16.4  0.566  0.636  0.005  545. 1023.   -962.9  0.37   0.49   0.53    4.60  253.   10.0  268.8    2.0
 16 01 01   1 14   13.8  0.625  0.614  0.005  582. 1185.  -1540.1  0.37   0.49   0.53    5.10  259.   10.0  268.8    2.0
 16 01 01   1 15    7.0  0.474  0.493  0.006  592.  805.  -1314.3  0.30   0.49   0.56    4.10  272.   10.0  269.2    2.0
 16 01 01   1 16  -14.2  0.486 -9.000 -9.000 -999.  812.    703.5  0.30   0.49   0.64    4.10  274.   10.0  268.8    2.0
 16 01 01   1 17  -46.1  0.475 -9.000 -9.000 -999.  785.    247.8  0.30   0.49   0.83    4.10  271.   10.0  268.8    2.0
 16 01 01   1 18  -52.2  0.513 -9.000 -9.000 -999.  882.    290.0  0.37   0.49   1.00    4.10  257.   10.0  268.8    2.0
 16 01 01   1 19  -48.2  0.474 -9.000 -9.000 -999.  786.    247.4  0.30   0.49   1.00    4.10  274.   10.0  268.8    2.0
 16 01 01   1 20  -39.0  0.384 -9.000 -9.000 -999.  577.    161.9  0.37   0.49   1.00    3.10  257.   10.0  268.8    2.0
 16 01 01   1 21  -36.0  0.354 -9.000 -9.000 -999.  507.    138.2  0.30   0.49   1.00    3.10  280.   10.0  268.8    2.0
 16 01 01   1 22  -48.2  0.474 -9.000 -9.000 -999.  783.    247.4  0.30   0.49   1.00    4.10  272.   10.0  268.8    2.0
 16 01 01   1 23  -52.3  0.513 -9.000 -9.000 -999.  882.    289.9  0.37   0.49   1.00    4.10  250.   10.0  268.1    2.0
 16 01 01   1 24  -36.0  0.354 -9.000 -9.000 -999.  527.    138.2  0.30   0.49   1.00    3.10  280.   10.0  268.8    2.0
```

```
 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 16 01 01 01   10.0 1  251.    5.10   271.5   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                        ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR PROP2                                        ***        14:52:37
                                                                                                                    PAGE   4
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

                                                      *** THE SUMMARY OF HIGHEST 24-HR RESULTS ***


                                          ** CONC OF PROP1    IN MICROGRAMS/M**3                          **

                                                         DATE
NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)            RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE
GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
-

C100     HIGH   1ST HIGH VALUE IS       1.02561  ON 19070224: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


C101     HIGH   1ST HIGH VALUE IS       1.04707  ON 16081824: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


C60      HIGH   1ST HIGH VALUE IS       0.54648  ON 16081824: AT (  562091.71,  4821554.66,   312.98,   312.98,    0.00)  DC


C72      HIGH   1ST HIGH VALUE IS       0.91339  ON 19070224: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


C75      HIGH   1ST HIGH VALUE IS       0.02453  ON 18112724: AT (  562063.97,  4821525.92,   312.69,   312.69,    0.00)  DC


C99      HIGH   1ST HIGH VALUE IS       0.94816  ON 18071724: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


ALL      HIGH   1ST HIGH VALUE IS       3.63544  ON 20012824: AT (  562064.35,  4821518.39,   312.36,   312.36,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
```

```
                     DC = DISCCART
                     DP = DISCPOLR
↑ *** AERMOD - VERSION 22112  ***   *** OC Guelph                                                                  ***        02/06/25
 *** AERMET - VERSION  22112 ***   *** March 2025 SSS ESDMR PROP2                                                  ***        14:52:37
                                                                                                                               PAGE   5
 *** MODELOPTs:    CONC  ELEV  FLGPOL  NODRYDPLT  NOWETDPLT  RURAL  ADJ_U*

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            1 Warning Message(s)
 A Total of          503 Informational Message(s)

 A Total of        43848 Hours Were Processed

 A Total of            0 Calm Hours Identified

 A Total of          503 Missing Hours Identified (  1.15 Percent)


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W187     298       MEOPEN: ADJ_U* Option for Stable Low Winds used in AERMET
```

PROJECT TITLE:

OC Guelph Glass Plant
24 Hour Acid Solubilized Fatty Acid Amide (Prop2) Emissions

PLOT FILE OF HIGH 1ST HIGH 24-HR VALUES FOR SOURCE GROUP: ALL

MICROGRAMS/M**3

Max: 3.64 [MICROGRAMS/M**3] at (562064.35, 4821518.39)

COMMENTS: Statistical High: 3.544 ug/m^3	SOURCES: **6**	COMPANY NAME: **Owens Corning Guelph Facility**
	RECEPTORS: **2768**	MODELER: **Montrose Environmental Solutions Canada Inc.**
	OUTPUT TYPE: **Concentration**	SCALE: 1:10,000 0 — 0.3 km
	MAX: **3.64 MICROGRAMS/M**3**	DATE: **3/3/2025**
		PROJECT NO.: **24-035387**

MONTROSE ENVIRONMENTAL

APPENDIX R
Source Testing Documentation

SOURCE TEST REPORT

Evaluation of Hexavalent Chromium Emissions From Selected Sources Owens Corning Guelph Glass Plant

June 2024

Prepared for:

Owens Corning Composite Materials Canada - LP
247 York Road
Guelph, ON
N1H 6P6

Attention: Jeff Taylor

Prepared by:

Montrose Environmental Group, Ltd.
704 Mara Street, Suite 210
Point Edward, Ontario, N7V 1X4

Project No. 032615
August 9, 2024

Executive Summary

Montrose Environmental Group Ltd. (Montrose) was retained by Owens Corning Composite Materials Canada – LP to conduct a hexavalent chromium emissions sampling program at the Guelph, Ontario facility (OC Guelph).

Table I lists the sources assessed for this program.

Table I: Sources of Interest

Source / Stacks
T105 Furnace West Furnace Stack (B24)
T105 Furnace East Furnace Stack (B25)
T105 Forehearth Stack (B38)
Furnace Hall Ventilation Fans (B33, B34, C79)

Sampling was performed June 18 - 20, 2024. Sampling results are summarized in Tables II - IV.

Table II: Hexavalent Chromium Emissions - Furnace Sources

Parameter	Units	T105 West (B24)	T105 East (B25)	T105 Furnace Aggregate
Cr^{6+} Concentration	µg/R.m^3	12.2	21.7	16.9
Cr^{6+} Mass Emissions	**g/s**	**8.87E-06**	**1.50E-05**	**2.39E-05**
Reference Flow Rate (dry)	R.m^3/s,d	0.73	0.70	1.43

Table III: Hexavalent Chromium Emissions – Forehearth Source

Parameter	Units	T105 Forehearth (B38)
Cr^{6+} Concentration	µg/R.m^3	30.7
Cr^{6+} Mass Emissions	**g/s**	**8.08E-05**
Reference Flow Rate (dry)	R.m^3/s,d	2.63

Table IV: Hexavalent Chromium Emissions – Ventilation Sources

Parameter	Units	Furnace Hall Ventilation Fans		
		B33	B34	C79
Cr^{6+} Concentration	µg/R.m^3	0.16	0.22	*0.11*
Cr^{6+} Mass Emissions	**g/s**	**3.06E-06**	**4.11E-06**	***2.07E-06***
Reference Flow Rate (dry)	R.m^3/s,d	19.2	18.8	19.1

Italics indicate results below analytical limit of reporting.

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1. Introduction

Background

Montrose Environmental Group Ltd. (Montrose) was retained by Owens Corning Composite Materials Canada – LP to conduct a hexavalent chromium emissions sampling program at the Guelph, Ontario facility (OC Guelph). The results from this source sampling program will be used to assess current emissions for the development of a site-specific standard renewal application, and to assess facility emissions in lieu of continued ambient monitoring.

Scope of Work

Table 1 provides a sampling matrix for the testing program.

Table 1: Test Matrix

Source / Stacks	Sampling
T105 Furnace West Stack (B24)	*Minimum* triplicate hexavalent chromium sampling
T105 Furnace East Stack (B25)	*Minimum* triplicate hexavalent chromium sampling
T105 Forehearth Stack (B38)	*Minimum* triplicate hexavalent chromium sampling
Furnace Hall Ventilation Fans (B33, B34, C79)	Triplicate hexavalent chromium sampling from each of three ventilation fans

Test Program Organization

Table 2 provides a list of responsible parties for the testing program.

Table 2: Test Program Organization

Company Name:	Owens Corning Canada LP 247 York Road, P.O. Box 3603, Guelph, ON, N1H 6P6
Facility Environmental Contact:	**Jeff Taylor** Tel: (519) 823-7328 Email: Jeff.Taylor@owenscorning.com
Ministry of Environment, Conservation and Parks Officer:	**Jacqueline Lamport** Senior Environmental Officer Guelph District Office Tel: 519-240-4327 Email: jacqueline.lamport@ontario.ca
Ministry of Environment, Conservation and Parks TSS:	Source Assessment Specialist Technology Standards Section 40 St. Clair Ave. West, 7th Floor Toronto, ON, M4V 1M2 Email: source.testing@ontario.ca
Sampling Company:	Montrose Environmental Group, Ltd. 704 Mara Street, Suite 210 Point Edward, ON, N7V 1X4
Project Manager:	**Guy Bastien**, P.Eng. Tel: (519) 336-4101, Ext. 248 Email: gubastien@montrose-env.com
Analytical Laboratory:	**Breanne Dusureault** ALS Environmental 1435 Norjohn Court Burlington, ON, L7L 0E6 Email: Breanne.Dusureault@alsglobal.com

2. Process Description

General

The OC Guelph Glass plant produces textile glass yarn and fiberglass for reinforcements for the commercial and industrial market. This facility is the sole producer of Continuous Filament Mat (CFM) in Ontario and Canada. The NAICS code for the facility is 327214: *Glass Manufacturing*. The facility operates under Amended Environmental Compliance Approval Number 4548-AA3QXU (ECA), issued on June 22, 2016. A copy of the current ECA is provided in Appendix A.

The main manufacturing operations include:

- Raw materials storage and handling
- Glass melting
- Production of textile glass and textile glass products
- Packaging of products
- Product storage, handling, and shipping

Glass Melting

Raw materials, such as clay, silica sand, and limestone are received in bulk and stored in silos. These materials are automatically weighed and mixed to form a mixed batch, which is then pneumatically conveyed to storage hoppers located above the melting unit (furnace).

Glass melting occurs in a natural gas-fired furnace. The gas burners for this furnace use an oxygen / gas-fired combustion system and an e-boost system. The batch of mixed raw material is fed into the rear of the furnace and melts to form a molten homogeneous glass. Chemical components in the batch cause gas bubbling in the mixture, and result in particulate and gaseous emissions.

Molten glass flows from the melter via channels into the forehearth leading to the fiber forming area. The forehearth areas are also heated with natural gas and use an oxygen / gas-fired combustion system to maintain glass in a molten state. The molten glass flows to electrically heated bushings, which contain numerous small holes through which the glass is drawn.

Furnace Hall Ventilation

Ventilation fans are provided in the furnace hall for worker comfort. The operations of these fans are dependent on the season and/or outdoor meteorological conditions, and can be operated at variable exhaust velocity settings, to maintain desired working conditions and to protect the roof deck from heat damage.

During cold months, most of the ventilation fans are typically not operated, or are operated at low-speed settings. During warmer months, most or all the ventilation fans are operated. For the purposes of this study, Fans B33, B34 and C79 were all operated at constant exhaust rates throughout the program.

Due to weather conditions encountered during this sampling program (i.e., high ambient temperatures), Fan C80 was also in operation during testing. However, it was not sampled as part of this program.

3. Sampling Locations

Physical Parameters

Table 3 summarizes the physical characteristics of the furnace and forehearth stacks sampled for this program. Appendix B provides photographs of the stacks.

Table 3: Physical Parameters of Selected Stacks

Parameter	T105 West Furnace Stack	T105 East Furnace Stack	T105 Forehearth Stack
Stack ID	B24	B25	B38
Stack Configuration	Vertical, flow upwards	Vertical, flow upwards	Vertical, flow upwards
Stack Notes	Jacketed with 7.6 cm (3”) of insulation and metal jacketing	Jacketed with 7.6 cm (3”) of insulation and metal jacketing	Train supported by table from roof deck
Stack Diameter	~0.44 m (~17.5”)	~0.44 m (~17.5”)	0.75 m (29.5”)
Number of Sample Ports	2 (90° apart)	2 (90° apart)	2 (90° apart)
Port Diameter	10 cm (4”)	10 cm (4”)	10 cm (4”)
Port Length	30.5 cm (12”)	30.5 cm (12”)	18 cm (7”)
Upstream Distance before Ports	~2.0 m (~6.5’) or < 8 Φ	~2.0 m (~6.5’) or < 8 Φ	< 8 Φ
Downstream Distance after Ports	~5.5 m (~18’) or > 2 Φ	~5.5 m (~18’) or > 2 Φ	> 2 Φ
No. of Sample Points	16	16	16
Sampling Matrix	2 x 8	2 x 8	2 x 8

Φ = stack diameter

Furnace Hall Roof Vent Design

The Furnace Hall roof vents all have a similar design. Each fan is positioned over openings in the furnace hall roof, with no associated ductwork, allowing heated indoor air to be ventilated as it rises naturally to the roof level.

The exhaust fans are located at roof level and consist of circular fan housings and exhaust shrouds. The exhaust systems are all fitted with a louvered (butterfly) damper system above the fan. Roof ventilation fans B33 and B34 are also fitted with acoustic silencers. Appendix B provides photographs depicting the roof ventilation fans.

4. Sampling Methodology

Effluent Parameters

Effluent parameters were determined by the following *Ontario Source Testing Code*, Version #3 (OSTC) Methods:

- **Method ON-1**: *Location of Sampling Site and Sampling Points*
- **Method ON-2**: *Determination of Stack Gas Velocity and Volumetric Flow Rate*
- **Method ON-3:** *Determination of Molecular Weight of Dry Stack Gas*
- **Method ON-4**: *Determination of Moisture Content of Stack Gas*

Effluent gas is mainly composed of oxygen (O_2), carbon dioxide (CO_2), and nitrogen (N_2). Furnace and forehearth process gas compositions were measured with a portable flue gas analyzer. The gas composition for the roof ventilation source was assumed to be the same as ambient air (20.9% O_2, 0% CO_2).

Velocity pressure and temperature measurements are used to determine average stack gas velocities. The product of the average stack gas velocity and the cross-sectional area of the duct is the actual volumetric flow rate. The actual volumetric flow rate is converted to Ontario reference conditions (25°C and 101.3 kPa) using the gas laws. The dry reference volumetric flow rate is calculated by subtracting the moisture fraction from the reference volume rate.

Hexavalent Chromium Sampling

Table 4 summarizes hexavalent chromium sampling method details.

Table 4: Hexavalent Chromium Sampling Method Specifications

Item	Specification
Test Method	
Reference:	US EPA Method 0061(Ref: SW-846): *Determination of Hexavalent Chromium Emissions from Stationary Sources*
Sampling Technique:	Isokinetic (except where noted), with circulation of impinger solution to the probe. Teflon reagent circulation tubing was maintained outside of the stack on hot sources to prevent melting and/or minimize evaporation of the circulating solution.
Sampling Train	
Nozzle:	Glass, where applicable (not required for non-isokinetic sampling on the roof vent)
Probe liner:	5/8” glass liner; 5/8” Teflon line for roof vent sampling (no probe used)
Filter:	No filter (probe exit or Teflon line connected directly to impingers)
Recirculation System:	Peristaltic pump circulating impinger solution from impinger #1 into the probe liner / Teflon line
Impingers:	Full sized Teflon® with 3/8” OD Teflon stems and connectors, containing: • Impinger #1: 150 mL of 0.1 N or 0.5 N* KOH • Impinger #2: 75 mL of 0.1 N or 0.5 N* KOH • Impinger #3: 75 mL of 0.1 N or 0.5 N* KOH • Impinger #4: Empty • Impinger #5 (glass): Known quantity of silica gel ***0.5 N KOH was used for furnace sampling to ensure the capture solution pH remained above 8.5.**
Sampling Procedures	
Pre-cleaning:	Wash with hot tap water, then hot soapy water, and then rinse three times with tap water and reagent water. Train components (up to the silica gel impinger) soaked for a minimum of 4 hrs in 10% (v/v) nitric acid solution. Components are then rinsed three times with reagent grade water and air-dried.
Train Operation:	Sample at each sample point while KOH solution from impinger #1 is circulated to the probe and back into impinger #1 to prevent reduction of Cr^{6+} to Cr^{3+} in the sample gas stream.

Table 4 (cont'd): Method 0061 Sampling Specifications

Item	Specification
Sampling Procedures (cont'd)	
Solution pH Check:	Check pH of solution at the end of the test run. If pH less than 8.5, test run is void.
Post Test Activities:	Sample train post-test leak check. Criterion is 0.020 cfm or 4% of sample rate at the highest vacuum encountered during the test run. Disconnect probe from train prior to nitrogen purge. Purge sampling train from inlet of first impinger to exhaust of silica gel with UHP nitrogen at a rate of 10 Lpm for 30 minutes.
Sample Recovery	
Recovery Procedure:	• Impinger catch from impingers #1 - 4 volumetrically measured and combined into a 1 L polyethylene (PE) bottle (Container #1), for hexavalent chromium analyses. • Glass nozzle, probe liner, circulation system components, impingers and connecting tubing rinsed with DI water into Container #1
Filtration:	• Entire aqueous sample passed through a 0.45 µm acetate filter in a Teflon filtration device. • Filtration device washed with DI water, and rinses added to Container #1. • Final aqueous sample volume recorded.
Analysis	
Analytical Laboratory	ALS Environmental, Waterloo, ON
Hold Time:	14 days
QA/QC:	• KOH solution proofed for hexavalent chromium content by the analytical laboratory prior to delivery. • One set of reagent blanks collected for the program, to be analyzed with samples.

5. Results and Discussion

Process Exhaust Results Summaries

Tables 5 - 7 summarize sampling results for the T105 West and East Furnace Stacks, and the T105 Forehearth Stack, respectively. Additional information and emissions calculations for all sampling are available in the Appendices.

Ventilation Fan Results Summaries

Tables 8 - 10 summarize sampling results for Ventilation Fans B33, B34, and C79 respectively. Additional information and emissions calculations are available in the Appendices.

Emissions Testing Discussion

Reported emission data are believed to be representative of effluent conditions at the time of sampling.

The final pH of all sample runs were greater than 8.5.

Test Run #4 on the West Furnace Stack yielded a final negative condensed moisture gain, suggesting that a significant quantity of solution was lost or unrecovered from the solution circulation system. An additional test run was conducted on both furnace stacks to replace this test run.

QA/QC Discussion

Source sampling equipment was calibrated in accordance with procedures outlined in the applicable test methods. QA/QC information is provided in the Appendices.

Teflon impingers used for sampling were cleaned as described in Section 3. This cleaning process ensured that the sampling equipment was free of contamination before it was used for this project.

Sample line leak checks were conducted before and after each test. Sampling did not proceed until the integrity of the sampling train was confirmed. Leak checks were within acceptable criteria for the methods. Pitot tube leak checks were conducted whenever pitot lines were initially connected or re-connected to confirm system integrity.

The isokinetic sampling rate was calculated for each point during testing and routinely checked. Consequently, test runs showed average isokinetic variations within the method specification of 100 ± 10%.

Field reagent blanks reported non-detectable hexavalent chromium quantities for the 0.1 N KOH and water used for this program. The 0.5 N KOH used for furnace sampling reported a blank quantity of 0.52 µg in 300 mL of solution. Furnace sampling results have not been blank-corrected.

Table 5: T105 Furnace West (B24) Results Summary

Measurement Parameter		**T105 Furnace West Stack**						**Averages**
		Run #1 **18-Jun-24** **8:41-10:05**	**Run #2** **18-Jun-24** **11:17-12:43**	**Run #3** **18-Jun-24** **15:06-16:38**	**Run #5** **19-Jun-24** **10:30-11:56**	**Run #6** **19-Jun-24** **13:29-14:54**	**Run #7** **19-Jun-24** **15:50-17:20**	
Cr^{6+} Concentration	$\mu g/R.m^3$	17.6	5.55	16.2	7.36	13.9	12.8	12.2
Cr^{6+} Mass Emission Rates	**g/s**	**1.27E-05**	**4.08E-06**	**1.18E-05**	**5.46E-06**	**1.01E-05**	**9.16E-06**	**8.87E-06**
Effluent Characteristics								
Average Stack Temperature	ºC	295	294	294	292	288	293	292
Effluent Moisture Content	% vol	9.12	8.02	9.77	9.49	10.5	9.39	9.39
Oxygen Concentration	% vol	20.2	20.3	20.0	20.1	20.3	20.1	20.2
Carbon Dioxide Concentration	% vol	4.0	4.1	4.2	4.4	3.8	4.1	4.1
Actual Effluent Flow Rate	$A.m^3/s$	1.56	1.57	1.58	1.60	1.57	1.55	1.57
Reference Flow Rate (wet)	$R.m^3/s$	0.79	0.80	0.81	0.82	0.81	0.79	0.80
Reference Flow Rate (dry)	$R.m^3/s,d$	0.72	0.73	0.73	0.74	0.72	0.72	0.73
Sample Parameters								
Chromium (Cr^{6+})	µg	22.3	7.0	20.6	9.6	17.7	15.9	15.5
Dry Reference Sample Volume	$R.m^3$	1.27	1.27	1.27	1.30	1.27	1.25	1.27
Average Isokinetic Variation	%	98.5	96.6	97.3	97.6	97.8	96.5	97.4

Table 6: T105 Furnace East (B25) Results Summary

Measurement Parameter		**T105 Furnace East Stack**						**Averages**
		Run #1 **18-Jun-24** **8:41-10:05**	**Run #2*** **18-Jun-24** **11:17-12:43**	**Run #3** **18-Jun-24** **15:06-16:38**	**Run #5** **19-Jun-24** **10:30-11:56**	**Run #6** **19-Jun-24** **13:29-14:54**	**Run #7** **19-Jun-24** **15:50-17:20**	
Cr^{6+} Concentration	µg/R.m^3	25.7	7.35*	23.0	23.3	18.1	32.6	21.7
Cr^{6+} Mass Emission Rates	**g/s**	**1.79E-05**	**5.34E-06***	**1.65E-05**	**1.63E-05**	**1.25E-05**	**2.11E-05**	**1.50E-05**
<u>Effluent Characteristics</u>								
Average Stack Temperature	ºC	286	286	290	287	283	292	287
Effluent Moisture Content	% vol	9.43	4.49*	8.26	10.4	11.2	11.8	9.26
Oxygen Concentration	% vol	20.2	20.3	20.0	20.1	20.3	20.1	20.2
Carbon Dioxide Concentration	% vol	4.0	4.1	4.2	4.4	3.8	4.1	4.1
Actual Effluent Flow Rate	A.m^3/s	1.49	1.47	1.52	1.51	1.48	1.43	1.48
Reference Flow Rate (wet)	R.m^3/s	0.77	0.76	0.78	0.78	0.77	0.74	0.77
Reference Flow Rate (dry)	R.m^3/s,d	0.70	0.73	0.72	0.70	0.69	0.65	0.70
<u>Sample Parameters</u>								
Chromium (Cr^{6+})	µg	32.6	9.4*	29.9	29.8	23.2	39.5	27.4
Dry Reference Sample Volume	R.m^3	1.27	1.27	1.30	1.28	1.28	1.21	1.27
Average Isokinetic Variation	%	101	97.5	101	101	103	104	101

***Results checked as potential statistical outlier – see Discussion**.*

Table 7: T105 Forehearth (B38) Results Summary

Measurement Parameter		**T105 Forehearth**						**Averages**
		Run #1	**Run #2**	**Run #3**	**Run #4**	**Run #5**	**Run #6**	
		18-Jun-24	**18-Jun-24**	**18-Jun-24**	**19-Jun-24**	**19-Jun-24**	**19-Jun-24**	
		8:33-9:57	**11:08-12:34**	**15:02-16:25**	**8:07-9:31**	**10:23-11:47**	**13:25-14:48**	
Cr^{6+} Concentration	μg/R.m^3	31.3	24.8	38.0	30.3	32.5	27.5	30.7
Cr^{6+} Mass Emission Rates	**g/s**	**8.30E-05**	**6.53E-05**	**9.53E-05**	**8.45E-05**	**8.62E-05**	**7.03E-05**	**8.08E-05**
Effluent Characteristics								
Average Stack Temperature	ºC	119	121	128	118	119	127	122
Effluent Moisture Content	% vol	4.83	5.13	5.04	5.28	5.34	2.86*	4.75
Oxygen Concentration	% vol	21.3	21.5	21.2	21.2	21.3	21.2	21.3
Carbon Dioxide Concentration	% vol	1.20	1.25	1.35	1.15	1.35	1.20	1.25
Actual Effluent Flow Rate	A.m^3/s	3.79	3.78	3.67	3.97	3.80	3.63	3.77
Reference Flow Rate (wet)	R.m^3/s	2.79	2.77	2.64	2.94	2.81	2.63	2.76
Reference Flow Rate (dry)	R.m^3/s,d	2.66	2.63	2.51	2.79	2.66	2.56	2.63
Sample Parameters								
Chromium (Cr^{6+})	μg	55.7	43.5	63.4	56.5	58.0	46.3	53.9
Dry Reference Sample Volume	R.m^3	1.78	1.75	1.67	1.86	1.79	1.69	1.76
Average Isokinetic Variation	%	101	100	100	101	101	99	100

Results checked as potential statistical outlier – see Discussion

Table 8: Roof Vent B33 Results Summary

Measurement Parameter		**Roof Vent B33**			**Averages**
		Run #1 **18-Jun-24** **7:42-14:43**	**Run #2** **19-Jun-24** **7:30-14:31**	**Run #3** **20-Jun-24** **7:52-14:52**	
Cr^{6+} Concentration	µg/R.m^3	0.28	0.092	0.11	0.16
Cr^{6+} Mass Emission Rates	**g/s**	**5.38E-06**	**1.77E-06**	**2.03E-06**	**3.06E-06**
Effluent Characteristics					
Average Temperature*	ºC	53	55	54	54
Effluent Moisture Content	% vol	2.32	1.77	2.22	2.10
Actual Effluent Flow Rate*	A.m^3/s	21.5	21.5	21.5	21.5
Reference Flow Rate (wet)	R.m^3/s	19.7	19.6	19.6	19.6
Reference Flow Rate (dry)	R.m^3/s,d	19.2	19.2	19.2	19.2
Sample Parameters					
Chromium (Cr^{6+})	µg	2.45	0.81	0.95	1.40
Dry Reference Sample Volume	R.m^3	8.75	8.81	8.95	8.84

Italics indicate results below analytical limit of reporting.
**Volumetric flow rate and temperature data provided by Owens Corning.*

Table 9: Roof Vent B34 Results Summary

Measurement Parameter		**Roof Vent B34**			**Averages**
		Run #1 **18-Jun-24** **7:38-14:38**	**Run #2** **19-Jun-24** **7:27-14:27**	**Run #3** **20-Jun-24** **7:35-14:35**	
Cr^{6+} Concentration	µg/R.m^3	0.21	0.22	0.23	0.22
Cr^{6+} Mass Emission Rates	**g/s**	**4.15E-06**	**3.74E-06**	**4.43E-06**	**4.11E-06**
Effluent Characteristics					
Average Temperature*	ºC	47	49	47	48
Effluent Moisture Content	% vol	2.15	2.01	2.11	2.09
Actual Effluent Flow Rate*	A.m^3/s	21.5	18.8	21.5	20.6
Reference Flow Rate (wet)	R.m^3/s	20.1	17.4	20.1	19.2
Reference Flow Rate (dry)	R.m^3/s,d	19.6	17.0	19.6	18.8
Sample Parameters					
Chromium (Cr^{6+})	µg	1.90	1.96	2.01	1.96
Dry Reference Sample Volume	R.m^3	8.99	8.92	8.91	8.94

Italics indicate results below analytical limit of reporting.
**Volumetric flow rate and temperature data provided by Owens Corning.*

Table 10: Roof Vent C79 Results Summary

Measurement Parameter		**Roof Vent C79**			**Averages**
		Run #1 **18-Jun-24** **7:28-14:28**	**Run #2** **19-Jun-24** **7:29-14:29**	**Run #3** **20-Jun-24** **7:58-15:02**	
Cr^{6+} Concentration	µg/R.m^3	0.12	*0.10*	*0.10*	*0.11*
Cr^{6+} Mass Emission Rates	**g/s**	**2.34E-06**	***1.93E-06***	***1.93E-06***	***2.07E-06***
Effluent Characteristics					
Average Temperature*	ºC	57	57	57	57
Effluent Moisture Content	% vol	2.26	1.99	2.19	2.15
Actual Effluent Flow Rate*	A.m^3/s	21.5	21.5	21.5	21.5
Reference Flow Rate (wet)	R.m^3/s	19.5	19.5	19.5	19.5
Reference Flow Rate (dry)	R.m^3/s,d	19.0	19.1	19.1	19.1
Sample Parameters					
Chromium (Cr^{6+})	µg	1.0	*0.84*	*0.85*	*0.90*
Dry Reference Sample Volume	R.m^3	8.31	8.28	8.38	8.33

Italics indicate results below analytical limit of reporting.
**Volumetric flow rate and temperature data provided by Owens Corning.*

6. Process Data

Process Data Monitoring	Data related to the operation of Furnace T105 was monitored during each sampling period. During sampling, the facility operated at a glass pull (production) rate of **1,713 kg/hr** (3,778 lb/hr). Process data that were monitored during sampling are **considered Business Confidential by Owens Corning** and will be provided separately.

7. Closure

Closure

The data presented in this report are believed to be representative of the effluent conditions at the time of testing and the result of best efforts in the field. Comments pertaining to the data or to anomalies in the data are made without bias and are based on the experience and technical judgment of the writer. Questions pertaining to the technical content of this report should be directed to the undersigned.

Respectfully submitted,

Guy Bastien, P.Eng.
Sr. Environmental Engineer
Tel: (519) 336-4101, Ext. 248
Email: gubastien@montrose-env.com

Appendix A

ECA Number 4548-AA3QXU and MECP Correspondence

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

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AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 4548-AA3QXU
Issue Date: June 22, 2016

Owens Corning Composite Materials Canada GP Inc. as general partner for and on behalf of
Owens Corning Composite Materials Canada LP
247 York Street
Guelph, Ontario
N1E 3G4

Site Location: Guelph Glass Plant
247 York Street
Guelph City, County of Wellington
N1H 6P6

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

Description Section

A glass fibre manufacturing facility, consisting of the following processes and support units:

- raw material storage, handling and blending;
- glass melting;
- production of textile glass;
- production of textile glass products;
- packaging;
- production of oxygen for melting;
- comfort heating; and
- back-up power;

- One (1) regenerative thermal oxidizer controlling the emissions of process gases from the Continuous Filament Mat line natural gas fired curing oven, exhausting to the air at a maximum volumetric flow rate of 11.00 cubic metres per second, through a stack identified as source number C75, having an outside diameter of 0.76 metre, extending 6.00 metres above the roof and 15.20 metres above grade, firing one (1) natural gas burner at 1.06 million kilojoules per hour, equipped with two (2) heat recovery beds operating at 815 degrees Celsius with a residence time of 0.75 second, equipped with continuous temperature recording and four (4) thermocouples, one (1) before and one (1) after each heat recovery bed;

including the *Equipment* and any other ancillary and support processes and activities, operating at a *Facility Production Limit* of up to 16,000 tonnes of molten glass per year discharging to the air as described in the *Original ESDM Report.*

For the purpose of this environmental compliance approval, the following definitions apply:

1. "*Acceptable Point of Impingement Concentration*" means a concentration accepted by the *Ministry* as not likely to cause an adverse effect for a *Compound of Concern* that,

   (a) has no *Ministry Point of Impingement Limit* and no *Jurisdictional Screening Level,* or

   (b) has a concentration at a *Point of Impingement* that exceeds the *Jurisdictional Screening Level.*

   With respect to the *Original ESDM Report,* the *Acceptable Point of Impingement Concentration* for a *Compound of Concern* mentioned above is the concentration set out in the *Original ESDM Report.*

2. "*Acoustic Assessment Report*" means the report, prepared in accordance with *Publication NPC-233* and Appendix A of the *Basic Comprehensive User Guide,* by Corey Kinart, P.Eng. / HGC Engineering and dated December 22, 2015, submitted in support of the application, that documents all sources of noise emissions and *Noise Control Measures* present at the *Facility,* as updated in accordance with Condition 6 of this *Approval.*

3. "*Acoustic Assessment Summary Table*" means a table prepared in accordance with the *Basic Comprehensive User Guide* summarising the results of the *Acoustic Assessment Report,* as updated in accordance with Condition 5 of this *Approval.*

4. "*Acoustic Audit*" means an investigative procedure consisting of measurements and/or acoustic modelling of all sources of noise emissions due to the operation of the *Facility* , assessed to determine compliance with the Performance Limits for the *Facility* regarding noise emissions, completed in accordance with the procedures set in *Publication NPC-103* and reported in accordance with *Publication NPC-233.*

5. "*Acoustic Audit Report*" means a report presenting the results of an *Acoustic Audit,* prepared in accordance with *Publication NPC-233.*

6. "*Acoustical Consultant*" means a person currently active in the field of environmental acoustics and noise/vibration control, who is familiar with *Ministry* noise guidelines and procedures and has a combination of formal university education, training and experience necessary to assess noise emissions from a *Facility*.

7. "*Approval*" means this entire Environmental Compliance Approval and any *Schedules* to it.

8. "*Basic Comprehensive User Guide*" means the *Ministry* document titled "Basic Comprehensive Certificates of Approval (Air) User Guide" dated March 2011, as amended.

9. "*Company*" means **Owens Corning Composite Materials Canada GP Inc. as general partner for and on behalf of Owens Corning Composite Materials Canada LP** that is responsible for the construction or operation of the *Facility* and includes any successors and assigns in accordance with section 19 of the *EPA*.

10. "*Compound of Concern*" means a contaminant described in paragraph 4 subsection 26 (1) of *O. Reg. 419/05*, namely, a contaminant that is discharged from the *Facility* in an amount that is not negligible.

11. "*Description Section*" means the section on page one of this *Approval* describing the *Company's* operations and the *Equipment* located at the *Facility* and specifying the *Facility Production Limit* for the *Facility*.

12. "*Director*" means a person appointed for the purpose of section 20.3 of the *EPA* by the *Minister* pursuant to section 5 of the *EPA*.

13. "*District Manager*" means the District Manager of the appropriate local district office of the *Ministry*, where the *Facility* is geographically located.

14. "*Emission Summary Table*" means a table described in paragraph 14 of subsection 26 (1) of *O. Reg. 419/05;* namely a table in the *ESDM Report* that compares the *Point of Impingement* concentration for each *Compound of Concern* to the corresponding *Ministry Point of Impingement Limit, Acceptable Point of Impingement Concentration,* or *Jurisdictional Screening Level*.

15. "*Environmental Assessment Act*" means the Environmental Assessment Act, R.S.O. 1990, c.E.18, as amended.

16. "*EPA*" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended.

17. "*Equipment*" means equipment or processes described in the *ESDM Report,* this *Approval* and in the *Schedules* referred to herein and any other equipment or processes.

18. "*Equipment with Specific Operational Limits*" means the regenerative thermal oxidizer and any *Equipment* related to the thermal oxidation of waste or waste derived fuels, fume incinerators or any other *Equipment* that is specifically referenced in any published *Ministry* document that outlines specific operational guidance that must be considered by the *Director* in issuing an *Approval.*

19. "*ESDM Report*" means the most current Emission Summary and Dispersion Modelling Report that describes the *Facility.* The *ESDM Report* is based on the *Original ESDM Report* and is updated after the issuance of this *Approval* in accordance with section 26 of *O. Reg. 419/05* and the *Procedure Document.*

20. "*Facility*" means the entire operation located on the property where the *Equipment* is located.

21. "*Facility Production Limit*" means the production limit placed by the *Director* on the main product(s) or raw materials used by the *Facility.*

22. "*Independent Acoustical Consultant*" means an *Acoustical Consultant* who is not representing the *Company* and was not involved in preparing the *Acoustic Assessment Report* or the design/implementation of *Noise Control Measures* for the *Facility* and/or *Equipment.* The *Independent Acoustical Consultant* shall not be retained by the *Acoustical Consultant* involved in the noise impact assessment or the design/implementation of *Noise Control Measures* for the *Facility* and/or *Equipment.*

23. "*Jurisdictional Screening Level*" means a screening level for a *Compound of Concern* that is listed in the *Ministry* publication titled "Jurisdictional Screening Level (JSL) List, A Screening Tool for Ontario Regulation 419: Air Pollution - Local Air Quality", dated February 2008, as amended.

24. "*Log*" means a document that contains a record of each change that is required to be made to the *ESDM Report* and *Acoustic Assessment Report,* including the date on which the change occurred. For example, a record would have to be made of a more accurate emission rate for a source of contaminant, more accurate meteorological data, a more accurate value of a parameter that is related to a source of contaminant, a change to a *Point of Impingement* and all changes to information associated with a *Modification* to the *Facility* that satisfies Condition 2.

25. "*Manager*" means the Manager, Technology Standards Section, Standards Development Branch of the *Ministry,* or any other person who represents and carries out the duties of the *Manager,* as those duties relate to the conditions of this *Approval.*

26. "*Minister*" means the Minister of the Environment and Climate Change or such other member of the Executive Council as may be assigned the administration of the *EPA* under the Executive Council Act.

27. "*Ministry*" means the ministry of the *Minister.*

28. *"Ministry Point of Impingement Limit"* means the applicable Standard set out in Schedule 2 or 3 of *O. Reg. 419/05* or a limit set out in the *Ministry* publication titled "Summary of Standards and Guidelines to support Ontario Regulation 419/05: Air Pollution - Local Air Quality (including Schedule 6 of *O. Reg. 419/05* on Upper Risk Thresholds", dated April 2012, as amended.

29. *"Modification"* means any construction, alteration, extension or replacement of any plant, structure, equipment, apparatus, mechanism or thing, or alteration of a process or rate of production at the *Facility* that may discharge or alter the rate or manner of discharge of a *Compound of Concern* to the air or discharge or alter noise or vibration emissions from the *Facility.*

30. *"Noise Control Measures"* means measures to reduce the noise emissions from the *Facility* and/or *Equipment* including, but not limited to, silencers, acoustic louvres, enclosures, absorptive treatment, plenums and barriers. It also means the noise control measures outlined in the *Acoustic Assessment Report.*

31. *"O. Reg. 419/05"* means Ontario Regulation 419/05, Air Pollution – Local Air Quality, as amended.

32. *"Organic Matter"* means organic matter having carbon content expressed as equivalent methane.

33. *"Original ESDM Report"* means the Emission Summary and Dispersion Modelling Report which was prepared in accordance with section 26 of *O. Reg. 419/05* and the *Procedure Document* by Penny McInnis / LEHDER Environmental Services Limited and dated December 2015 submitted in support of the application, and includes any changes to the report made up to the date of issuance of this *Approval.*

34. *"Point of Impingement"* has the same meaning as in section 2 of *O. Reg. 419/05.*

35. *"Point of Reception"* means Point of Reception as defined by *Publication NPC-300.*

36. *"Pre-Test Plan"* means a plan for the *Source Testing* including the information required in Section 5 of the *Source Testing Code.*

37. *"Procedure Document"* means *Ministry* guidance document titled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009, as amended.

38. *"Processes with Significant Environmental Aspects"* means the *Equipment* which, during regular operation, would discharge one or more contaminants into the air in an amount which is not considered as negligible in accordance with section 26 (1) 4 of *O. Reg. 419/05* and the *Procedure Document.*

39. *"Publication NPC-103"* means the *Ministry* Publication NPC-103 of the Model Municipal Noise Control By-Law, Final Report, August 1978, published by the *Ministry* as amended.

40. *"Publication NPC-207"* means the *Ministry* draft technical publication "Impulse Vibration in Residential Buildings", November 1983, supplementing the Model Municipal Noise Control By-Law, Final Report, published by the *Ministry,* August 1978, as amended.

41. "*Publication NPC-233*" means the *Ministry* Publication NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound", October, 1995, as amended.

42. "*Publication NPC-300*" means the *Ministry* Publication NPC-300, "Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning, Publication NPC-300", August 2013, as amended.

43. "*Schedules*" means the following schedules attached to this *Approval* and forming part of this *Approval* namely:

Schedule A - Supporting Documentation
Schedule B - Continuous Temperature Monitor
Schedule C - Source Testing Requirement

44. "*Source Testing*" means sampling and testing to measure emissions resulting from operating the *Targeted Sources* under conditions which yield the worst case emissions within the approved operating range of the *Targeted Sources* which satisfies paragraph 1 of subsection 11(1) of O. Reg. 419/05.

45. "*Source Testing Code*" means the Ontario Source Testing Code, dated June 2010, prepared by the *Ministry*, as amended.

46. "*Targeted Sources*" means the sources listed in Schedule C.

47. "*Test Contaminant*" means hexavalent chromium.

48. "*Toxicologist*" means a qualified professional currently active in the field of risk assessment and toxicology that has a combination of formal university education, training and experience necessary to assess contaminants.

49. "*Written Summary Form*" means the electronic questionnaire form, available on the *Ministry* website, and supporting documentation, that documents the activities undertaken at the *Facility* in the previous calendar year.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL

1.1 Except as otherwise provided by this *Approval,* the *Facility* shall be designed, developed, built, operated and maintained in accordance with the terms and conditions of this *Approval* and in accordance with the following *Schedules* attached hereto:

Schedule A - Supporting Documentation
Schedule B - Continuous Temperature Monitor
Schedule C - Source Testing Requirement

2. LIMITED OPERATIONAL FLEXIBILITY

2.1 Pursuant to section 20.6 (1) of the *EPA* and subject to Conditions 2.2 and 2.3 of this *Approval,* future construction, alterations, extensions or replacements are approved in this *Approval* if the future construction, alterations, extensions or replacements are *Modifications* to the *Facility* that:

(a) are within the scope of the operations of the *Facility* as described in the *Description Section* of this *Approval;*

(b) do not result in an increase of the *Facility Production Limit* above the level specified in the *Description Section* of this *Approval;* and

(c) result in compliance with the performance limits as specified in Condition 4.

2.2 Condition 2.1 does not apply to,

(a) the addition of any new *Equipment with Specific Operational Limits* or to the *Modification* of any existing *Equipment with Specific Operational Limits* at the *Facility;* or

(b) *Modifications* to the *Facility* that would be subject to the *Environmental Assessment Act.*

2.3 Condition 2.1 of this *Approval* shall expire on February 1, 2020, the date of this *Approval,* unless this *Approval* is revoked prior to the expiry date. The *Company* may apply for renewal of Condition 2.1 of this *Approval* by including an *ESDM Report* and an *Acoustic Assessment Report* that describes the *Facility* as of the date of the renewal application.

3. REQUIREMENT TO REQUEST AN *ACCEPTABLE POINT OF IMPINGEMENT CONCENTRATION*

3.1 Prior to making a *Modification* to the *Facility* that satisfies Condition 2.1 (a) and (b), the *Company* shall prepare a proposed update to the *ESDM Report* to reflect the proposed *Modification.*

3.2 The *Company* shall request approval of an *Acceptable Point of Impingement Concentration* for a *Compound of Concern* if the *Compound of Concern* does not have a *Ministry Point of Impingement Limit* and a proposed update to an *ESDM Report* indicates that one of the following changes with respect to the concentration of the *Compound of Concern* may occur:

(a) The *Compound of Concern* was not a *Compound of Concern* in the previous version of the *ESDM Report* and

  (i) the concentration of the *Compound of Concern* is higher than the *Jurisdictional Screening Level* for the contaminant; or

  (ii) there is no *Jurisdictional Screening Level* for the contaminant.

(b) The concentration of the *Compound of Concern* in the updated *ESDM Report* is higher than:

  (i) the most recent *Acceptable Point of Impingement Concentration,* and

  (ii) the *Jurisdictional Screening Level* if a *Jurisdictional Screening Level* exists.

3.3 The request required by Condition 3.2 shall propose a concentration for the *Compound of Concern* and shall contain an assessment, performed by a *Toxicologist,* of the likelihood of the proposed concentration causing an adverse effect at *Points of Impingement.*

3.4 If the request required by Condition 3.2 is a result of a proposed *Modification* described in Condition 3.1, the *Company* shall submit the request, in writing, to the *Director* at least 30 days prior to commencing to make the *Modification.* The *Director* shall provide written confirmation of receipt of this request to the *Company.*

3.5 If a request is required to be made under Condition 3.2 in respect of a proposed *Modification* described in Condition 3.1, the *Company* shall not make the *Modification* mentioned in Condition 3.1 unless the request is approved in writing by the *Director.*

3.6 If the *Director* notifies the *Company* in writing that the *Director* does not approve the request, the *Company* shall,

(a) revise and resubmit the request; or

(b) notify the *Director* that it will not be making the *Modification.*

3.7 The re-submission mentioned in Condition 3.6 shall be deemed a new submission under Condition 3.2.

3.8 If the *Director* approves the request, the *Company* shall update the *ESDM Report* to reflect the *Modification.*

3.9 Condition 3 does not apply if Condition 2.1 has expired.

4. PERFORMANCE LIMITS

4.1 Subject to Condition 4.2, the *Company* shall not discharge or cause or permit the discharge of a *Compound of Concern* into the air if,

(a) the *Compound of Concern* has a *Ministry Point of Impingement Limit* and the discharge results in the concentration at a *Point of Impingement* exceeding the *Ministry Point of Impingement Limit;* or

(b) the *Compound of Concern* does not have a *Ministry Point of Impingement Limit* and the discharge results in the concentration at a *Point of Impingement* exceeding the higher of,

(i) if an *Acceptable Point of Impingement Concentration* exists the most recent *Acceptable Point of Impingement Concentration,* and

(ii) the *Jurisdictional Screening Level* if a *Jurisdictional Screening Level* exists.

4.2 Condition 4.1 does not apply if the *Ministry Point of Impingement Limit* has a 10-minute averaging period and no ambient monitor indicates an exceedance at a *Point of Impingement* where human activities regularly occur at a time when those activities regularly occur.

4.3 The *Company* shall:

(a) implement by not later than October 27, 2019, the *Noise Control Measures* as outlined in the *Acoustic Assessment Report;*

(b) ensure, subsequent to the implementation of the *Noise Control Measures* that the noise emissions from the *Facility* comply with the limits set in *Ministry Publication NPC-300;* and

(c) ensure that the *Noise Control Measures* are properly maintained and continue to provide the acoustical performance outlined in the *Acoustic Assessment Report.*

4.4 The *Company* shall ensure that the vibration emissions from the *Facility* comply with the limits set out in *Ministry Publication NPC-207.*

4.5 The *Company* shall operate any *Equipment with Specific Operational Limits* approved by this *Approval* in accordance with the *Original ESDM Report* and Conditions 5 and 7 in this *Approval.*

5. EQUIPMENT WITH SPECIFIC OPERATIONAL LIMITS

5.1 The *Company* shall ensure that the regenerative thermal oxidizer system serving the Continuous Filament Mat line natural gas fired curing oven is designed and operated to comply, at all times, with the following performance requirements:

(a) The temperature in the combustion chamber shall be maintained at a minimum of 815 degrees Celsius, as measured by the continuous monitoring and recording system, throughout the combustion cycle;

(b) the residence time of the combustion gases in the combustion chamber shall be not less than 0.75 second at a temperature of not less than 815 degrees Celsius.

(c) the concentration of *Organic Matter,* being an average of ten measurements taken at approximately one minute intervals, in the combustion gases emitted into the atmosphere from operating the regenerative thermal oxidizer system, shall not be greater than 100 parts per million by volume, measured on an undiluted basis.

6. DOCUMENTATION REQUIREMENTS

6.1 The *Company* shall maintain an up-to-date *Log.*

6.2 No later than June 30 in each year, the *Company* shall update the *Acoustic Assessment Report* and shall update the *ESDM Report* in accordance with section 26 of *O. Reg. 419/05* so that the information in the reports is accurate as of December 31 in the previous year.

6.3 The *Company* shall make the *Emission Summary Table* (see section 27 of *O. Reg. 419/05)* and *Acoustic Assessment Summary Table* available for examination by any person, without charge, by posting it on the Internet or by making it available during regular business hours at the *Facility.*

6.4 The *Company* shall, within three (3) months after the expiry of Condition 2.1 of this *Approval,* update the *ESDM Report* and the *Acoustic Assessment Report* such that the information in the reports is accurate as of the date that Condition 2.1 of this *Approval* expired.

6.5 Conditions 6.1 and 6.2 do not apply if Condition 2.1 has expired.

7. CONTINUOUS MONITORING

7.1 The *Company* shall install and subsequently conduct and maintain a program to continuously monitor:

(a) the temperature in the combustion chamber of the regenerative thermal oxidizer system, where the minimum retention time of the combustion gases of not less than 0.75 second at a minimum temperature of 815 degrees Celsius is achieved.

The continuous monitoring and recording system shall be equipped with continuous recording devices, and shall comply with the requirements outlined in the attached Schedule B.

8. REPORTING REQUIREMENTS

8.1 Subject to Condition 6.2, the *Company* shall provide the *Director* no later than August 31 of each year, a *Written Summary Form* to be submitted through the *Ministry's* website that shall include the following:

(a) a declaration of whether the *Facility* was in compliance with section 9 of the *EPA, O. Reg. 419/05* and the conditions of this *Approval;*

(b) a summary of each *Modification* satisfying Condition 2.1 (a) and (b) that took place in the previous calendar year that resulted in a change in the previously calculated concentration at a *Point of Impingement* for any *Compound of Concern* or resulted in a change in the sound levels reported in the *Acoustic Assessment Summary Table* at any *Point of Reception.*

8.2 Condition 8.1 does not apply if Condition 2.1 has expired.

9. OPERATION AND MAINTENANCE

9.1 The *Company* shall prepare and implement, not later than six (6) months from the date of this *Approval,* operating procedures and maintenance programs for all *Processes with Significant Environmental Aspects,* which shall specify as a minimum:

(a) frequency of inspections and scheduled preventative maintenance;

(b) procedures to prevent upset conditions;

(c) procedures to minimize all fugitive emissions;

(d) procedures to prevent and/or minimize odorous emissions;

(e) procedures to prevent and/or minimize noise emissions; and

(f) procedures for record keeping activities relating to the operation and maintenance programs.

9.2 The *Company* shall ensure that all *Processes with Significant Environmental Aspects* are operated and maintained in accordance with this *Approval,* the operating procedures and maintenance programs.

10. COMPLAINTS RECORDING AND REPORTING

10.1 If at any time, the *Company* receives an environmental complaint from the public regarding the operation of the *Equipment* approved by this *Approval,* the *Company* shall take the following steps:

(a) Record and number each complaint, either electronically or in a log book. The record shall include the following information: the time and date of the complaint and incident to which the complaint relates, the nature of the complaint, wind direction at the time and date of the incident to which the complaint relates and, if known, the address of the complainant.

(b) Notify the *District Manager* of the complaint within two (2) business days after the complaint is received, or in a manner acceptable to the *District Manager.*

(c) Initiate appropriate steps to determine all possible causes of the complaint, and take the necessary actions to appropriately deal with the cause of the subject matter of the complaint.

(d) Complete and retain on-site a report written within one (1) week of the complaint date. The report shall list the actions taken to appropriately deal with the cause of the complaint and set out steps to be taken to avoid the recurrence of similar incidents.

11. RECORD KEEPING REQUIREMENTS

11.1 Any information requested by any employee in or agent of the *Ministry* concerning the *Facility* and its operation under this *Approval,* including, but not limited to, any records required to be kept by this *Approval,* shall be provided to the employee in or agent of the *Ministry,* upon request, in a timely manner.

11.2 Unless otherwise specified in this *Approval,* the *Company* shall retain, for a minimum of five (5) years from the date of their creation all reports, records and information described in this *Approval,* including,

(a) a copy of the *Original ESDM Report* and each updated version;

(b) a copy of each version of the *Acoustic Assessment Report;*

(c) supporting information used in the emission rate calculations performed in the *ESDM Reports* and *Acoustic Assessment Reports;*

(d) the records in the *Log;*

(e) copies of each *Written Summary Form* provided to the *Ministry* under Condition 6.1 of this *Approval;*

(f) records of maintenance, repair and inspection of *Equipment* related to all *Processes with Significant Environmental Aspects;* and

(g) all records related to environmental complaints made by the public as required by Condition 8 of this *Approval.*

12. *SOURCE TESTING*

12.1 The *Company* shall perform *Source Testing* to determine the rates of emissions of the *Test Contaminants* from the *Targeted Sources* listed in Schedule C.

12.2 The *Company* shall submit, not later than three (3) months from the date of this *Approval,* to the *Manager* a *Pre-Test Plan* for the *Source Testing* required by the *Source Testing Code.* The *Company* shall finalize the *Pre-Test Plan* in consultation with the *Manager.*

12.3 The *Company* shall not perform *Source Testing* required under this *Approval* until the *Manager* has accepted the *Pre-Test Plan.*

12.4 The *Company* shall complete the *Source Testing* not later than three (3) months after acceptance of the *Pre-Test Plan* by the *Manager,* or within a period as directed or agreed by the *District Manager.*

12.5 The *Company* shall repeat the *Source Testing* for the sources and contaminants outlined in Schedule C and as directed or agreed by the *District Manager.*

12.6 The *Company* shall notify the *Director,* the *District Manager* and the *Manager* in writing of the location, date and time of any impending *Source Testing* required by this *Approval,* at least fifteen (15) days prior to the *Source Testing.*

12.7 The *Company* shall submit a report, whenever *Source Testing* is completed, on the *Source Testing* to the *Director,* the *District Manager* and the *Manager* not later than three (3) months after completing the *Source Testing,* or within a period as directed or agreed by the *District Manager.* The report shall be in the format described in the *Source Testing Code,* and shall include, but not be limited to:

(a) an executive summary;

(b) records of weather conditions such as ambient temperature and relative humidity, wind speed and direction, and any environmental complaints if received, at the time of the *Source Testing;*

(c) all operating conditions of the *Facility* including any upset conditions during the *Source Testing;*

(d) results of the *Source Testing;*

(e) results of *Source Testing,* including the emission rate, emission concentration and relevant emission factor of the *Test Contaminants* from the sources listed in Schedule C;

(f) a tabular comparison of *Source Testing* results for the sources and *Test Contaminants* listed in Schedule C to original emission estimates described in the *Company* 's application and the *Original ESDM Report.*

12.8 If the *Source Testing* results indicate the emission estimates are higher than the original emission estimates described in the *Company's* application and the *Original ESDM Report,* the *Company* shall update their *ESDM Report* in accordance with Section 26 of *O. Reg. 419/05* with the emission estimates from the *Source Testing* report and make these records available for review by staff of the *Ministry* upon request. The updated *Emission Summary Table* from the updated *ESDM Report* shall be submitted within two (2) months after the *Source Testing* report is issued.

12.9 The *Director* may not accept the results of the *Source Testing* if:

(a) the *Source Testing Code* or the requirements of the *Manager* were not followed; or

(b) the *Company* did not notify the *District Manager* and the *Manager* of the *Source Testing;* or

(c) the *Company* failed to provide a complete report on the *Source Testing.*

12.10 If the *Director* does not accept the results of the *Source Testing,* the *Director* may require re-testing. If re-testing is required, the *Pre-Test Plan* strategies need to be revised and submitted to the *Manager* for approval. The actions taken to minimize the possibility of the *Source Testing* results not being accepted by the *Director* must be noted in the revision.

13. PUBLIC LIAISON COMMITTEE

13.1 The *Company* shall, not later than November 30, 2016, facilitate the formation of and participate in a Public Liaison Committee (PLC). The objectives of the PLC shall include:

(a) Keeping the community informed about the operations of the *Facility* in relation to the requirements of this *Approval.*

(b) Keeping the *Company* informed of any community concerns about the operations of the *Facility.*

(c) To serve as a forum for the dissemination, review and exchange of information related to the *Facility.*

13.2 The PLC shall not exercise any supervisory, regulatory or approval roles with respect to the operation of the *Facility.*

13.3 To fulfil the objectives of the PLC, the *Company* shall ensure that the following activities are undertaken:

(a) The initial meeting of the initial members shall be convened not later than November 30, 2016.

(b) The initial members of the PLC should consist of representatives from the *Company, Ministry* (none voting), three (3) community members, one (1) academia, one (1) public health, and one (1) non-government organization.

(c) Terms of reference (TOR) will be developed by the *Company* and submitted to the PLC for acceptance not later than three (3) months from the initial meeting.

(d) The TOR will establish the number of members and the initial members of the PLC will select the first community members to fill the positions on the PLC. The initial TOR and any amendments to the TOR must be agreed to by the *District Manager* prior to its implementation.

13.4 The *Company* shall provide for the initial and ongoing administrative costs of the PLC, including, at a minimum:

a) providing a meeting space for Community Liaison Committee meetings; and

b) providing access to resources, such as a photocopier, stationery, and office supplies, so that the Community Liaison Committee can:

(i) prepare and distribute meeting notices;

(ii) record and distribute minutes of each meeting; and

(iii) prepare reports about the Community Liaison Committee's activities.

13.5 The PLC shall meet four (4) times a year, be provided with information on an on-going basis and be notified of any significant events, including but not limited to process upsets, failure of any equipment, including failure of any air pollution control equipment, in the *Facility.*

13.6 The PLC shall review all *Written Summary Forms* and the quarterly and annual reports on the ambient air monitoring results before they are submitted to the *Ministry.*

13.7 The PLC shall review all amendments to this *Approval* or facility operations before the application is submitted to the *Ministry.*

13.8 The *Company* shall submit any reports reviewed by the PLC to the *District Manager.*

14. AIR QUALITY MONITORING PROGRAM

14.1 The *Company* shall:

(a) develop and submit to the *District Manager,* an air quality monitoring program in accordance with the requirements set out in the Operations Manual for Air Quality Monitoring in Ontario PIBS 6687e, dated March 2008, as amended that includes ambient air quality monitoring for the measurement of:

hexavalent chromium compounds at a minimum of three (3) locations approved by the *District Manager;* and

(b) implement the air quality monitoring program approved by the *District Manager* within a time period acceptable to the *District Manager.*

14.2 All aspects of the ambient air quality program are subject to audit at any time by *Ministry* designated personnel.

14.3 The *Company* shall submit quarterly and annual reports on the ambient air monitoring results to the *District Manager* and shall, during regular business hours, make a copy of the annual reports on the ambient air monitoring available for inspection at the *Facility* by any interested member of the public.

14.4 The *Company* may request relief from the air quality monitoring program from the *District Manager* after three (3) years of monitoring while the facility is fully operational. The *District Manager* reserves the right to grant relief from the air quality monitoring program, or to require a resumption of the air quality monitoring program.

15. REVOCATION OF PREVIOUS APPROVALS

This *Approval* replaces and revokes all Certificates of Approval (Air) issued under section 9 *EPA* and Environmental Compliance Approvals issued under Part II.1 *EPA* to the *Facility* in regards to the activities mentioned in subsection 9(1) of the *EPA* and dated prior to the date of this *Approval.*

16. *ACOUSTIC AUDIT*

16.1 The *Company* shall carry out *Acoustic Audit* measurements on the actual noise emissions due to the operation of the *Facility.* The *Company:*

(a) shall carry out *Acoustic Audit* measurements in accordance with the procedures in *Publication NPC-103;* and

(b) shall submit an *Acoustic Audit Report* on the results of the *Acoustic Audit,* prepared by an *Independent Acoustical Consultant,* in accordance with the requirements of *Publication NPC-233,* to the *District Manager* and the *Director,* not later than twelve (12) months after the full implementation of the *Noise Control Measures.*

16.2 The *Director:*

(a) may not accept the results of the *Acoustic Audit* if the requirements of *Publication NPC-233* were not followed; and

(b) may require the *Company* to repeat the *Acoustic Audit* if the results of the *Acoustic Audit* are found unacceptable to the *Director.*

SCHEDULE A

Supporting Documentation

(a) Environmental Compliance Approval Application, dated December 22, 2015, signed by Rob Nixon and submitted by the *Company;*

(b) Emission Summary and Dispersion Modelling Report, prepared by Penny McInnis and dated December 2015;

(c) Email updates provided by Penny McInnis on May 19, 20, 24 and 26, and June 1 and 6, 2016; and

(d) *Acoustic Assessment Report,* prepared by HGC Engineering, dated December 22, 2015 and signed by Corey Kinart, P.Eng.

SCHEDULE B

PARAMETER: TEMPERATURE

LOCATION:

The sample point for the continuous temperature monitoring and recording system shall be located in the combustion chamber of the regenerative thermal oxidizer where the minimum retention time of the combustion gases of not less than 0.75 second at a minimum temperature of 815 degrees Celsius is achieved.

PERFORMANCE:

The continuous temperature monitor shall meet the following minimum performance specifications for the following parameters.

	PARAMETERS	SPECIFICATION
1.	Type:	shielded "K" type thermocouple, or equivalent
2.	Accuracy:	± 1.5 percent of the minimum gas temperature

DATA RECORDER:

The data recorder must be capable of registering continuously the measurement of the monitor without a significant loss of accuracy and with a time resolution of 1 minute or better.

RELIABILITY:

The monitor shall be operated and maintained so that accurate data is obtained during a minimum of 95 percent of the time for each calendar quarter.

SCHEDULE C

Source Testing Requirement

Source ID	Source Description	Test Contaminant
B10	General Exhaust Above T107B Forehearth	Hexavalent Chromium
B32	General Exhaust Above T106	
B34	General Exhaust Above T107A Forehearth	
B35	General Exhaust Above Continuous Filament Mat Main Channel	
C79	General Exhaust West Continuous Filament Mat Forehearth	
C80	General Exhaust East Continuous Filament Mat Forehearth	
B38	Forehearth Stack	
B24	T105 Furnace Stack (West)	
B25	T105 Furnace Stack (East)	

The reasons for the imposition of these terms and conditions are as follows:

GENERAL

1. Condition No. 1 is included to require the *Approval* holder to build, operate and maintain the *Facility* in accordance with the Supporting Documentation in Schedule A considered by the *Director* in issuing this *Approval.*

LIMITED OPERATIONAL FLEXIBILITY, REQUIREMENT TO REQUEST AN *ACCEPTABLE POINT OF IMPINGEMENT CONCENTRATION* AND *PERFORMANCE LIMITS*

2. Conditions No. 2, 3 and 4 are included to limit and define the *Modifications* permitted by this *Approval,* and to set out the circumstances in which the *Company* shall request approval of an *Acceptable Point of Impingement Concentration* prior to making *Modifications.* The holder of the *Approval* is approved for operational flexibility for the *Facility* that is consistent with the description of the operations included with the application up to the *Facility Production Limit.* In return for the operational flexibility, the *Approval* places performance based limits that cannot be exceeded under the terms of this *Approval. Approval* holders will still have to obtain other relevant approvals required to operate the *Facility,* including requirements under other environmental legislation such as the *Environmental Assessment Act.*

EQUIPMENT WITH SPECIFIC OPERATIONAL LIMITS

3. Condition No. 5 is included to outline the specific operational limits considered necessary to prevent an adverse effect resulting from the operation of the regenerative thermal oxidizer system. This *Condition* is also included to emphasize that the regenerative thermal oxidizer system must be operated according to a procedure that will result in compliance with the *EPA,* the regulations and this *Approval.*

DOCUMENTATION REQUIREMENTS

4. Condition No. 6 is included to require the *Company* to maintain ongoing documentation that demonstrates compliance with the *Performance Limits* of this *Approval* and allows the *Ministry* to monitor on-going compliance with these *Performance Limits.* The *Company* is required to have an up to date *ESDM Report* and *Acoustic Assessment Report* that describe the *Facility* at all times and make the *Emission Summary Table* and *Acoustic Assessment Summary Table* from these reports available to the public on an ongoing basis in order to maintain public communication with regard to the emissions from the *Facility.*

CONTINUOUS MONITORING

5. Condition No. 7 is included to require the *Company* to gather accurate information on a continuous basis so that compliance with the *EPA,* the regulations and this *Approval* can be verified.

REPORTING REQUIREMENTS

6. Condition No. 8 is included to require the *Company* to provide a yearly *Written Summary Form* to the *Ministry,* to assist the *Ministry* with the review of the site's compliance with the *EPA,* the regulations and this *Approval.*

OPERATION AND MAINTENANCE

7. Condition No. 9 is included to require the *Company* to properly operate and maintain the *Processes with Significant Environmental Aspects* to minimize the impact to the environment from these processes.

COMPLAINTS RECORDING AND REPORTING PROCEDURE

8. Condition No. 10 is included to require the *Company* to respond to any environmental complaints regarding the operation of the *Equipment,* according to a procedure that includes methods for preventing recurrence of similar incidents and a requirement to prepare and retain a written report.

RECORD KEEPING REQUIREMENTS

9. Condition No. 11 is included to require the *Company* to retain all documentation related to this *Approval* and provide access to employees in or agents of the *Ministry,* upon request, so that the *Ministry* can determine if a more detailed review of compliance with the *Performance Limits* is necessary.

SOURCE TESTING

10. Condition No. 12 is included to require the *Company* to gather accurate information so that the environmental impact and subsequent compliance with the *EPA,* the regulations and this *Approval* can be verified.

PUBLIC LIAISON COMMITTEE

11. Condition No. 13 is included to require the *Company* to involve and inform the public on the environmental performance of the *Facility.*

AIR QUALITY MONITORING PROGRAM

12. Condition No. 14 is included to require the *Company* to gather accurate information so that the environmental impact and subsequent compliance with the *EPA,* the Regulations and this *Approval* can be verified.

REVOCATION OF PREVIOUS APPROVALS

13. Condition No. 15 is included to identify that this *Approval* replaces all Section 9 Certificate(s) of Approval and Part II.1 Approvals in regards to the activities mentioned in subsection 9(1) of the *EPA* and dated prior to the date of this *Approval.*

ACOUSTIC AUDIT

14. Condition No. 16 is included to require the *Company* to gather accurate information and submit an *Acoustic Audit Report* in accordance with procedures set in the *Ministry* 's noise guidelines, so that the environmental impact and subsequent compliance with this *Approval* can be verified.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 1059-8K4QCE issued on October 27, 2011, 8-2181-91-999, 121/2/666, 2320-4HFKGH, 8-2216-99-206, 5254-4T2HFS, 2287-4KSP8E, 8-2181-91-990, 8-2209-94-006, 8-2267-89-937, 8-2168-86-006, 8-2039-97-006, 8-2301-87-006, 8-2092-85-006, 113/2/404, 8-2250-92-947, 8-2121-99-006, 8-2142-94-006, 8-2041-87-006, 8-2125-86-006, 8-2080-86-006, 8-2183-96-006, 8-2063-96-006, 8-2130-85-006, 71/2/389, 8-2096-85-927, 51/2/264, 22/2/58.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me, the Environmental Review Tribunal and in accordance with Section 47 of the Environmental Bill of Rights, 1993, S.O. 1993, c. 28 (Environmental Bill of Rights), the Environmental Commissioner, within 15 days after receipt of this Notice, require a hearing by the Tribunal. The Environmental Commissioner will place notice of your appeal on the Environmental Registry. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

1. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The environmental compliance approval number;
6. The date of the environmental compliance approval;
7. The name of the Director, and;
8. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Environmental Commissioner
1075 Bay Street, Suite 605
Toronto, Ontario
M5S 2B1

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment and
Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

* **Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

This instrument is subject to Section 38 of the Environmental Bill of Rights, 1993, that allows residents of Ontario to seek leave to appeal the decision on this instrument. Residents of Ontario may seek leave to appeal within 15 days from the date this decision is placed on the Environmental Registry. By accessing the Environmental Registry at www.ebr.gov.on.ca , you can determine when the leave to appeal period ends.

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 22nd day of June, 2016

Rudolf Wa

Rudolf Wan, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

EC/

c: District Manager, MOECC Guelph
Penny McInnis, LEHDER Environmental Services Limited

Ministry of the Environment,
Conservation and Parks
Technical Assessment and
Standards Development Branch
40 St. Clair Avenue West
7th Floor
Toronto ON M4V 1M2
Phone: 416.327.5519
Fax: 416.327.2936

Ministère de l'Environnement, de
la Protection de la nature et des Parcs
Direction des évaluations techniques et de
l'élaboration des normes
40, avenue St. Clair Ouest
7e étage
Toronto, ON M4V 1M2
Tél: 416 .327.5519
Téléc: 416. 327.2936

Ontario

Via email: gubastien@montrose-env.com

TSS File No.: WCR:SA: 110230:24

2024/01/24

Guy Bastien
Montrose Environmental

Dear Mr. Bastien

Subject: Pre-test plan review for source testing to be conducted at Owens Corning Guelph Glass

We received your pre-test plan (Project #032615), dated January 17, 2024, prepared on behalf of Owens Corning Guelph Glass (Owens Corning) and referring to source testing to be conducted at their facility in Guelph, Ontario.

Source testing is a requirement under amended Environmental Compliance Approval No. 4548-AA3QXU issued June 22, 2016. The testing program will be conducted in two phases in 2024 to assess potential seasonal differences in emissions.

Sources to be tested:

- Source B24- T105 West Furnace Stack
- Source B25- T105 East Furnace Stack
- Source B38- T105 Forehearth Stack
- Source B33- Furnace Hall General Exhaust
- Source B34- Furnace Hall General Exhaust
- Source C79- Furnace Hall General Exhaust

Target contaminant:

- Hexavalent Chromium (Cr^{+6})

Reference methods to be used:

Stack gas parameters	Ontario Source Testing Code (OSTC) Methods ON-1-ON-4
Cr^{+6}	US EPA Method 0061

General facility description:

The Owens Corning plant produces textile glass yarn and fiberglass for reinforcements for the commercial and industrial market. This facility is the sole producer of Continuous Filament Mat (CFM) in Ontario and Canada.

Testing strategy

T105 furnace exhaust gases are exhausted to atmosphere via two stacks. To assess hexavalent chromium emissions from this source, both furnace stacks will be sampled concurrently.

For the first mobilization, Fan C79 will be operated at a constant exhaust rate throughout the program; other roof ventilation fans will not be operated during sampling. For the second mobilization, Fans B33, B34 and C79 will all be operated at constant exhaust rates.

The stacks will be sampled over a period of 80 minutes, while the furnace hall ventilation will be sampled over a period of seven hours per test run at a constant sampling rate and single sampling point.

Operating conditions:

Data related to the operation of Furnace T105 will be monitored during each sampling period. During sampling, the facility will operate at the expected production rate at the time of testing. The expected glass pull rate for the February 2024 testing is 1,175 kg/hr which is approximately 65% of the maximum pull rate for the facility. Hexavalent chromium emissions are primarily related to asset degradation, and not production rates.

Data expected in the final report, consistent with previous testing programs, are listed below:

- T105 Furnace/Forehearth glass pull rate
- Melter O2 flow rate
- Melter glass flow rate
- Forehearth O2 flow rate
- Forehearth gas flow rate

The pre-test plan is approved as the proposed reference methodologies/sampling strategies are acceptable.

We have noted the sampling schedule to commence February 12, 2024. If changes to this schedule occur, please notify both the MECP’s Guelph District Office and the Source Testing Group.

Just a reminder that the source testing report is required to be submitted in electronic format to the district office and to the source testing group at sourcetesting@ontario.ca.

If you have any questions with regards to this assessment, I can be reached by phone at 437-995-2835 or by email at sourcetesting@ontario.ca

Sincerely,

Caitlyn Ruddy
Source Assessment Specialist
Technology Standards Section

cc: J. Taylor- Owens Corning (jeff.taylor@owenscorning.com)
J. Lamport- Guelph District Office (jacqueline.lamport@ontario.ca)
J. McKerrall –TSS (jeffrey.mckerrall@ontario.ca)
B. Fullerton- TSS (bill.fullerton@ontario.ca)

File AQ-02 (Owens Corning- Guelph)

Doc.Mgmt # 5AH010009

Date: Tue, 30 Jul 2024 08:24:59 -0400
From: Guy Bastien <gubastien@montrose-env.com>
Subject: RE: 032615 - Owens Corning Guelph Glass Plant Hexavalent Chromium Notification of Intent to Test
Mime-Version: 1.0
Organization: LEHDER
X-Mailer: GoldMine [2020.1.1.62083]

Guy,

We have noted the second round of testing at Owens Corning scheduled for June 17, 2024. The only change from the previous round will be that the three roof ventilation sources will be operating and will be sampled concurrently. We have noted the lab change for this round of testing.

If changes to the sampling schedule occur please notify both the Guelph District Office and the Source Testing Group.

Caitlyn Ruddy
Source Assessment Specialist | Technical Assessment and Standards Development Branch
Ministry of the Environment, Conservation and Parks | Ontario Public Service
437-995-2835 | caitlyn.ruddy @ontario.ca
Taking pride in strengthening Ontario, its places and its people

From: Guy Bastien <gubastien@montrose-env.com>
Sent: Friday, May 17, 2024 12:37 PM
To: Source Testing (MECP) <SOURCETESTING@ontario.ca>; Lamport, Jacqueline (MECP) <Jacqueline.Lamport@ontario.ca>
Cc: Jeff Taylor <Jeff.Taylor@owenscorning.com>; Penny McInnis <PeMcinnis@montrose-env.com>; Evan Metcalfe <EvMetcalfe@montrose-env.com>
Subject: 032615 - Owens Corning Guelph Glass Plant Hexavalent Chromium Notification of Intent to Test

To Whom It May Concern:

Owens Corning Guelph Glass (OC Guelph) has retained Montrose Environmental Group, Ltd. (Montrose) to conduct **hexavalent chromium emissions testing** from selected sources servicing the T105 production line at the facility located at 247 York Road, Guelph, Ontario.

Attached please find a previously approved Test Protocol for the source sampling program. Please note that the Protocol submission included **Business Confidential** Information, which was provided as a separate file for review.

This Test Protocol was originally submitted in January 2024, and was approved for a February 2024 sampling campaign. Attached please find a copy of the Ministry PTP review letter.

Montrose is scheduled to repeat this sampling program over the period of **June 17 - 20, 2024**, with the following changes:

- Three (3) roof ventilation sources will be operating and will be sampled concurrently. The three sources and the areas they service are identified in the January 2024 Test Protocol. The remainder of the sampling program will remain as described in the Test Protocol.

- Subsequent to the completion of the February 2024 sampling program, Bureau Veritas discontinued providing stack sample analytical services. The analytical laboratory will now be as shown below:

Laboratory: **ALS Environmental**

Contact: **Ron McLeod**

Phone: (905) 331-3111, Ext. 222

Ron is based in the ALS Burlington, ON laboratory. However, I believe hexavalent chromium analyses are performed in the ALS Environmental Waterloo, ON Laboratory.

If you have any questions or concerns regarding the proposed sampling program, please feel free to contact me.

Respectfully submitted,

Guy Bastien, P.Eng.
Senior Environmental Engineer
Montrose Environmental
704 Mara Street, Suite 210, Point Edward, ON, N7V 1X4 | CA Eastern Time
Office: 1-519-336-4101 ext. 248 | Mobile: 1-519-330-1240
gubastien@montrose-env.com | montrose-env.com

-- NextPart --

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Appendix B

Site Photographs

Figure B1: T105 Furnace Stacks (Sources B24 and B25)

Figure B2: T105 East Furnace Stack (Typical of Both)

Figure B3: T105 East Furnace Stack (Typical of Both)

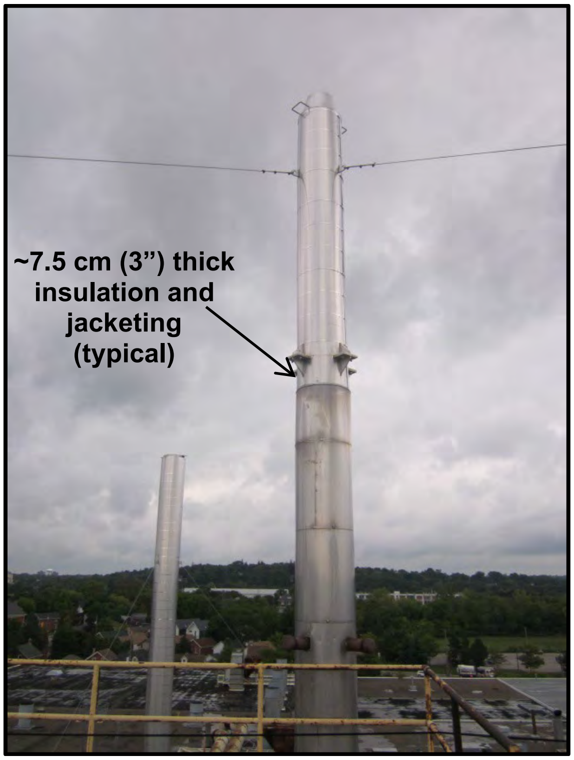

Figure B4: T105 Forehearth Stack (Source B38)

Figure B5: Furnace Hall Ventilator Style 1 (Sources C79 / C80)

Note: Source C79 is pictured; Source C80 is an identical design

Figure B6: Furnace Hall Ventilator Style 2 (Sources B33 / B34)

Note: Source B33 is pictured; Source B34 has a similar configuration

Appendix C

Emission Calculations

Montrose Environmental Group, Ltd.

Effluent Measurement Data

Client: Owens Corning
Facility: Guelph Glass
Source: West Furnace B24
Method: 0061
Project No.: 032615
Operators: MM
Data Entry: MH
Reviewed By: GB

Notes: Furnace Run #4 reported a negative moisture gain for the system; an additional test run set was completed

Jurisdiction:	ON	
Ref.Temperature:	77 ºF	25 ºC
Ref. Pressure:	29.92 in Hg	101.3 kPa
Velocity Constant:	85.25 (Eng. Units)	128.6 (SI Units)
Molar Volume:	24.46 L/mol	

Sampling Data	Run # or Source ID	Run #1	Run #2	Run #3	Run #5	Run #6	Run #7
Date	dd-mmm-yy	18-Jun-24	18-Jun-24	18-Jun-24	19-Jun-24	19-Jun-24	19-Jun-24
Start Time	hh:mm	08:41	11:17	15:06	10:30	13:29	15:50
End Time	hh:mm	10:05	12:43	16:38	11:56	14:54	17:20
Number of Ports Used		2	2	2	2	2	2
Number of Sample Points / Port		8	8	8	8	8	8
No. of Sample Points Used		16	16	16	16	16	16
Sample Time / Point	min	5.0	5.0	5.0	5.0	5.0	5.0
Reading Time / Point	min	2.5	2.5	2.5	2.5	2.5	2.5
Total Sample Time	min	80	80	80	80	80	80
Barometric Pressure, P_b	"Hg	29.01	29.02	29.00	29.11	29.11	29.09
Source Gauge Pressure, P_{gauge}	"H_2O	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Absolute Source Gas Pressure, P_s	"Hg	29.01	29.02	29.00	29.11	29.11	29.09
Pitot Tube Coefficient, Cp		0.839	0.839	0.839	0.839	0.839	0.839
Oxygen Content, O_2	%	20.2	20.3	20.0	20.1	20.2	20.1
Carbon Dioxide Content, CO_2	%	4.0	4.1	4.2	4.4	4.1	4.1
Nitrogen Content, N_2	%	75.8	75.6	75.8	75.5	75.7	75.8
Initial DGM Reading, v_{mi}	ft^3	674.130	721.200	770.000	867.300	915.800	964.700
Final DGM Reading, v_{mf}	ft^3	720.740	768.580	818.320	915.410	963.530	1011.850
DGM Unity, Y		0.9933	0.9933	0.9933	0.9933	0.9933	0.9933
$\Delta H_@$	"H_2O	1.8328	1.8328	1.8328	1.8328	1.8328	1.8328
Actual Volume of Dry Gas, v_d	ft^3	46.3	47.1	48.0	47.8	47.4	46.8
Condensate Collected, W_{H2O}	g	93.6	81.3	101.4	100.7	110.6	123.7
Circular Source Diameter, D_s	in	17.5	17.5	17.5	17.5	17.5	17.5
Source Flow Area, A_s	ft^2	1.67	1.67	1.67	1.67	1.67	1.67
Nozzle Diameter, D_n	in	0.3377	0.3377	0.3390	0.3390	0.3390	0.3390

Condensate Data

Impinger 1	Initial	g	655.4	653.9	659.0	658.1	655.7	657.2
	Final	g	547.2	518.9	534.2	622.5	661.8	666.5
Impinger 2	Initial	g	518.2	512.3	519.2	519.3	513.8	518.6
	Final	g	623.6	596.3	591.2	583.3	572.4	590.2
Impinger 3	Initial	g	510.4	510.9	511.2	511.8	514.5	513.8
	Final	g	563.1	586.7	601.8	544.4	535.4	533.7
Impinger 4	Initial	g	445.4	439.5	446.7	446.1	441.2	447.2
	Final	g	463.2	461.6	486.4	458.3	448.9	453.6
Impinger 5	Initial	g	982.7	945.0	974.4	941.1	919.9	954.2
	Final	g	1008.6	979.4	998.3	968.6	937.2	970.7

Montrose Environmental Group, Ltd.

Point by Point Sampling Data Entry Sheet

Client: Owens Corning
Facility: Guelph Glass
Source: West Furnace B24
Project No.: 032615

Run #1								Run #2								Run #3							
18-Jun-24								18-Jun-24								18-Jun-24							
08:41 - 10:05								11:17 - 12:43								15:06 - 16:38							
Port ID / Point #	Time min	Vd ft^3	Delta P "H$_2$O	Delta H "H$_2$O	T_s °F	T_{mi} °F	T_{mo} °F	Port ID / Point #	Time min	Vd ft^3	Delta P "H$_2$O	Delta H "H$_2$O	T_s °F	T_{mi} °F	T_{mo} °F	Port ID / Point #	Time min	Vd ft^3	Delta P "H$_2$O	Delta H "H$_2$O	T_s °F	T_{mi} °F	T_{mo} °F
SE 1	0.0	674.130	0.150	0.910	555	78	78	SW 1	0.0	721.200	0.190	1.200	560	88	88	SE 1	0.0	770.000	0.150	0.900	541	97	97
	2.5	675.590	0.150	0.910	563	78	78		2.5	722.780	0.190	1.200	562	88	88		2.5	771.440	0.150	0.900	562	97	97
2	5.0	676.850	0.150	0.910	561	78	78	2	5.0	724.310	0.170	1.000	564	88	88	2	5.0	772.810	0.170	1.000	562	97	97
	7.5	678.210	0.140	0.850	557	78	78		7.5	725.800	0.200	1.200	562	88	88		7.5	774.300	0.170	1.000	563	97	97
3	10.0	679.550	0.140	0.850	562	79	79	3	10.0	727.500	0.190	1.200	558	88	88	3	10.0	775.770	0.150	0.900	564	97	97
	12.5	680.860	0.150	0.910	560	79	79		12.5	729.050	0.180	1.100	561	89	89		12.5	777.160	0.150	0.900	558	97	97
4	15.0	682.170	0.150	0.910	565	79	79	4	15.0	730.430	0.180	1.100	563	89	89	4	15.0	778.550	0.150	0.900	559	97	97
	17.5	683.520	0.150	0.910	563	79	79		17.5	731.920	0.180	1.100	566	89	89		17.5	779.900	0.150	0.900	552	97	97
5	20.0	684.860	0.150	0.910	561	79	79	5	20.0	733.450	0.180	1.100	560	89	89	5	20.0	781.310	0.150	0.900	565	97	97
	22.5	686.230	0.150	0.910	562	79	79		22.5	734.860	0.150	0.900	558	89	89		22.5	782.690	0.150	0.900	562	97	97
6	25.0	687.600	0.170	1.000	569	79	79	6	25.0	736.300	0.150	0.900	563	89	89	6	25.0	784.070	0.150	0.900	566	98	98
	27.5	689.060	0.170	1.000	571	79	79		27.5	737.680	0.180	1.100	563	89	89		27.5	785.460	0.200	1.200	573	98	98
7	30.0	690.500	0.170	1.000	573	79	79	7	30.0	739.120	0.180	1.100	557	89	89	7	30.0	787.050	0.200	1.200	566	98	98
	32.5	691.940	0.200	1.200	567	79	79		32.5	740.680	0.180	1.100	559	89	89		32.5	788.610	0.200	1.200	570	98	98
8	35.0	693.500	0.200	1.200	568	79	79	8	35.0	742.200	0.180	1.100	562	89	89	8	35.0	790.270	0.200	1.200	568	98	98
	37.5	695.070	0.190	1.100	568	79	79		37.5	743.700	0.180	1.100	553	89	89		37.5	791.890	0.230	1.400	568	98	98
SW 1	40.0	696.600	0.190	1.100	554	79	79	SE 1	40.0	745.230	0.150	0.900	551	89	89	SW 1	40.0	793.600	0.190	1.200	560	98	98
	42.5	698.170	0.190	1.100	570	80	80		42.5	746.580	0.150	0.900	561	89	89		42.5	795.230	0.190	1.200	572	98	98
2	45.0	699.700	0.190	1.100	571	80	80	2	45.0	747.950	0.150	0.900	556	89	89	2	45.0	796.750	0.190	1.200	566	98	98
	47.5	701.300	0.190	1.100	575	80	80		47.5	749.330	0.150	0.900	554	89	89		47.5	798.330	0.190	1.200	560	97	97
3	50.0	702.830	0.170	1.000	569	80	80	3	50.0	750.700	0.150	0.900	556	89	89	3	50.0	799.900	0.190	1.200	555	97	97
	52.5	704.240	0.170	1.000	563	80	80		52.5	752.100	0.170	1.000	552	89	89		52.5	801.460	0.190	1.200	552	97	97
4	55.0	705.790	0.170	1.000	564	80	80	4	55.0	753.560	0.170	1.000	558	89	89	4	55.0	802.960	0.150	0.930	550	97	97
	57.5	707.150	0.140	0.900	567	81	81		57.5	755.000	0.170	1.000	560	89	89		57.5	804.380	0.150	0.900	551	97	97
5	60.0	708.550	0.150	0.900	567	81	81	5	60.0	756.480	0.170	1.000	553	89	89	5	60.0	805.780	0.150	0.900	552	96	96
	62.5	709.880	0.150	0.900	562	81	81		62.5	757.930	0.150	0.900	563	89	89		62.5	807.210	0.150	0.900	554	96	96
6	65.0	711.240	0.200	1.200	558	81	81	6	65.0	759.320	0.140	0.830	567	89	89	6	65.0	808.610	0.200	1.200	557	96	96
	67.5	712.810	0.200	1.200	551	81	81		67.5	760.640	0.200	1.200	560	89	89		67.5	810.220	0.200	1.200	558	96	96
7	70.0	714.360	0.200	1.200	564	82	82	7	70.0	762.290	0.200	1.200	565	89	89	7	70.0	811.840	0.200	1.200	556	96	96
	72.5	716.000	0.200	1.200	554	82	82		72.5	763.800	0.200	1.200	573	89	89		72.5	813.460	0.200	1.200	557	96	96
8	75.0	717.600	0.200	1.200	560	82	82	8	75.0	765.400	0.200	1.200	574	89	89	8	75.0	815.090	0.200	1.200	566	96	96
	77.5	719.150	0.200	1.200	550	82	82		77.5	766.900	0.200	0.200	572	89	89		77.5	816.710	0.190	1.100	568	95	95
	80.0	720.740							80.0	768.580							80.0	818.320					

Run #5
19-Jun-24
10:30 - 11:56

Port ID / Point #	Time min	Vd ft^3	Delta P "H_2O	Delta H "H_2O	T_s °F	T_{mi} °F	T_{mo} °F
SE 1	0.0	867.300	0.150	0.900	553	81	81
	2.5	868.700	0.150	0.900	561	81	81
2	5.0	870.020	0.150	0.900	557	81	81
	7.5	871.390	0.150	0.900	558	81	81
3	10.0	872.760	0.170	1.000	560	81	81
	12.5	874.210	0.170	1.000	562	82	82
4	15.0	875.690	0.170	1.000	564	82	82
	17.5	877.160	0.170	1.000	563	82	82
5	20.0	878.610	0.150	0.900	564	82	82
	22.5	879.990	0.150	0.900	566	82	82
6	25.0	881.380	0.150	0.900	558	82	82
	27.5	882.760	0.190	1.100	555	82	82
7	30.0	884.230	0.190	1.100	557	82	82
	32.5	885.770	0.220	1.300	552	82	82
8	35.0	887.430	0.220	1.300	552	82	82
	37.5	889.080	0.220	1.300	560	82	82
SW 1	40.0	890.750	0.190	1.100	556	84	84
	42.5	892.280	0.190	1.100	555	84	84
2	45.0	893.790	0.190	1.100	552	84	84
	47.5	895.350	0.190	1.100	561	84	84
3	50.0	896.890	0.190	1.100	560	84	84
	52.5	898.390	0.170	1.000	559	84	84
4	55.0	899.750	0.170	1.000	561	85	85
	57.5	901.210	0.170	1.000	562	85	85
5	60.0	902.680	0.170	1.000	555	85	85
	62.5	904.190	0.170	1.000	549	85	85
6	65.0	905.670	0.190	1.100	555	86	86
	67.5	907.240	0.190	1.100	551	86	86
7	70.0	908.740	0.220	1.300	551	86	86
	72.5	910.320	0.220	1.300	549	86	86
8	75.0	912.000	0.220	1.300	549	86	86
	77.5	913.700	0.220	1.300	552	86	86
	80.0	915.410					

Run #6
19-Jun-24
13:29 - 14:54

Port ID / Point #	Time min	Vd ft^3	Delta P "H_2O	Delta H "H_2O	T_s °F	T_{mi} °F	T_{mo} °F
SW 1	0.0	915.800	0.150	0.900	550	90	90
	2.5	917.220	0.190	1.200	545	90	90
2	5.0	918.890	0.190	1.200	545	90	90
	7.5	920.430	0.190	1.200	542	90	90
3	10.0	921.990	0.190	1.200	548	90	90
	12.5	923.500	0.190	1.200	545	90	90
4	15.0	925.060	0.150	0.900	546	90	90
	17.5	926.450	0.150	0.900	543	90	90
5	20.0	927.820	0.150	0.900	543	91	91
	22.5	929.250	0.150	0.900	551	91	91
6	25.0	930.580	0.200	1.200	549	91	91
	27.5	932.160	0.200	1.200	547	91	91
7	30.0	933.730	0.200	1.200	549	91	91
	32.5	935.320	0.200	1.200	557	91	91
8	35.0	936.930	0.200	1.200	554	91	91
	37.5	938.520	0.200	1.200	559	91	91
SE 1	40.0	940.090	0.180	1.100	550	91	91
	42.5	941.610	0.180	1.100	551	91	91
2	45.0	943.110	0.170	1.000	555	91	91
	47.5	944.610	0.170	1.000	549	93	93
3	50.0	946.110	0.170	1.000	553	93	93
	52.5	947.590	0.150	0.900	553	93	93
4	55.0	948.990	0.150	0.900	554	93	93
	57.5	950.390	0.150	0.900	547	93	93
5	60.0	951.730	0.150	0.900	554	93	93
	62.5	953.100	0.150	0.900	549	93	93
6	65.0	954.470	0.150	0.900	555	93	93
	67.5	955.850	0.150	0.900	549	93	93
7	70.0	957.230	0.150	0.900	554	93	93
	72.5	958.670	0.200	1.200	552	94	94
8	75.0	960.190	0.200	1.200	555	94	94
	77.5	961.790	0.230	1.400	554	94	94
	80.0	963.530					

Run #7
19-Jun-24
15:50 - 17:20

Port ID / Point #	Time min	Vd ft^3	Delta P "H_2O	Delta H "H_2O	T_s °F	T_{mi} °F	T_{mo} °F
SE 1	0.0	964.700	0.150	0.900	548	96	96
	2.5	966.100	0.150	0.900	550	96	96
2	5.0	967.570	0.150	0.900	557	96	96
	7.5	968.940	0.150	0.900	553	96	96
3	10.0	970.330	0.150	0.900	555	96	96
	12.5	971.650	0.150	0.900	552	96	96
4	15.0	973.050	0.170	1.050	551	97	97
	17.5	974.500	0.160	1.000	551	97	97
5	20.0	975.945	0.150	0.920	551	97	97
	22.5	977.330	0.150	0.920	555	97	97
6	25.0	978.720	0.150	0.910	559	97	97
	27.5	980.195	0.200	1.200	556	97	97
7	30.0	981.690	0.210	1.300	558	97	97
	32.5	983.325	0.220	1.350	555	97	97
8	35.0	985.025	0.200	1.200	559	97	97
	37.5	986.630	0.220	1.350	551	97	97
SW 1	40.0	988.344	0.170	1.000	554	97	97
	42.5	989.840	0.170	1.000	555	97	97
2	45.0	991.310	0.190	1.100	560	97	97
	47.5	992.820	0.190	1.100	558	97	97
3	50.0	994.320	0.150	0.900	560	97	97
	52.5	995.700	0.150	0.900	560	97	97
4	55.0	997.200	0.150	0.900	561	97	97
	57.5	998.590	0.150	0.900	560	97	97
5	60.0	999.990	0.150	0.900	560	97	97
	62.5	1001.400	0.150	0.900	560	97	97
6	65.0	1002.760	0.150	0.900	570	97	97
	67.5	1004.150	0.150	0.900	569	97	97
7	70.0	1005.530	0.200	1.200	575	97	97
	72.5	1007.070	0.200	1.200	574	97	97
8	75.0	1008.680	0.200	1.200	571	97	97
	77.5	1010.250	0.200	1.200	568	97	97
	80.0	1011.850					

Montrose Environmental Group, Ltd.

Point by Point Calculations

Client: Owens Corning
Facility: Guelph Glass
Source: West Furnace B24
Project No.: 032615

Run #1 18-Jun-24 08:41 - 10:05							Run #2 18-Jun-24 11:17 - 12:43							Run #3 18-Jun-24 15:06 - 16:38						
Point	Period	Sample Volume		Stack Velocity		Isokineticity	Point	Period	Sample Volume		Stack Velocity		Isokineticity	Point	Period	Sample Volume		Stack Velocity		Isokineticity
	min	m^3	ft^3	m/s	ft/s	%		min	m^3	ft^3	m/s	ft/s	%		min	m^3	ft^3	m/s	ft/s	%
SE 1	2.5	0.041	1.450	9.4	30.7	105.2	SW 1	2.5	0.044	1.569	10.5	34.6	98.7	SE 1	2.5	0.041	1.430	9.3	30.6	99.4
	2.5	0.035	1.252	9.4	30.9	91.2		2.5	0.043	1.520	10.6	34.6	95.7		2.5	0.039	1.361	9.4	30.9	95.6
2	2.5	0.038	1.351	9.4	30.8	98.3	2	2.5	0.042	1.480	10.0	32.8	98.6	2	2.5	0.042	1.480	10.0	32.9	97.6
	2.5	0.038	1.331	9.1	29.7	100.1		2.5	0.048	1.689	10.8	35.5	103.7		2.5	0.041	1.460	10.0	32.9	96.4
3	2.5	0.037	1.301	9.1	29.8	97.9	3	2.5	0.044	1.540	10.5	34.6	96.8	3	2.5	0.039	1.381	9.4	30.9	97.0
	2.5	0.037	1.301	9.4	30.8	94.5		2.5	0.039	1.371	10.3	33.7	88.5		2.5	0.039	1.381	9.4	30.8	96.8
4	2.5	0.038	1.341	9.4	30.9	97.6	4	2.5	0.042	1.480	10.3	33.7	95.6	4	2.5	0.038	1.341	9.4	30.8	94.0
	2.5	0.038	1.331	9.4	30.9	96.8		2.5	0.043	1.520	10.3	33.8	98.3		2.5	0.040	1.401	9.4	30.7	97.9
5	2.5	0.039	1.361	9.4	30.8	98.9	5	2.5	0.040	1.401	10.3	33.7	90.3	5	2.5	0.039	1.371	9.4	30.9	96.4
	2.5	0.039	1.361	9.4	30.9	98.9		2.5	0.041	1.430	9.4	30.7	100.9		2.5	0.039	1.371	9.4	30.9	96.3
6	2.5	0.041	1.450	10.0	33.0	99.4	6	2.5	0.039	1.371	9.4	30.8	97.0	6	2.5	0.039	1.381	9.4	30.9	97.0
	2.5	0.041	1.430	10.1	33.0	98.1		2.5	0.041	1.430	10.3	33.7	92.4		2.5	0.045	1.579	10.9	35.9	96.5
7	2.5	0.041	1.430	10.1	33.0	98.2	7	2.5	0.044	1.550	10.2	33.6	99.8	7	2.5	0.044	1.550	10.9	35.7	94.3
	2.5	0.044	1.550	10.9	35.7	97.9		2.5	0.043	1.510	10.3	33.7	97.3		2.5	0.047	1.649	10.9	35.8	100.6
8	2.5	0.044	1.559	10.9	35.7	98.5	8	2.5	0.042	1.490	10.3	33.7	96.2	8	2.5	0.046	1.609	10.9	35.8	98.0
	2.5	0.043	1.520	10.6	34.8	98.5		2.5	0.043	1.520	10.2	33.6	97.7		2.5	0.048	1.699	11.7	38.4	96.6
SW 1	2.5	0.044	1.559	10.5	34.6	100.4	SE 1	2.5	0.038	1.341	9.3	30.6	94.3	SW 1	2.5	0.046	1.619	10.6	34.7	100.8
	2.5	0.043	1.520	10.6	34.9	98.4		2.5	0.039	1.361	9.4	30.8	96.2		2.5	0.043	1.510	10.6	34.9	94.6
2	2.5	0.045	1.589	10.6	34.9	103.0	2	2.5	0.039	1.371	9.4	30.7	96.6	2	2.5	0.044	1.569	10.6	34.8	98.0
	2.5	0.043	1.520	10.7	34.9	98.6		2.5	0.039	1.361	9.3	30.6	95.8		2.5	0.044	1.559	10.6	34.7	97.3
3	2.5	0.040	1.401	10.0	33.0	95.8	3	2.5	0.039	1.391	9.4	30.7	98.0	3	2.5	0.044	1.550	10.6	34.6	96.4
	2.5	0.044	1.540	10.0	32.9	105.0		2.5	0.041	1.450	9.9	32.6	95.9		2.5	0.042	1.490	10.5	34.6	92.6
4	2.5	0.038	1.351	10.0	32.9	92.2	4	2.5	0.041	1.430	10.0	32.7	94.8	4	2.5	0.040	1.410	9.4	30.7	98.5
	2.5	0.039	1.391	9.1	29.9	104.5		2.5	0.042	1.470	10.0	32.7	97.6		2.5	0.039	1.391	9.4	30.7	97.1
5	2.5	0.037	1.321	9.4	30.9	95.9	5	2.5	0.041	1.440	9.9	32.6	95.2	5	2.5	0.040	1.420	9.4	30.7	99.4
	2.5	0.038	1.351	9.4	30.9	97.8		2.5	0.039	1.381	9.4	30.8	97.7		2.5	0.039	1.391	9.4	30.8	97.4
6	2.5	0.044	1.559	10.8	35.6	97.7	6	2.5	0.037	1.311	9.1	29.8	96.2	6	2.5	0.045	1.599	10.8	35.6	97.3
	2.5	0.044	1.540	10.8	35.4	96.1		2.5	0.046	1.639	10.8	35.5	100.3		2.5	0.046	1.609	10.8	35.6	97.9
7	2.5	0.046	1.629	10.9	35.7	102.2	7	2.5	0.042	1.500	10.8	35.6	92.0	7	2.5	0.046	1.609	10.8	35.6	97.8
	2.5	0.045	1.589	10.8	35.5	99.2		2.5	0.045	1.589	10.9	35.7	97.9		2.5	0.046	1.619	10.8	35.6	98.5
8	2.5	0.044	1.540	10.8	35.6	96.4	8	2.5	0.042	1.490	10.9	35.7	91.8	8	2.5	0.046	1.609	10.9	35.7	98.3
	2.5	0.045	1.579	10.8	35.4	98.4		2.5	0.047	1.669	10.9	35.7	102.5		2.5	0.045	1.599	10.6	34.9	100.5

		Run #5 19-Jun-24 10:30 - 11:56							Run #6 19-Jun-24 13:29 - 14:54							Run #7 19-Jun-24 15:50 - 17:20				
Point	Period	Sample Volume		Stack Velocity		Isokineticity	Point	Period	Sample Volume		Stack Velocity		Isokineticity	Point	Period	Sample Volume		Stack Velocity		Isokineticity
	min	m^3	ft^3	m/s	ft/s	%		min	m^3	ft^3	m/s	ft/s	%		min	m^3	ft^3	m/s	ft/s	%
SE 1	2.5	0.039	1.391	9.3	30.7	100.1	SW 1	2.5	0.040	1.410	9.4	30.7	100.6	SE 1	2.5	0.039	1.391	9.3	30.6	97.0
	2.5	0.037	1.311	9.4	30.8	94.7		2.5	0.047	1.659	10.5	34.5	104.9		2.5	0.041	1.460	9.3	30.6	101.9
2	2.5	0.039	1.361	9.4	30.7	98.1	2	2.5	0.043	1.530	10.5	34.5	96.8	2	2.5	0.039	1.361	9.4	30.7	95.3
	2.5	0.039	1.361	9.4	30.7	98.2		2.5	0.044	1.550	10.5	34.4	97.9		2.5	0.039	1.381	9.4	30.7	96.5
3	2.5	0.041	1.440	10.0	32.7	97.7	3	2.5	0.042	1.500	10.5	34.5	95.0	3	2.5	0.037	1.311	9.4	30.7	91.7
	2.5	0.042	1.470	10.0	32.8	99.7		2.5	0.044	1.550	10.5	34.5	98.0		2.5	0.039	1.391	9.3	30.7	97.1
4	2.5	0.041	1.460	10.0	32.8	99.1	4	2.5	0.039	1.381	9.3	30.6	98.3	4	2.5	0.041	1.440	9.9	32.6	94.3
	2.5	0.041	1.440	10.0	32.8	97.7		2.5	0.039	1.361	9.3	30.6	96.7		2.5	0.041	1.435	9.6	31.7	96.9
5	2.5	0.039	1.371	9.4	30.8	99.0	5	2.5	0.040	1.420	9.3	30.6	100.8	5	2.5	0.039	1.376	9.3	30.7	95.9
	2.5	0.039	1.381	9.4	30.9	99.8		2.5	0.037	1.321	9.4	30.7	94.1		2.5	0.039	1.381	9.4	30.7	96.4
6	2.5	0.039	1.371	9.4	30.7	98.7	6	2.5	0.044	1.569	10.8	35.4	96.8	6	2.5	0.041	1.465	9.4	30.8	102.5
	2.5	0.041	1.460	10.5	34.5	93.4		2.5	0.044	1.559	10.8	35.4	96.1		2.5	0.042	1.485	10.8	35.5	89.9
7	2.5	0.043	1.530	10.5	34.6	97.9	7	2.5	0.045	1.579	10.8	35.4	97.4	7	2.5	0.046	1.624	11.1	36.4	96.1
	2.5	0.047	1.649	11.3	37.1	97.9		2.5	0.045	1.599	10.8	35.6	99.0		2.5	0.048	1.689	11.3	37.2	97.5
8	2.5	0.046	1.639	11.3	37.1	97.3	8	2.5	0.045	1.579	10.8	35.5	97.6	8	2.5	0.045	1.594	10.8	35.5	96.7
	2.5	0.047	1.659	11.4	37.3	98.8		2.5	0.044	1.559	10.9	35.6	96.7		2.5	0.048	1.703	11.3	37.1	98.1
SW 1	2.5	0.043	1.520	10.5	34.6	96.9	SE 1	2.5	0.043	1.510	10.3	33.6	98.2	SW 1	2.5	0.042	1.486	10.0	32.7	97.5
	2.5	0.042	1.500	10.5	34.5	95.5		2.5	0.042	1.490	10.3	33.6	96.9		2.5	0.041	1.460	10.0	32.7	95.8
2	2.5	0.044	1.550	10.5	34.5	98.6	2	2.5	0.042	1.490	10.0	32.8	99.9	2	2.5	0.042	1.500	10.6	34.7	93.3
	2.5	0.043	1.530	10.6	34.6	97.7		2.5	0.042	1.490	10.0	32.7	99.3		2.5	0.042	1.490	10.6	34.6	92.6
3	2.5	0.042	1.490	10.6	34.6	95.1	3	2.5	0.042	1.470	10.0	32.7	98.1	3	2.5	0.039	1.371	9.4	30.8	96.0
	2.5	0.038	1.351	10.0	32.7	91.1		2.5	0.039	1.391	9.4	30.7	98.8		2.5	0.042	1.490	9.4	30.8	104.3
4	2.5	0.041	1.450	10.0	32.8	97.7	4	2.5	0.039	1.391	9.4	30.8	98.8	4	2.5	0.039	1.381	9.4	30.8	96.7
	2.5	0.041	1.460	10.0	32.8	98.5		2.5	0.038	1.331	9.3	30.7	94.3		2.5	0.039	1.391	9.4	30.8	97.4
5	2.5	0.042	1.500	10.0	32.7	100.8	5	2.5	0.039	1.361	9.4	30.8	96.7	5	2.5	0.040	1.401	9.4	30.8	98.0
	2.5	0.042	1.470	9.9	32.6	98.5		2.5	0.039	1.361	9.4	30.7	96.5		2.5	0.038	1.351	9.4	30.8	94.6
6	2.5	0.044	1.559	10.5	34.5	99.0	6	2.5	0.039	1.371	9.4	30.8	97.5	6	2.5	0.039	1.381	9.4	30.9	97.1
	2.5	0.042	1.490	10.5	34.5	94.4		2.5	0.039	1.371	9.4	30.7	97.2		2.5	0.039	1.371	9.4	30.9	96.4
7	2.5	0.044	1.569	11.3	37.1	92.4	7	2.5	0.041	1.430	9.4	30.8	101.7	7	2.5	0.043	1.530	10.9	35.8	93.5
	2.5	0.047	1.669	11.3	37.1	98.2		2.5	0.043	1.510	10.8	35.5	92.7		2.5	0.045	1.599	10.9	35.8	97.7
8	2.5	0.048	1.689	11.3	37.1	99.3	8	2.5	0.045	1.589	10.8	35.5	97.8	8	2.5	0.044	1.559	10.9	35.7	95.1
	2.5	0.048	1.699	11.3	37.1	100.1		2.5	0.049	1.728	11.6	38.1	99.2		2.5	0.045	1.589	10.9	35.7	96.8

Montrose Environmental Group, Ltd.

Effluent Calculation Summary

Client: Owens Corning
Facility: Guelph Glass
Source: West Furnace B24
Project No.: 032615
Reviewed By: GB
Notes: Furnace Run #4 reported a negative moisture gain for the system; an additional test run set was completed

Measurement Parameter		Use Run #1 18-Jun-24 08:41 - 10:05	Use Run #2 18-Jun-24 11:17 - 12:43	Use Run #3 18-Jun-24 15:06 - 16:38	Use Run #5 19-Jun-24 10:30 - 11:56	Use Run #6 19-Jun-24 13:29 - 14:54	Use Run #7 19-Jun-24 15:50 - 17:20	Arithmetic Averages
Effluent Characteristics								
Area of Sample Plane	m^2	0.16	0.16	0.16	0.16	0.16	0.16	
Area of Sample Plane	ft^2	1.67	1.67	1.67	1.67	1.67	1.67	
Average Stack Temperature	ºC	295	294	294	292	288	293	292
Average Stack Temperature	ºF	563	561	560	557	550	559	558
Average Stack Gas Pressure	kPa	98.2	98.2	98.2	98.5	98.5	98.5	98.4
Average Stack Gas Pressure	"Hg	29.0	29.0	29.0	29.1	29.1	29.1	29.1
Average Stack Gas Static Pressure	"H$_2$O	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Average Stack Gas Velocity	m/s	10.0	10.1	10.2	10.3	10.1	10.0	10.1
Average Stack Gas Velocity	ft/s	32.9	33.1	33.4	33.8	33.1	32.7	33.2
Average Stack Gas Velocity	fpm	1.98E+03	1.99E+03	2.00E+03	2.03E+03	1.99E+03	1.96E+03	1.99E+03
Oxygen Concentration	% vol	20.2	20.3	20.0	20.1	20.2	20.1	20.2
Carbon Dioxide Concentration	% vol	4.00	4.10	4.20	4.40	4.10	4.10	4.15
Effluent Molecular Weight (dry)	g/gmol	29.45	29.47	29.47	29.51	29.46	29.46	29.47
Effluent Molecular Weight (wet)	g/gmol	28.40	28.55	28.35	28.42	28.25	28.38	28.39
Effluent Moisture Content	% vol.	9.12	8.02	9.77	9.49	10.55	**9.39**	9.39
Dry Gas Fraction	% vol.	90.9	92.0	90.2	90.5	89.5	90.6	90.6
Actual Effluent Flow Rate	A.m^3/s	1.56	1.57	1.58	1.60	1.57	1.55	1.57
Actual Effluent Flow Rate	acfm	3.30E+03	3.32E+03	3.35E+03	3.38E+03	3.32E+03	3.28E+03	3.32E+03
Reference Flow Rate (wet)	R.m^3/s	0.79	0.80	0.81	0.82	0.81	0.79	0.80
Standard Flow Rate (wet)	scfm	1.68E+03	1.69E+03	1.71E+03	1.74E+03	1.71E+03	1.68E+03	1.70E+03
Reference Flow Rate (dry)	**R.m^3/s (dry)**	**0.72**	**0.73**	**0.73**	**0.74**	**0.72**	**0.72**	**0.73**
Standard Flow Rate (dry)	**scfm (dry)**	**1.53E+03**	**1.56E+03**	**1.54E+03**	**1.57E+03**	**1.53E+03**	**1.52E+03**	**1.54E+03**
Sample Parameters								
Sample Period	min	80	80	80	80	80	80	
Sample Volume	A.m^3	1.31	1.33	1.36	1.35	1.34	1.33	1.34
Sample Volume	acf	46.3	47.1	48.0	47.8	47.4	46.8	47.2
Dry Reference Sample Volume	**R.m^3**	**1.27**	**1.27**	**1.27**	**1.30**	**1.27**	**1.25**	**1.27**
Dry Standard Sample Volume	**scf**	**44.8**	**44.8**	**45.0**	**46.1**	**45.0**	**44.0**	**44.9**
Water Vapour Reference Volume	R.m^3	0.13	0.11	0.14	0.14	0.15	0.13	0.13
Water Vapour Standard Volume	scf	4.49	3.90	4.87	4.83	5.31	4.68	4.68
Average Meter Temperature	ºC	27	32	36	29	33	36	32
Average Meter Temperature	ºF	80	89	97	83	92	97	90
Average Absolute Meter Pressure	kPa	98.50	98.53	98.48	98.85	98.85	98.77	98.66
Average Absolute Meter Pressure	in Hg	29.09	29.10	29.08	29.19	29.19	29.17	29.13
Average Delta P	in H$_2$O	0.17	0.17	0.18	0.18	0.18	0.17	0.18
Average Delta H	in H$_2$O	1.02	1.02	1.07	1.07	1.06	1.03	1.05
Average Sample Rate	Lpm	16.4	16.7	17.0	16.9	16.8	16.6	16.7
Average Sample Rate	cfm	0.58	0.59	0.60	0.60	0.59	0.59	0.59
Average Isokinetic Variation	%	98.5	96.6	97.3	97.6	97.8	96.5	97.4

Montrose Environmental Group, Ltd.

Client: Owens Corning
Facility: Guelph Glass
Source: West Furnace B24
Method: Method 0061
Project No.: 032615
Operators: MH/MM
Data Entry: MH/GB
Reviewed By: GB
Notes: Furnace Run #4 reported a negative moisture gain for the system; an additional test run set was completed

Hexavalent Chromium Analytical		Run #1	Run #2	Run #3	Run #5	Run #6	Run #7
Lab Report ID: *BU2400112*		18-Jun-24	18-Jun-24	18-Jun-24	19-Jun-24	19-Jun-24	19-Jun-24
		08:41 - 10:05	11:17 - 12:43	15:06 - 16:38	10:30 - 11:56	13:29 - 14:54	15:50 - 17:20
Chromium (Cr^{6+})	µg	22.3	7.04	20.6	9.60	17.7	15.9

Method 0061 Blank Analyses

0.5 N KOH Blank	µg	0.52

italics indicate result less than reportable detection limit (RDL)

Montrose Environmental Group, Ltd.

Client: Owens Corning
Facility: Guelph Glass
Source: West Furnace B24
Method: Method 0061
Project No.: 032615
Reviewed By: MH

	Test Selector	Use	Use	Use	Use	Use	Use	
Measurement Parameter		Run #1 18-Jun-24 08:41 - 10:05	Run #2 18-Jun-24 11:17 - 12:43	Run #3 18-Jun-24 15:06 - 16:38	Run #5 19-Jun-24 10:30 - 11:56	Run #6 19-Jun-24 13:29 - 14:54	Run #7 19-Jun-24 15:50 - 17:20	Average for Source
Hexavalent Chromium Concentration	$\mu g/R.m^3$	17.6	5.55	16.2	7.36	13.9	12.8	12.2
Hexavalent Chromium Mass Rate	µg/s	12.7	4.08	11.8	5.46	10.1	9.16	8.87
	g/s	1.27E-05	4.08E-06	1.18E-05	5.46E-06	1.01E-05	9.16E-06	8.87E-06
	kg/hr	4.56E-05	1.47E-05	4.24E-05	1.97E-05	3.62E-05	3.30E-05	3.19E-05
	lb/hr	1.01E-04	3.24E-05	9.33E-05	4.34E-05	7.98E-05	7.27E-05	7.03E-05
Effluent Characteristics								
Average Stack Temperature	ºC	295	294	294	292	288	293	292
Average Stack Temperature	ºF	563	561	560	557	550	559	558
Effluent Moisture Content	% vol.	9.12	8.02	9.77	9.49	10.5	9.39	9.39
Oxygen Concentration	% vol	20.2	20.3	20.0	20.1	20.2	20.1	20.2
Carbon Dioxide Concentration	% vol	4.00	4.10	4.20	4.40	4.10	4.10	4.15
Actual Effluent Flow Rate	$A.m^3/s$	1.56	1.57	1.58	1.60	1.57	1.55	1.57
Actual Effluent Flow Rate	acfm	3.30E+03	3.32E+03	3.35E+03	3.38E+03	3.32E+03	3.28E+03	3.32E+03
Reference Flow Rate (wet)	$R.m^3/s$	0.79	0.80	0.81	0.82	0.81	0.79	0.80
Standard Flow Rate (wet)	scfm	1.68E+03	1.69E+03	1.71E+03	1.74E+03	1.71E+03	1.68E+03	1.70E+03
Reference Flow Rate (dry)	**$R.m^3/s$ (dry)**	**0.72**	**0.73**	**0.73**	**0.74**	**0.72**	**0.72**	**0.73**
Standard Flow Rate (dry)	**scfm (dry)**	**1.53E+03**	**1.56E+03**	**1.54E+03**	**1.57E+03**	**1.53E+03**	**1.52E+03**	**1.54E+03**
Sample Parameters								
Chromium (Cr6+)	**µg**	**22.3**	**7.0**	**20.6**	**9.6**	**17.7**	**15.9**	**15.5**
Sample Volume	$A.m^3$	1.31	1.33	1.36	1.35	1.34	1.33	1.34
Sample Volume	acf	46.3	47.1	48.0	47.8	47.4	46.8	47.2
Dry Reference Sample Volume	**$R.m^3$**	**1.27**	**1.27**	**1.27**	**1.30**	**1.27**	**1.25**	**1.27**
Dry Standard Sample Volume	**scf**	**44.8**	**44.8**	**45.0**	**46.1**	**45.0**	**44.0**	**44.9**
Average Isokinetic Variation	%	98.5	96.6	97.3	97.6	97.8	96.5	97.4

Montrose Environmental Group, Ltd.

Effluent Measurement Data

Client: Owens Corning
Facility: Guelph Glass
Source: East Furnace B25
Method: 0061
Project No.: 032615
Operators: CM
Data Entry: MH
Reviewed By: GB

Notes: Furnace Run #4 reported a negative moisture gain for the system; an additional test run set was completed

Jurisdiction:	ON	
Ref.Temperature:	77 ºF	25 ºC
Ref. Pressure:	29.92 in Hg	101.3 kPa
Velocity Constant:	85.25 (Eng. Units)	128.6 (SI Units)
Molar Volume:	24.46 L/mol	

Sampling Data	Run # or Source ID	Run #1	Run #2	Run #3	Run #5	Run #6	Run #7
Date	dd-mmm-yy	18-Jun-24	18-Jun-24	18-Jun-24	19-Jun-24	19-Jun-24	19-Jun-24
Start Time	hh:mm	08:41	11:17	15:06	10:30	13:29	15:50
End Time	hh:mm	10:05	12:43	16:38	11:56	14:54	17:20
Number of Ports Used		2	2	2	2	2	2
Number of Sample Points / Port		8	8	8	8	8	8
No. of Sample Points Used		16	16	16	16	16	16
Sample Time / Point	min	5.0	5.0	5.0	5.0	5.0	5.0
Reading Time / Point	min	2.5	2.5	2.5	2.5	2.5	2.5
Total Sample Time	min	80	80	80	80	80	80
Barometric Pressure, P_b	"Hg	29.02	29.02	29.00	29.11	29.11	29.09
Source Gauge Pressure, P_{gauge}	"H_2O	0.02	0.02	0.02	0.02	0.02	0.02
Absolute Source Gas Pressure, P_s	"Hg	29.02	29.02	29.00	29.11	29.11	29.09
Pitot Tube Coefficient, Cp		0.834	0.834	0.834	0.834	0.834	0.834
Oxygen Content, O_2	%	20.2	20.3	20.0	20.1	20.3	20.1
Carbon Dioxide Content, CO_2	%	4.0	4.1	4.2	4.4	3.8	4.1
Nitrogen Content, N_2	%	75.8	75.6	75.8	75.5	75.9	75.8
Initial DGM Reading, v_{mi}	ft^3	5.250	51.900	99.760	94.800	42.300	90.300
Final DGM Reading, v_{mf}	ft^3	51.540	99.230	148.720	141.660	89.840	135.800
DGM Unity, Y		1.0047	1.0047	1.0047	1.0047	1.0047	1.0047
$\Delta H_@$	"H_2O	1.8175	1.8175	1.8175	1.8175	1.8175	1.8175
Actual Volume of Dry Gas, v_d	ft^3	46.5	47.6	49.2	47.1	47.8	45.7
Condensate Collected, W_{H2O}	g	97.0	44.1	86.2	108.8	118.5	119.5
Circular Source Diameter, D_s	in	17.5	17.5	17.5	17.5	17.5	17.5
Source Flow Area, A_s	ft^2	1.67	1.67	1.67	1.67	1.67	1.67
Nozzle Diameter, D_n	in	0.3388	0.3388	0.3388	0.3388	0.3388	0.3388

Condensate Data

Impinger 1	Initial	g	658.4	676.9	655.7	655.6	679.0	670.7
	Final	g	582.3	536.5	577.3	620.2	659.2	680.5
Impinger 2	Initial	g	496.7	513.7	498.3	498.3	514.2	519.1
	Final	g	582.5	583.9	585.4	571.2	598.8	595.4
Impinger 3	Initial	g	509.0	513.4	510.2	509.7	516.8	517.8
	Final	g	562.4	564.6	553.2	546.4	552.6	535.6
Impinger 4	Initial	g	435.0	438.5	436.0	435.3	439.4	444.8
	Final	g	447.8	464.7	449.6	447.2	443.6	447.8
Impinger 5	Initial	g	963.2	946.5	955.9	956.1	959.7	964.6
	Final	g	984.3	983.4	976.8	978.8	973.4	977.2

Montrose Environmental Group, Ltd.
Point by Point Sampling Data Entry Sheet

Client: Owens Corning
Facility: Guelph Glass
Source: East Furnace B25
Project No.: 032615

Run #1 18-Jun-24 08:41 - 10:05								Run #2 18-Jun-24 11:17 - 12:43								Run #3 18-Jun-24 15:06 - 16:38							
Port ID /	Time	Vd	Delta P	Delta H	T_s	T_{mi}	T_{mo}	Port ID /	Time	Vd	Delta P	Delta H	T_s	T_{mi}	T_{mo}	Port ID /	Time	Vd	Delta P	Delta H	T_s	T_{mi}	T_{mo}
Point #	min	ft^3	"H_2O	"H_2O	°F	°F	°F	Point #	min	ft^3	"H_2O	"H_2O	°F	°F	°F	Point #	min	ft^3	"H_2O	"H_2O	°F	°F	°F
SW 1	0.0	5.250	0.140	0.920	548	81	80	SE 1	0.0	51.900	0.160	1.100	546	90	90	SW 1	0.0	99.760	0.140	0.900	552	98	97
	2.5	6.680	0.140	0.910	548	81	80		2.5	53.410	0.160	1.100	548	91	90		2.5	101.150	0.150	0.970	550	98	98
2	5.0	8.090	0.140	0.910	547	82	80	2	5.0	54.930	0.160	1.100	552	91	90	2	5.0	102.560	0.150	0.970	552	99	98
	7.5	9.420	0.150	0.990	542	82	81		7.5	56.430	0.180	1.200	542	92	90		7.5	104.040	0.150	0.960	557	99	98
3	10.0	10.790	0.140	0.910	551	82	81	3	10.0	58.060	0.180	1.200	543	92	90	3	10.0	105.460	0.150	0.970	555	100	98
	12.5	12.230	0.120	0.790	546	82	81		12.5	59.590	0.170	1.100	573	92	90		12.5	106.930	0.150	0.970	555	100	98
4	15.0	13.580	0.130	0.850	549	82	81	4	15.0	61.090	0.150	1.000	550	92	90	4	15.0	108.370	0.150	0.970	552	101	98
	17.5	14.860	0.120	0.790	547	83	81		17.5	62.560	0.140	0.930	550	93	90		17.5	109.840	0.150	0.980	547	101	99
5	20.0	16.110	0.120	0.790	546	83	81	5	20.0	64.030	0.140	0.930	545	93	90	5	20.0	111.310	0.150	0.960	562	101	99
	22.5	17.360	0.130	0.860	542	83	81		22.5	65.470	0.140	0.930	547	93	90		22.5	112.740	0.170	1.100	555	101	99
6	25.0	18.630	0.120	0.780	551	83	81	6	25.0	66.870	0.130	0.830	554	93	90	6	25.0	114.310	0.200	1.300	561	101	99
	27.5	19.850	0.190	1.240	554	83	81		27.5	68.150	0.190	1.200	551	93	91		27.5	115.970	0.190	1.200	565	101	99
7	30.0	21.350	0.200	1.300	554	84	81	7	30.0	69.780	0.200	1.300	546	93	91	7	30.0	117.520	0.200	1.300	566	101	99
	32.5	22.930	0.200	1.300	555	84	81		32.5	71.400	0.190	1.200	548	93	91		32.5	119.130	0.200	1.300	558	101	99
8	35.0	24.610	0.210	1.400	549	84	81	8	35.0	73.040	0.180	1.200	554	93	91	8	35.0	120.830	0.200	1.300	559	101	99
	37.5	26.240	0.210	1.400	553	85	81		37.5	74.610	0.200	1.300	545	93	91		37.5	122.510	0.210	1.400	556	101	99
SE 1	40.0	27.870	0.170	1.100	542	82	82	SW 1	40.0	76.220	0.120	0.780	537	91	91	SE 1	40.0	124.240	0.160	1.000	547	99	99
	42.5	29.350	0.170	1.100	555	84	82		42.5	77.490	0.120	0.770	541	92	91		42.5	125.820	0.150	1.000	560	99	99
2	45.0	30.830	0.180	1.200	550	85	82	2	45.0	78.750	0.120	0.780	536	93	91	2	45.0	127.320	0.150	0.960	560	99	99
	47.5	32.380	0.160	1.000	560	85	83		47.5	80.040	0.130	0.850	533	93	91		47.5	128.810	0.170	1.100	551	99	99
3	50.0	33.810	0.160	1.000	557	85	83	3	50.0	81.350	0.130	0.850	533	93	91	3	50.0	130.280	0.170	1.100	548	99	98
	52.5	35.250	0.160	1.000	554	86	83		52.5	82.690	0.130	0.850	529	93	91		52.5	131.770	0.170	1.100	547	99	98
4	55.0	36.730	0.150	0.980	550	86	83	4	55.0	84.010	0.130	0.850	533	93	91	4	55.0	133.300	0.130	0.850	543	99	98
	57.5	38.170	0.130	0.850	557	86	83		57.5	85.350	0.130	0.850	532	93	91		57.5	134.700	0.130	0.840	547	98	98
5	60.0	39.520	0.130	0.850	551	86	83	5	60.0	86.690	0.160	1.000	540	93	91	5	60.0	136.120	0.150	0.980	544	98	98
	62.5	40.880	0.140	0.920	550	86	83		62.5	88.190	0.160	1.000	551	94	91		62.5	137.560	0.150	0.970	547	98	98
6	65.0	42.210	0.160	1.100	539	87	84	6	65.0	89.640	0.150	0.960	552	94	91	6	65.0	139.000	0.190	1.200	551	98	98
	67.5	43.610	0.160	1.100	502	87	84		67.5	91.090	0.200	1.300	547	94	92		67.5	140.640	0.190	1.200	551	98	98
7	70.0	45.070	0.190	1.300	540	87	84	7	70.0	92.670	0.200	1.300	551	95	92	7	70.0	142.200	0.200	1.300	544	98	97
	72.5	46.590	0.220	1.500	518	87	84		72.5	94.320	0.200	1.300	560	95	92		72.5	143.890	0.200	1.300	551	98	97
8	75.0	48.290	0.210	1.400	541	87	84	8	75.0	95.920	0.200	1.300	556	95	92	8	75.0	145.530	0.180	1.200	562	98	97
	77.5	49.940	0.210	1.400	533	87	84		77.5	97.580	0.200	1.300	562	95	92		77.5	147.110	0.190	1.200	559	98	97
	80.0	51.540							80.0	99.230							80.0	148.720					

Run #5								**Run #6**								**Run #7**							
19-Jun-24								**19-Jun-24**								**19-Jun-24**							
10:30 - 11:56								**13:29 - 14:54**								**15:50 - 17:20**							
Port ID /	Time	Vd	Delta P	Delta H	T_s	T_{mi}	T_{mo}	Port ID /	Time	Vd	Delta P	Delta H	T_s	T_{mi}	T_{mo}	Port ID /	Time	Vd	Delta P	Delta H	T_s	T_{mi}	T_{mo}
Point #	min	ft^3	"H$_2$O	"H$_2$O	°F	°F	°F	Point #	min	ft^3	"H$_2$O	"H$_2$O	°F	°F	°F	Point #	min	ft^3	"H$_2$O	"H$_2$O	°F	°F	°F
SE 1	0.0	94.800	0.140	0.890	546	84	83	SW 1	0.0	42.300	0.170	1.100	529	91	91	SE 1	0.0	90.300	0.120	0.770	550	97	97
	2.5	96.180	0.150	0.950	549	86	86		2.5	43.840	0.170	1.100	532	92	91		2.5	91.620	0.120	0.780	544	98	97
2	5.0	97.570	0.140	0.890	547	85	83	2	5.0	45.380	0.170	1.100	530	92	91	2	5.0	92.960	0.120	0.770	554	98	97
	7.5	98.900	0.140	0.880	549	86	84		7.5	46.920	0.180	1.200	529	93	92		7.5	94.280	0.120	0.780	543	99	98
3	10.0	100.240	0.140	0.880	553	86	84	3	10.0	48.520	0.170	1.100	533	93	92	3	10.0	95.540	0.120	0.780	548	99	97
	12.5	101.560	0.140	0.880	556	86	84		12.5	50.070	0.170	1.100	532	93	92		12.5	96.840	0.130	0.850	541	99	98
4	15.0	102.870	0.140	0.880	556	87	84	4	15.0	51.590	0.150	0.970	537	94	92	4	15.0	98.190	0.130	0.850	542	99	98
	17.5	104.200	0.130	0.820	554	87	84		17.5	53.040	0.140	0.910	533	94	92		17.5	99.540	0.130	0.840	547	99	98
5	20.0	105.470	0.120	0.750	555	87	84	5	20.0	54.480	0.140	0.900	544	94	92	5	20.0	100.890	0.130	0.850	545	99	98
	22.5	106.730	0.120	0.760	552	87	85		22.5	55.870	0.150	0.970	544	94	92		22.5	102.240	0.140	0.910	549	99	98
6	25.0	107.980	0.130	0.830	545	87	85	6	25.0	57.280	0.200	1.300	535	94	92	6	25.0	103.630	0.170	1.100	549	99	98
	27.5	109.270	0.190	1.200	548	87	85		27.5	58.970	0.200	1.300	537	94	93		27.5	105.090	0.170	1.100	555	99	98
7	30.0	110.840	0.200	1.300	546	88	85	7	30.0	60.640	0.200	1.300	540	94	93	7	30.0	106.570	0.170	1.100	547	99	98
	32.5	112.460	0.200	1.300	546	88	85		32.5	62.320	0.200	1.300	544	95	93		32.5	108.120	0.200	1.300	547	99	98
8	35.0	114.080	0.200	1.300	543	88	86	8	35.0	63.980	0.200	1.300	551	95	93	8	35.0	109.790	0.190	1.200	555	99	98
	37.5	115.730	0.200	1.300	552	88	86		37.5	65.630	0.200	1.300	556	95	93		37.5	111.420	0.190	1.200	543	99	98
SW 1	40.0	117.370	0.160	1.000	551	87	86	SE 1	40.0	67.280	0.130	0.840	539	94	93	SW 1	40.0	113.030	0.140	0.900	554	98	98
	42.5	118.760	0.170	1.100	545	88	86		42.5	68.630	0.130	0.840	547	95	93		42.5	114.460	0.150	0.960	555	98	98
2	45.0	120.220	0.180	1.200	538	89	87	2	45.0	69.970	0.130	0.840	540	95	94	2	45.0	115.940	0.150	0.970	547	98	98
	47.5	121.780	0.170	1.100	552	89	87		47.5	71.320	0.140	0.910	538	95	94		47.5	117.400	0.140	0.900	560	99	98
3	50.0	123.310	0.170	1.100	551	89	87	3	50.0	72.730	0.140	0.910	536	95	94	3	50.0	118.820	0.130	0.840	555	99	98
	52.5	124.850	0.150	0.950	553	89	87		52.5	74.140	0.140	0.910	540	96	94		52.5	120.210	0.130	0.840	549	99	98
4	55.0	126.230	0.160	1.000	549	89	87	4	55.0	75.510	0.140	0.900	545	96	94	4	55.0	121.550	0.130	0.840	556	99	98
	57.5	127.700	0.130	0.820	556	90	87		57.5	76.920	0.120	0.770	556	96	94		57.5	122.890	0.120	0.770	563	99	98
5	60.0	128.990	0.160	1.000	550	90	87	5	60.0	78.230	0.130	0.840	551	96	94	5	60.0	124.240	0.140	0.880	575	99	98
	62.5	130.410	0.160	1.000	546	90	87		62.5	79.570	0.130	0.840	550	96	95		62.5	125.640	0.140	0.890	571	99	98
6	65.0	131.850	0.160	1.000	549	90	88	6	65.0	80.870	0.130	0.830	553	96	95	6	65.0	126.970	0.130	0.820	579	99	98
	67.5	133.280	0.200	1.300	541	90	88		67.5	82.190	0.150	0.970	549	96	95		67.5	128.260	0.130	0.820	579	98	98
7	70.0	134.890	0.200	1.300	540	90	88	7	70.0	83.590	0.140	0.900	549	97	95	7	70.0	129.600	0.130	0.810	584	98	98
	72.5	136.480	0.220	1.400	538	90	88		72.5	85.010	0.190	1.200	547	97	95		72.5	130.950	0.190	1.200	588	98	98
8	75.0	138.220	0.220	1.400	539	90	88	8	75.0	86.570	0.190	1.200	549	97	95	8	75.0	132.540	0.210	1.300	574	98	98
	77.5	140.050	0.210	1.400	539	90	88		77.5	88.190	0.190	1.200	550	97	95		77.5	134.170	0.210	1.300	574	100	98
	80.0	141.660							80.0	89.840							80.0	135.800					

Montrose Environmental Group, Ltd.

Point by Point Calculations

Client: Owens Corning
Facility: Guelph Glass
Source: East Furnace B25
Project No.: 032615

Run #1 18-Jun-24 08:41 - 10:05							Run #2 18-Jun-24 11:17 - 12:43							Run #3 18-Jun-24 15:06 - 16:38						
Point	Period	Sample Volume		Stack Velocity		Isokineticity	Point	Period	Sample Volume		Stack Velocity		Isokineticity	Point	Period	Sample Volume		Stack Velocity		Isokineticity
	min	m^3	ft^3	m/s	ft/s	%		min	m^3	ft^3	m/s	ft/s	%		min	m^3	ft^3	m/s	ft/s	%
SW 1	2.5	0.041	1.437	9.0	29.4	107.3	SE 1	2.5	0.043	1.517	9.5	31.1	99.7	SW 1	2.5	0.040	1.397	9.0	29.4	100.3
	2.5	0.040	1.417	9.0	29.4	105.8		2.5	0.043	1.527	9.5	31.1	100.4		2.5	0.040	1.417	9.3	30.4	98.1
2	2.5	0.038	1.336	9.0	29.4	99.7	2	2.5	0.043	1.507	9.5	31.2	99.3	2	2.5	0.042	1.487	9.3	30.5	103.0
	2.5	0.039	1.376	9.3	30.4	98.9		2.5	0.046	1.638	10.0	32.9	101.1		2.5	0.040	1.427	9.3	30.5	99.0
3	2.5	0.041	1.447	9.0	29.5	108.0	3	2.5	0.044	1.537	10.0	33.0	95.0	3	2.5	0.042	1.477	9.3	30.5	102.3
	2.5	0.038	1.356	8.3	27.2	109.1		2.5	0.043	1.507	9.9	32.5	97.2		2.5	0.041	1.447	9.3	30.5	100.3
4	2.5	0.036	1.286	8.6	28.4	99.5	4	2.5	0.042	1.477	9.2	30.2	100.3	4	2.5	0.042	1.477	9.3	30.5	102.1
	2.5	0.036	1.256	8.3	27.2	101.0		2.5	0.042	1.477	8.9	29.2	103.7		2.5	0.042	1.477	9.3	30.4	101.8
5	2.5	0.036	1.256	8.3	27.2	100.9	5	2.5	0.041	1.447	8.9	29.1	101.3	5	2.5	0.041	1.437	9.3	30.6	99.7
	2.5	0.036	1.276	8.6	28.3	98.3		2.5	0.040	1.407	8.9	29.1	98.6		2.5	0.045	1.577	9.9	32.5	102.5
6	2.5	0.035	1.226	8.3	27.3	98.7	6	2.5	0.036	1.286	8.6	28.2	93.8	6	2.5	0.047	1.668	10.8	35.3	100.3
	2.5	0.043	1.507	10.5	34.4	96.7		2.5	0.046	1.638	10.4	34.0	98.7		2.5	0.044	1.557	10.5	34.5	96.2
7	2.5	0.045	1.587	10.8	35.3	99.2	7	2.5	0.046	1.628	10.6	34.8	95.4	7	2.5	0.046	1.618	10.8	35.4	97.5
	2.5	0.048	1.688	10.8	35.3	105.6		2.5	0.047	1.648	10.3	33.9	99.2		2.5	0.048	1.708	10.8	35.3	102.6
8	2.5	0.046	1.638	11.0	36.1	99.7	8	2.5	0.045	1.577	10.1	33.1	97.8	8	2.5	0.048	1.688	10.8	35.3	101.4
	2.5	0.046	1.638	11.0	36.1	99.8		2.5	0.046	1.618	10.6	34.8	94.8		2.5	0.049	1.738	11.0	36.1	101.8
SE 1	2.5	0.042	1.487	9.9	32.3	100.3	SW 1	2.5	0.036	1.276	8.2	26.8	96.2	SE 1	2.5	0.045	1.587	9.6	31.4	106.1
	2.5	0.042	1.487	9.9	32.5	100.7		2.5	0.036	1.266	8.2	26.9	95.5		2.5	0.043	1.507	9.3	30.6	104.7
2	2.5	0.044	1.557	10.2	33.4	102.2	2	2.5	0.037	1.296	8.2	26.8	97.5	2	2.5	0.042	1.497	9.3	30.6	104.0
	2.5	0.041	1.437	9.6	31.7	100.3		2.5	0.037	1.316	8.5	27.9	95.0		2.5	0.042	1.477	9.9	32.4	96.0
3	2.5	0.041	1.447	9.6	31.6	100.9	3	2.5	0.038	1.346	8.5	27.9	97.1	3	2.5	0.042	1.497	9.9	32.4	97.2
	2.5	0.042	1.487	9.6	31.6	103.5		2.5	0.038	1.326	8.5	27.8	95.5		2.5	0.044	1.537	9.9	32.3	99.8
4	2.5	0.041	1.447	9.3	30.5	103.7	4	2.5	0.038	1.346	8.5	27.9	97.1	4	2.5	0.040	1.407	8.6	28.2	104.1
	2.5	0.038	1.356	8.7	28.5	104.8		2.5	0.038	1.346	8.5	27.9	97.1		2.5	0.040	1.427	8.6	28.3	105.9
5	2.5	0.039	1.366	8.7	28.4	105.3	5	2.5	0.043	1.507	9.5	31.0	98.4	5	2.5	0.041	1.447	9.2	30.3	99.9
	2.5	0.038	1.336	9.0	29.5	99.2		2.5	0.041	1.457	9.5	31.2	95.6		2.5	0.041	1.447	9.3	30.4	100.0
6	2.5	0.040	1.407	9.5	31.3	97.0	6	2.5	0.041	1.457	9.2	30.2	98.7	6	2.5	0.047	1.648	10.4	34.3	101.5
	2.5	0.042	1.467	9.4	30.7	99.2		2.5	0.045	1.587	10.6	34.8	92.9		2.5	0.044	1.567	10.4	34.3	96.5
7	2.5	0.043	1.527	10.4	34.2	96.7	7	2.5	0.047	1.658	10.6	34.9	97.2	7	2.5	0.048	1.698	10.7	35.0	101.7
	2.5	0.048	1.708	11.1	36.3	99.5		2.5	0.046	1.608	10.7	35.0	94.6		2.5	0.047	1.648	10.7	35.2	99.0
8	2.5	0.047	1.658	11.0	35.9	99.9	8	2.5	0.047	1.668	10.7	35.0	98.0	8	2.5	0.045	1.587	10.2	33.5	101.1
	2.5	0.046	1.608	10.9	35.8	96.5		2.5	0.047	1.658	10.7	35.1	97.7		2.5	0.046	1.618	10.5	34.4	100.1

Run #5 **19-Jun-24** **10:30 - 11:56**							**Run #6** **19-Jun-24** **13:29 - 14:54**							**Run #7** **19-Jun-24** **15:50 - 17:20**						
Point	Period	Sample Volume		Stack Velocity		Isokineticity	Point	Period	Sample Volume		Stack Velocity		Isokineticity	Point	Period	Sample Volume		Stack Velocity		Isokineticity
	min	m^3	ft^3	m/s	ft/s	%		min	m^3	ft^3	m/s	ft/s	%		min	m^3	ft^3	m/s	ft/s	%
SE 1	2.5	0.039	1.386	9.0	29.4	104.0	SW 1	2.5	0.044	1.547	9.8	32.2	103.7	SE 1	2.5	0.038	1.326	8.3	27.4	106.3
	2.5	0.040	1.397	9.3	30.5	100.9		2.5	0.044	1.547	9.8	32.3	103.8		2.5	0.038	1.346	8.3	27.3	107.5
2	2.5	0.038	1.336	9.0	29.4	100.2	2	2.5	0.044	1.547	9.8	32.2	103.7	2	2.5	0.038	1.326	8.4	27.4	106.4
	2.5	0.038	1.346	9.0	29.4	100.9		2.5	0.046	1.608	10.1	33.1	104.5		2.5	0.036	1.266	8.3	27.3	100.9
3	2.5	0.038	1.326	9.0	29.5	99.6	3	2.5	0.044	1.557	9.8	32.3	104.3	3	2.5	0.037	1.306	8.3	27.3	104.4
	2.5	0.037	1.316	9.0	29.5	99.0		2.5	0.043	1.527	9.8	32.3	102.2		2.5	0.038	1.356	8.6	28.4	103.7
4	2.5	0.038	1.336	9.0	29.5	100.4	4	2.5	0.041	1.457	9.3	30.4	104.0	4	2.5	0.038	1.356	8.6	28.4	103.8
	2.5	0.036	1.276	8.7	28.4	99.4		2.5	0.041	1.447	8.9	29.3	106.6		2.5	0.038	1.356	8.7	28.4	104.1
5	2.5	0.036	1.266	8.3	27.3	102.6	5	2.5	0.040	1.397	9.0	29.4	103.5	5	2.5	0.038	1.356	8.7	28.4	104.0
	2.5	0.036	1.256	8.3	27.3	101.6		2.5	0.040	1.417	9.3	30.5	101.4		2.5	0.040	1.397	9.0	29.6	103.4
6	2.5	0.037	1.296	8.6	28.3	100.4	6	2.5	0.048	1.698	10.7	35.0	104.9	6	2.5	0.042	1.467	9.9	32.6	98.6
	2.5	0.045	1.577	10.4	34.3	101.3		2.5	0.048	1.678	10.7	35.1	103.7		2.5	0.042	1.487	10.0	32.7	100.2
7	2.5	0.046	1.628	10.7	35.1	101.7	7	2.5	0.048	1.688	10.7	35.1	104.5	7	2.5	0.044	1.557	9.9	32.5	104.5
	2.5	0.046	1.628	10.7	35.1	101.7		2.5	0.047	1.668	10.7	35.2	103.3		2.5	0.048	1.678	10.8	35.3	103.9
8	2.5	0.047	1.658	10.7	35.1	103.3	8	2.5	0.047	1.658	10.8	35.3	103.1	8	2.5	0.046	1.638	10.5	34.5	104.4
	2.5	0.047	1.648	10.7	35.2	103.2		2.5	0.047	1.658	10.8	35.4	103.3		2.5	0.046	1.618	10.5	34.3	102.5
SW 1	2.5	0.040	1.397	9.6	31.5	97.7	SE 1	2.5	0.038	1.356	8.6	28.3	103.9	SW 1	2.5	0.041	1.437	9.0	29.6	106.7
	2.5	0.042	1.467	9.9	32.4	99.2		2.5	0.038	1.346	8.7	28.4	103.5		2.5	0.042	1.487	9.4	30.7	106.7
2	2.5	0.044	1.567	10.1	33.2	102.5	2	2.5	0.038	1.356	8.6	28.3	103.8	2	2.5	0.042	1.467	9.3	30.6	104.9
	2.5	0.044	1.537	9.9	32.5	104.2		2.5	0.040	1.417	8.9	29.4	104.4		2.5	0.040	1.427	9.1	29.7	106.2
3	2.5	0.044	1.547	9.9	32.5	104.8	3	2.5	0.040	1.417	8.9	29.3	104.3	3	2.5	0.040	1.397	8.7	28.6	107.6
	2.5	0.039	1.386	9.3	30.5	100.0		2.5	0.039	1.376	9.0	29.4	101.4		2.5	0.038	1.346	8.7	28.5	103.4
4	2.5	0.042	1.477	9.6	31.5	103.0	4	2.5	0.040	1.417	9.0	29.5	104.7	4	2.5	0.038	1.346	8.7	28.6	103.7
	2.5	0.037	1.296	8.7	28.5	100.5		2.5	0.037	1.316	8.4	27.4	105.6		2.5	0.038	1.356	8.4	27.5	109.1
5	2.5	0.040	1.427	9.6	31.5	99.4	5	2.5	0.038	1.346	8.7	28.5	103.5	5	2.5	0.040	1.407	9.1	29.9	105.4
	2.5	0.041	1.447	9.6	31.4	100.6		2.5	0.037	1.306	8.7	28.5	100.3		2.5	0.038	1.336	9.1	29.9	100.0
6	2.5	0.041	1.437	9.6	31.5	100.0	6	2.5	0.038	1.326	8.7	28.5	102.0	6	2.5	0.037	1.296	8.8	28.9	101.0
	2.5	0.046	1.618	10.7	35.0	100.4		2.5	0.040	1.407	9.3	30.6	100.5		2.5	0.038	1.346	8.8	28.9	105.0
7	2.5	0.045	1.597	10.7	35.0	99.1	7	2.5	0.040	1.427	9.0	29.5	105.4	7	2.5	0.038	1.356	8.8	29.0	106.0
	2.5	0.050	1.748	11.2	36.7	103.3		2.5	0.044	1.567	10.5	34.4	99.4		2.5	0.045	1.597	10.7	35.1	103.6
8	2.5	0.052	1.839	11.2	36.7	108.7	8	2.5	0.046	1.628	10.5	34.4	103.3	8	2.5	0.046	1.638	11.2	36.6	100.4
	2.5	0.046	1.618	10.9	35.9	97.9		2.5	0.047	1.658	10.5	34.4	105.3		2.5	0.046	1.638	11.2	36.6	100.2

Montrose Environmental Group, Ltd.

Effluent Calculation Summary

Client: Owens Corning
Facility: Guelph Glass
Source: East Furnace B25
Project No.: 032615
Reviewed By: GB
Notes: Furnace Run #4 reported a negative moisture gain for the system; an additional test run set was completed

		Use	Use	Use	Use	Use	Use	
Measurement Parameter		Run #1 18-Jun-24 08:41 - 10:05	Run #2 18-Jun-24 11:17 - 12:43	Run #3 18-Jun-24 15:06 - 16:38	Run #5 19-Jun-24 10:30 - 11:56	Run #6 19-Jun-24 13:29 - 14:54	Run #7 19-Jun-24 15:50 - 17:20	Arithmetic Averages
Effluent Characteristics								
Area of Sample Plane	m^2	0.16	0.16	0.16	0.16	0.16	0.16	
Area of Sample Plane	ft^2	1.67	1.67	1.67	1.67	1.67	1.67	
Average Stack Temperature	ºC	286	286	290	287	283	292	287
Average Stack Temperature	ºF	546	546	554	548	542	557	549
Average Stack Gas Pressure	kPa	98.3	98.3	98.2	98.6	98.6	98.5	98.4
Average Stack Gas Pressure	"Hg	29.0	29.0	29.0	29.1	29.1	29.1	29.1
Average Stack Gas Static Pressure	"H_2O	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Average Stack Gas Velocity	m/s	9.6	9.5	9.8	9.7	9.6	9.2	9.6
Average Stack Gas Velocity	ft/s	31.4	31.1	32.2	31.9	31.4	30.3	31.4
Average Stack Gas Velocity	fpm	1.88E+03	1.87E+03	1.93E+03	1.91E+03	1.88E+03	1.82E+03	1.88E+03
Oxygen Concentration	% vol	20.2	20.3	20.0	20.1	20.3	20.1	20.2
Carbon Dioxide Concentration	% vol	4.00	4.10	4.20	4.40	3.80	4.10	4.10
Effluent Molecular Weight (dry)	g/gmol	29.45	29.47	29.47	29.51	29.42	29.46	29.46
Effluent Molecular Weight (wet)	g/gmol	28.37	28.95	28.52	28.31	28.14	28.11	28.40
Effluent Moisture Content	% vol.	9.43	4.49	8.26	10.38	11.18	11.80	9.26
Dry Gas Fraction	% vol.	90.6	95.5	91.7	89.6	88.8	88.2	90.7
Actual Effluent Flow Rate	$A.m^3/s$	1.49	1.47	1.52	1.51	1.48	1.43	1.48
Actual Effluent Flow Rate	acfm	3.15E+03	3.12E+03	3.23E+03	3.19E+03	3.14E+03	3.04E+03	3.15E+03
Reference Flow Rate (wet)	$R.m^3/s$	0.77	0.76	0.78	0.78	0.77	0.74	0.77
Standard Flow Rate (wet)	scfm	1.63E+03	1.61E+03	1.66E+03	1.66E+03	1.64E+03	1.56E+03	1.63E+03
Reference Flow Rate (dry)	**$R.m^3/s$ (dry)**	**0.70**	**0.73**	**0.72**	**0.70**	**0.69**	**0.65**	**0.70**
Standard Flow Rate (dry)	**scfm (dry)**	**1.48E+03**	**1.54E+03**	**1.52E+03**	**1.48E+03**	**1.46E+03**	**1.38E+03**	**1.48E+03**
Sample Parameters								
Sample Period	min	80	80	80	80	80	80	
Sample Volume	$A.m^3$	1.32	1.35	1.39	1.33	1.35	1.29	1.34
Sample Volume	acf	46.5	47.6	49.2	47.1	47.8	45.7	47.3
Dry Reference Sample Volume	**$R.m^3$**	**1.27**	**1.27**	**1.30**	**1.28**	**1.28**	**1.21**	**1.27**
Dry Standard Sample Volume	**scf**	**44.7**	**45.0**	**45.9**	**45.1**	**45.2**	**42.9**	**44.8**
Water Vapour Reference Volume	$R.m^3$	0.132	0.06	0.12	0.148	0.16	0.16	0.13
Water Vapour Standard Volume	scf	4.66	2.12	4.14	5.22	5.69	5.74	4.59
Average Meter Temperature	ºC	28	33	37	31	34	37	33
Average Meter Temperature	ºF	83	92	99	87	94	98	92
Average Absolute Meter Pressure	kPa	98.54	98.54	98.48	98.85	98.84	98.75	98.67
Average Absolute Meter Pressure	in Hg	29.10	29.10	29.08	29.19	29.19	29.16	29.13
Average Delta P	in H_2O	0.16	0.16	0.17	0.17	0.16	0.15	0.16
Average Delta H	in H_2O	1.06	1.05	1.09	1.06	1.04	0.94	1.04
Average Sample Rate	Lpm	16.5	16.8	17.4	16.7	16.9	16.2	16.7
Average Sample Rate	cfm	0.58	0.59	0.61	0.59	0.60	0.57	0.59
Average Isokinetic Variation	%	101.2	98	101	101	103	104	101

Montrose Environmental Group, Ltd.

Client: Owens Corning
Facility: Guelph Glass
Source: East Furnace B25
Method: Method 0061
Project No.: 032615
Operators: MH/MM
Data Entry: MH/GB
Reviewed By: GB
Notes: Furnace Run #4 reported a negative moisture gain for the system; an additional test run set was completed

Hexavalent Chromium Analytical		Run #1	Run #2	Run #3	Run #5	Run #6	Run #7
Lab Report ID: *BU2400112*		18-Jun-24	18-Jun-24	18-Jun-24	19-Jun-24	19-Jun-24	19-Jun-24
		08:41 - 10:05	11:17 - 12:43	15:06 - 16:38	10:30 - 11:56	13:29 - 14:54	15:50 - 17:20
Chromium (Cr^{6+})	µg	32.6	9.36	29.9	29.8	23.2	39.5

Method 0061 Blank Analyses		
0.5 N KOH Blank	µg	0.52

italics indicate result less than reportable detection limit (RDL)

Montrose Environmental Group, Ltd.

Client: Owens Corning
Facility: Guelph Glass
Source: East Furnace B25
Method: Method 0061
Project No.: 032615
Reviewed By: GB

	Test Selector	**Use**	**Use**	**Use**	**Use**	**Use**	**Use**	
Measurement Parameter		Run #1 18-Jun-24 08:41 - 10:05	Run #2 18-Jun-24 11:17 - 12:43	Run #3 18-Jun-24 15:06 - 16:38	Run #5 19-Jun-24 10:30 - 11:56	Run #6 19-Jun-24 13:29 - 14:54	Run #7 19-Jun-24 15:50 - 17:20	Average for Source
Hexavalent Chromium Concentration	µg/R.m^3	25.7	7.35	23.0	23.3	18.1	32.6	21.7
Hexavalent Chromium Mass Rate	µg/s	17.9	5.34	16.5	16.3	12.5	21.1	15.0
	g/s	1.79E-05	5.34E-06	1.65E-05	1.63E-05	1.25E-05	2.11E-05	1.50E-05
	kg/hr	6.46E-05	1.92E-05	5.94E-05	5.88E-05	4.49E-05	7.61E-05	5.38E-05
	lb/hr	1.42E-04	4.24E-05	1.31E-04	1.30E-04	9.89E-05	1.68E-04	1.19E-04
Effluent Characteristics								
Average Stack Temperature	ºC	286	286	290	287	283	292	287
Average Stack Temperature	ºF	546	546	554	548	542	557	549
Effluent Moisture Content	% vol.	9.43	4.49	8.26	10.4	11.2	11.8	9.26
Oxygen Concentration	% vol	20.2	20.3	20.0	20.1	20.3	20.1	20.2
Carbon Dioxide Concentration	% vol	4.0	4.1	4.2	4.4	3.8	4.1	4.1
Actual Effluent Flow Rate	A.m^3/s	1.49	1.47	1.52	1.51	1.48	1.43	1.48
Actual Effluent Flow Rate	acfm	3.15E+03	3.12E+03	3.23E+03	3.19E+03	3.14E+03	3.04E+03	3.15E+03
Reference Flow Rate (wet)	R.m^3/s	0.77	0.76	0.78	0.78	0.77	0.74	0.77
Standard Flow Rate (wet)	scfm	1.63E+03	1.61E+03	1.66E+03	1.66E+03	1.64E+03	1.56E+03	1.63E+03
Reference Flow Rate (dry)	**R.m^3/s (dry)**	**0.70**	**0.73**	**0.72**	**0.70**	**0.69**	**0.65**	**0.70**
Standard Flow Rate (dry)	**scfm (dry)**	**1.48E+03**	**1.54E+03**	**1.52E+03**	**1.48E+03**	**1.46E+03**	**1.38E+03**	**1.48E+03**
Sample Parameters								
Chromium (Cr6+)	**µg**	**32.6**	**9.4**	**29.9**	**29.8**	**23.2**	**39.5**	**27.4**
Sample Volume	A.m^3	1.32	1.35	1.39	1.33	1.35	1.29	1.34
Sample Volume	acf	46.5	47.6	49.2	47.1	47.8	45.7	47.3
Dry Reference Sample Volume	**R.m^3**	**1.27**	**1.27**	**1.30**	**1.28**	**1.28**	**1.21**	**1.27**
Dry Standard Sample Volume	**scf**	**44.7**	**45.0**	**45.9**	**45.1**	**45.2**	**42.9**	**44.8**
Average Isokinetic Variation	%	101	97.5	101	101	103	104	101

Montrose Environmental Group, Ltd.

Effluent Measurement Data

Client: Owens Corning
Facility: Guelph Glass
Source: Forehearth B38
Method: 0061
Project No.: 032615
Operators: MH
Data Entry: GB
Reviewed By: MH
Notes:

Jurisdiction:	ON	
Ref.Temperature:	77 ºF	25 ºC
Ref. Pressure:	29.92 in Hg	101.3 kPa
Velocity Constant:	85.25 (Eng. Units)	128.6 (SI Units)
Molar Volume:	24.46 L/mol	

Sampling Data	Run # or Source ID	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6
Date	dd-mmm-yy	18-Jun-24	18-Jun-24	18-Jun-24	19-Jun-24	19-Jun-24	19-Jun-24
Start Time	hh:mm	08:33	11:08	15:02	08:07	10:23	13:25
End Time	hh:mm	09:57	12:34	16:25	09:31	11:47	14:48
Number of Ports Used		2	2	2	2	2	2
Number of Sample Points / Port		8	8	8	8	8	8
No. of Sample Points Used		16	16	16	16	16	16
Sample Time / Point	min	5.0	5.0	5.0	5.0	5.0	5.0
Reading Time / Point	min	2.5	2.5	2.5	2.5	2.5	2.5
Total Sample Time	min	80	80	80	80	80	80
Barometric Pressure, P_b	"Hg	28.98	29.02	29.00	29.10	29.11	29.11
Source Gauge Pressure, P_{gauge}	"H_2O	-0.20	-0.19	-0.18	-0.20	-0.21	-0.21
Absolute Source Gas Pressure, P_s	"Hg	28.97	29.01	28.99	29.09	29.09	29.09
Pitot Tube Coefficient, Cp		0.832	0.832	0.832	0.832	0.832	0.832
Oxygen Content, O_2	%	21.3	21.5	21.2	21.2	21.3	21.2
Carbon Dioxide Content, CO_2	%	1.2	1.3	1.4	1.2	1.4	1.2
Nitrogen Content, N_2	%	77.5	77.3	77.5	77.7	77.4	77.6
Initial DGM Reading, v_{mi}	ft^3	62.693	129.430	196.836	263.375	333.935	403.718
Final DGM Reading, v_{mf}	ft^3	128.383	194.935	260.240	331.547	399.972	466.880
DGM Unity, Y		0.9877	0.9877	0.9877	0.9877	0.9877	0.9877
$\Delta H_@$	"H_2O	1.8588	1.8588	1.8588	1.8588	1.8588	1.8588
Actual Volume of Dry Gas, v_d	ft^3	64.9	64.7	62.6	67.3	65.2	62.4
Condensate Collected, W_{H2O}	g	66.6	69.7	65.2	76.5	74.2	36.5
Circular Source Diameter, D_s	in	29.5	29.5	29.5	29.5	29.5	29.5
Source Flow Area, A_s	ft^2	4.75	4.75	4.75	4.75	4.75	4.75
Nozzle Diameter, D_n	in	0.3473	0.3473	0.3473	0.3473	0.3473	0.3473

Condensate Data

Impinger 1	Initial	g	668.0	683.4	670.4	684.7	668.8	691.2
	Final	g	651.4	663.9	659.7	672.4	649.5	663.8
Impinger 2	Initial	g	517.4	499.8	520.8	500.8	518.6	503.4
	Final	g	553.8	546.3	558.2	551.9	554.2	534.6
Impinger 3	Initial	g	517.9	499.5	519.5	500.6	519.3	499.9
	Final	g	534.2	515.0	530.7	515.0	531.1	509.8
Impinger 4	Initial	g	443.2	438.7	444.5	439.0	444.3	439.4
	Final	g	453.1	450.2	451.0	444.6	449.7	445.3
Impinger 5	Initial	g	973.9	954.1	981.8	970.5	946.0	950.5
	Final	g	994.5	969.8	1002.6	988.2	986.7	967.4

Montrose Environmental Group, Ltd.

Point by Point Sampling Data Entry Sheet

Client: Owens Corning
Facility: Guelph Glass
Source: Forehearth B38
Project No.: 032615

Run #1 18-Jun-24 08:33 - 09:57								Run #2 18-Jun-24 11:08 - 12:34								Run #3 18-Jun-24 15:02 - 16:25							
Port ID /	Time	Vd	Delta P	Delta H	T_s	T_{mi}	T_{mo}	Port ID /	Time	Vd	Delta P	Delta H	T_s	T_{mi}	T_{mo}	Port ID /	Time	Vd	Delta P	Delta H	T_s	T_{mi}	T_{mo}
Point #	min	ft^3	"H_2O	"H_2O	°F	°F	°F	Point #	min	ft^3	"H_2O	"H_2O	°F	°F	°F	Point #	min	ft^3	"H_2O	"H_2O	°F	°F	°F
W 1	0.0	62.693	0.210	2.300	245	76	76	S 1	0.0	129.430	0.190	2.100	237	86	86	W 1	0.0	196.836	0.200	2.150	265	94	94
	2.5	64.835	0.220	2.400	244	77	77		2.5	131.480	0.190	2.100	242	86	86		2.5	198.990	0.200	2.150	262	95	95
2	5.0	67.050	0.190	2.100	249	77	77	2	5.0	133.585	0.190	2.100	236	87	87	2	5.0	201.100	0.200	2.150	270	95	95
	7.5	69.210	0.190	2.050	251	77	77		7.5	135.675	0.190	2.100	238	87	87		7.5	203.310	0.190	2.050	265	95	95
3	10.0	71.230	0.190	2.050	253	77	77	3	10.0	137.800	0.180	2.000	240	87	87	3	10.0	205.300	0.190	2.100	267	95	95
	12.5	73.300	0.190	2.050	252	78	78		12.5	139.860	0.180	2.000	236	87	87		12.5	207.365	0.190	2.100	267	95	95
4	15.0	75.345	0.190	2.100	250	78	78	4	15.0	141.950	0.180	2.000	245	87	87	4	15.0	209.485	0.180	1.900	267	95	95
	17.5	77.425	0.190	2.100	249	78	78		17.5	143.960	0.170	1.850	249	87	87		17.5	211.440	0.190	2.100	264	96	96
5	20.0	79.510	0.180	1.950	251	78	78	5	20.0	145.910	0.180	2.000	250	87	87	5	20.0	213.535	0.170	1.900	265	96	96
	22.5	81.498	0.180	2.000	246	78	78		22.5	147.920	0.180	2.000	248	87	87		22.5	215.515	0.180	2.000	256	96	96
6	25.0	83.510	0.180	2.000	246	78	78	6	25.0	149.965	0.160	1.800	247	87	87	6	25.0	217.580	0.180	2.000	257	96	96
	27.5	85.535	0.180	2.000	248	78	78		27.5	151.890	0.170	1.800	261	87	87		27.5	219.635	0.170	1.900	259	98	98
7	30.0	87.605	0.170	1.900	246	79	79	7	30.0	153.835	0.160	1.750	260	88	88	7	30.0	221.570	0.160	1.800	265	97	97
	32.5	89.525	0.180	2.000	252	79	79		32.5	155.745	0.150	1.700	233	88	88		32.5	223.600	0.150	1.700	256	97	97
8	35.0	91.560	0.170	1.900	247	79	79	8	35.0	157.625	0.150	1.700	234	88	88	8	35.0	225.440	0.160	1.800	256	97	97
	37.5	93.590	0.180	2.000	248	79	79		37.5	159.510	0.160	1.800	238	88	88		37.5	227.365	0.160	1.800	259	97	97
S 1	40.0	95.625	0.210	2.350	235	79	79	W 1	40.0	161.447	0.210	2.300	257	88	88	S 1	40.0	229.320	0.170	1.850	253	97	97
	42.5	97.810	0.200	2.200	237	79	79		42.5	163.640	0.200	2.200	255	88	88		42.5	231.240	0.180	2.000	249	97	97
2	45.0	99.940	0.200	2.300	231	79	79	2	45.0	165.720	0.210	2.300	254	88	88	2	45.0	233.310	0.190	2.100	255	97	97
	47.5	102.090	0.200	2.300	234	79	79		47.5	167.930	0.210	2.250	262	88	88		47.5	235.420	0.180	2.000	253	97	97
3	50.0	104.255	0.200	2.300	237	79	79	3	50.0	170.080	0.200	2.200	258	88	88	3	50.0	237.510	0.150	1.700	255	97	97
	52.5	106.480	0.200	2.250	239	80	80		52.5	172.235	0.190	2.050	259	88	88		52.5	239.380	0.160	1.800	257	96	96
4	55.0	108.580	0.190	2.100	243	80	80	4	55.0	174.300	0.190	2.100	251	89	89	4	55.0	241.240	0.170	1.950	252	96	96
	57.5	110.650	0.180	2.000	244	80	80		57.5	176.335	0.190	2.050	253	88	88		57.5	243.240	0.160	1.800	256	96	96
5	60.0	112.695	0.170	1.900	245	81	81	5	60.0	178.435	0.190	2.050	255	88	88	5	60.0	245.330	0.150	1.700	262	96	96
	62.5	114.665	0.170	1.900	255	81	81		62.5	180.500	0.190	2.100	256	89	89		62.5	247.215	0.140	1.550	275	96	96
6	65.0	116.640	0.180	2.000	260	81	81	6	65.0	182.620	0.190	2.100	253	88	88	6	65.0	249.010	0.160	1.800	269	95	95
	67.5	118.660	0.180	2.000	262	81	81		67.5	184.690	0.180	1.950	260	89	89		67.5	250.910	0.170	1.900	268	95	95
7	70.0	120.720	0.170	1.850	251	81	81	7	70.0	186.725	0.190	2.050	256	89	89	7	70.0	252.850	0.160	1.800	270	95	95
	72.5	122.740	0.160	1.800	241	81	81		72.5	188.800	0.190	2.100	256	90	90		72.5	254.800	0.150	1.650	277	95	95
8	75.0	124.590	0.160	1.800	241	81	81	8	75.0	190.880	0.180	2.000	252	89	89	8	75.0	256.660	0.140	1.500	273	95	95
	77.5	126.490	0.160	1.800	244	81	81		77.5	192.900	0.170	1.900	253	90	90		77.5	258.470	0.130	1.450	269	95	95
	80.0	128.383							80.0	194.935							80.0	260.240					

Run #4 19-Jun-24 08:07 - 09:31								Run #5 19-Jun-24 10:23 - 11:47								Run #6 19-Jun-24 13:25 - 14:48							
Port ID / Point #	Time min	Vd ft^3	Delta P "H_2O	Delta H "H_2O	T_s °F	T_{mi} °F	T_{mo} °F	Port ID / Point #	Time min	Vd ft^3	Delta P "H_2O	Delta H "H_2O	T_s °F	T_{mi} °F	T_{mo} °F	Port ID / Point #	Time min	Vd ft^3	Delta P "H_2O	Delta H "H_2O	T_s °F	T_{mi} °F	T_{mo} °F
S 1	0.0	263.375	0.210	2.300	230	76	76	W 1	0.0	333.935	0.220	2.400	249	80	80	S 1	0.0	403.718	0.170	1.900	257	88	88
	2.5	265.520	0.220	2.400	228	76	76		2.5	336.135	0.210	2.300	251	80	80		2.5	405.710	0.180	2.000	256	88	88
2	5.0	267.725	0.210	2.400	231	76	76	2	5.0	338.325	0.210	2.300	251	80	80	2	5.0	407.735	0.170	1.900	255	88	88
	7.5	269.890	0.210	2.400	232	76	76		7.5	340.470	0.210	2.350	250	80	80		7.5	409.725	0.180	2.000	253	88	88
3	10.0	272.080	0.210	2.350	236	76	76	3	10.0	342.650	0.210	2.300	254	81	81	3	10.0	411.740	0.160	1.850	256	88	88
	12.5	274.310	0.210	2.350	234	76	76		12.5	344.835	0.210	2.300	250	81	81		12.5	413.690	0.180	2.000	249	89	89
4	15.0	276.490	0.210	2.300	237	76	76	4	15.0	346.985	0.200	2.250	254	81	81	4	15.0	415.710	0.160	1.800	261	89	89
	17.5	278.540	0.210	2.350	240	76	76		17.5	349.125	0.200	2.250	253	81	81		17.5	417.680	0.180	2.050	252	89	89
5	20.0	280.740	0.190	2.100	245	77	77	5	20.0	351.260	0.190	2.100	250	81	81	5	20.0	419.720	0.170	1.950	254	89	89
	22.5	282.755	0.180	2.000	251	77	77		22.5	353.320	0.180	2.000	249	81	81		22.5	421.720	0.150	1.700	268	89	89
6	25.0	284.760	0.190	2.100	251	77	77	6	25.0	355.340	0.180	2.000	247	81	81	6	25.0	423.585	0.150	1.700	266	90	90
	27.5	286.800	0.190	2.100	257	77	77		27.5	357.360	0.180	2.000	253	82	82		27.5	425.450	0.150	1.650	269	90	90
7	30.0	288.840	0.180	2.050	244	77	77	7	30.0	359.425	0.170	2.000	204	83	83	7	30.0	427.270	0.150	1.700	267	90	90
	32.5	290.865	0.180	2.000	249	77	77		32.5	361.405	0.160	1.900	224	83	83		32.5	429.130	0.140	1.600	267	90	90
8	35.0	292.900	0.180	2.000	253	77	77	8	35.0	363.370	0.170	2.000	225	83	83	8	35.0	430.980	0.150	1.700	268	90	90
	37.5	294.850	0.180	2.000	255	78	78		37.5	365.385	0.170	2.000	222	83	83		37.5	432.815	0.160	1.800	271	90	90
W 1	40.0	296.860	0.230	2.500	246	78	78	S 1	40.0	367.400	0.210	2.350	238	83	83	W 1	40.0	434.725	0.190	2.150	258	90	90
	42.5	299.050	0.240	2.600	248	78	78		42.5	369.580	0.210	2.400	240	83	83		42.5	436.805	0.200	2.200	263	91	91
2	45.0	301.390	0.230	2.500	250	78	78	2	45.0	371.780	0.210	2.400	235	83	83	2	45.0	439.010	0.190	2.100	268	91	91
	47.5	303.620	0.230	2.600	249	78	78		47.5	373.940	0.210	2.400	241	84	84		47.5	441.060	0.180	2.050	262	91	91
3	50.0	305.970	0.230	2.550	254	78	78	3	50.0	376.140	0.190	2.150	241	84	84	3	50.0	443.085	0.180	2.050	261	91	91
	52.5	308.120	0.230	2.550	246	78	78		52.5	378.235	0.180	2.050	246	84	84		52.5	445.140	0.190	2.150	262	91	91
4	55.0	310.410	0.210	2.350	246	78	78	4	55.0	380.300	0.190	2.100	244	84	84	4	55.0	447.230	0.170	1.900	267	91	91
	57.5	312.550	0.210	2.350	249	78	78		57.5	382.350	0.190	2.150	244	84	84		57.5	449.310	0.180	2.000	261	92	92
5	60.0	314.725	0.210	2.350	250	78	78	5	60.0	384.520	0.190	2.150	243	84	84	5	60.0	451.290	0.180	2.050	260	92	92
	62.5	316.910	0.210	2.300	249	78	78		62.5	386.590	0.170	1.900	257	85	85		62.5	453.350	0.150	1.700	260	92	92
6	65.0	319.070	0.200	2.250	246	78	78	6	65.0	388.560	0.160	1.800	264	85	85	6	65.0	455.260	0.170	1.950	252	92	92
	67.5	321.200	0.200	2.200	251	78	78		67.5	390.485	0.160	1.800	260	85	85		67.5	457.210	0.150	1.800	260	92	92
7	70.0	323.340	0.190	2.100	252	79	79	7	70.0	392.380	0.160	1.800	260	85	85	7	70.0	458.915	0.170	1.950	257	92	92
	72.5	325.370	0.180	2.050	244	79	79		72.5	394.300	0.160	1.750	265	85	85		72.5	460.900	0.170	1.950	260	92	92
8	75.0	327.395	0.190	2.100	247	79	79	8	75.0	396.200	0.160	1.750	259	85	85	8	75.0	462.915	0.170	1.900	260	92	92
	77.5	329.460	0.190	2.150	245	79	79		77.5	398.095	0.150	1.650	267	85	85		77.5	464.950	0.160	1.900	255	93	93
	80.0	331.547							80.0	399.972							80.0	466.880					

Montrose Environmental Group, Ltd.

Point by Point Calculations

Client: Owens Corning
Facility: Guelph Glass
Source: Forehearth B38
Project No.: 032615

		Run #1 18-Jun-24 08:33 - 09:57							Run #2 18-Jun-24 11:08 - 12:34							Run #3 18-Jun-24 15:02 - 16:25				
Point	Period	Sample Volume		Stack Velocity		Isokineticity	Point	Period	Sample Volume		Stack Velocity		Isokineticity	Point	Period	Sample Volume		Stack Velocity		Isokineticity
	min	m^3	ft^3	m/s	ft/s	%		min	m^3	ft^3	m/s	ft/s	%		min	m^3	ft^3	m/s	ft/s	%
W 1	2.5	0.060	2.116	9.2	30.0	99.3	S 1	2.5	0.057	2.025	8.7	28.4	97.8	W 1	2.5	0.060	2.128	9.1	29.7	100.6
	2.5	0.062	2.188	9.4	30.7	100.1		2.5	0.059	2.079	8.7	28.5	100.8		2.5	0.059	2.084	9.0	29.7	98.2
2	2.5	0.060	2.133	8.7	28.6	105.3	2	2.5	0.058	2.064	8.6	28.4	99.5	2	2.5	0.062	2.183	9.1	29.8	103.4
	2.5	0.056	1.995	8.7	28.7	98.6		2.5	0.059	2.099	8.7	28.4	101.3		2.5	0.056	1.966	8.8	29.0	95.2
3	2.5	0.058	2.045	8.8	28.7	101.2	3	2.5	0.058	2.035	8.4	27.7	101.0	3	2.5	0.058	2.040	8.8	29.0	98.9
	2.5	0.057	2.020	8.8	28.7	99.8		2.5	0.058	2.064	8.4	27.6	102.2		2.5	0.059	2.094	8.8	29.0	101.6
4	2.5	0.058	2.054	8.7	28.7	101.3	4	2.5	0.056	1.985	8.5	27.8	98.9	4	2.5	0.055	1.931	8.6	28.2	96.2
	2.5	0.058	2.059	8.7	28.6	101.5		2.5	0.055	1.926	8.3	27.1	99.0		2.5	0.059	2.069	8.8	28.9	100.0
5	2.5	0.056	1.964	8.5	27.9	99.5	5	2.5	0.056	1.985	8.5	27.9	99.3	5	2.5	0.055	1.956	8.3	27.4	99.9
	2.5	0.056	1.987	8.5	27.8	100.4		2.5	0.057	2.020	8.5	27.9	100.9		2.5	0.058	2.040	8.5	28.0	100.6
6	2.5	0.057	2.000	8.5	27.8	101.0	6	2.5	0.054	1.901	8.0	26.2	100.6	6	2.5	0.057	2.030	8.5	28.0	100.2
	2.5	0.058	2.045	8.5	27.9	103.4		2.5	0.054	1.921	8.3	27.3	99.6		2.5	0.054	1.911	8.3	27.3	96.9
7	2.5	0.054	1.896	8.2	27.0	98.4	7	2.5	0.053	1.887	8.1	26.5	100.5	7	2.5	0.057	2.005	8.1	26.6	105.4
	2.5	0.057	2.010	8.5	27.9	101.8		2.5	0.053	1.857	7.7	25.2	100.2		2.5	0.051	1.817	7.8	25.6	98.0
8	2.5	0.057	2.005	8.2	27.1	104.1	8	2.5	0.053	1.862	7.7	25.2	100.6	8	2.5	0.054	1.901	8.0	26.4	99.3
	2.5	0.057	2.010	8.5	27.9	101.5		2.5	0.054	1.913	7.9	26.1	100.4		2.5	0.055	1.931	8.1	26.5	101.0
S 1	2.5	0.061	2.158	9.1	29.8	100.0	W 1	2.5	0.061	2.166	9.2	30.3	100.7	S 1	2.5	0.054	1.896	8.3	27.2	95.9
	2.5	0.060	2.104	8.9	29.1	100.0		2.5	0.058	2.054	9.0	29.5	97.7		2.5	0.058	2.045	8.5	27.9	100.2
2	2.5	0.060	2.124	8.8	29.0	100.6	2	2.5	0.062	2.183	9.2	30.2	101.2	2	2.5	0.059	2.084	8.8	28.8	99.9
	2.5	0.061	2.138	8.9	29.1	101.5		2.5	0.060	2.124	9.3	30.4	99.0		2.5	0.058	2.064	8.5	28.0	101.5
3	2.5	0.062	2.198	8.9	29.1	104.5	3	2.5	0.060	2.128	9.0	29.6	101.4	3	2.5	0.052	1.847	7.8	25.6	99.5
	2.5	0.059	2.074	8.9	29.2	98.6		2.5	0.058	2.040	8.8	28.8	99.7		2.5	0.052	1.837	8.1	26.4	96.2
4	2.5	0.058	2.045	8.7	28.5	100.0	4	2.5	0.057	2.010	8.7	28.7	97.6	4	2.5	0.056	1.975	8.3	27.1	100.0
	2.5	0.057	2.020	8.5	27.8	101.5		2.5	0.059	2.074	8.8	28.7	101.0		2.5	0.058	2.064	8.0	26.4	108.0
5	2.5	0.055	1.946	8.2	27.0	100.5	5	2.5	0.058	2.040	8.8	28.8	99.4	5	2.5	0.053	1.862	7.8	25.7	101.0
	2.5	0.055	1.951	8.3	27.2	101.5		2.5	0.059	2.094	8.8	28.8	102.0		2.5	0.050	1.773	7.6	25.0	100.4
6	2.5	0.056	1.995	8.6	28.1	101.2	6	2.5	0.058	2.045	8.8	28.7	99.6	6	2.5	0.053	1.877	8.1	26.6	99.2
	2.5	0.058	2.035	8.6	28.1	103.4		2.5	0.057	2.010	8.6	28.1	100.8		2.5	0.054	1.916	8.4	27.4	98.3
7	2.5	0.056	1.995	8.3	27.1	103.5	7	2.5	0.058	2.049	8.8	28.8	99.8	7	2.5	0.055	1.926	8.1	26.7	101.9
	2.5	0.052	1.827	8.0	26.1	97.0		2.5	0.058	2.054	8.8	28.8	99.9		2.5	0.052	1.837	7.9	25.9	100.8
8	2.5	0.053	1.877	8.0	26.1	99.6	8	2.5	0.056	1.995	8.5	27.9	99.5	8	2.5	0.051	1.788	7.6	25.0	101.3
	2.5	0.053	1.870	8.0	26.2	99.4		2.5	0.057	2.010	8.3	27.2	103.0		2.5	0.050	1.748	7.3	24.0	102.5

Run #4
19-Jun-24
08:07 - 09:31

Point	Period	Sample Volume		Stack Velocity		Isokineticity
	min	m^3	ft^3	m/s	ft/s	%
S 1	2.5	0.060	2.119	9.0	29.7	99.0
	2.5	0.062	2.178	9.2	30.3	99.3
2	2.5	0.061	2.138	9.1	29.7	100.0
	2.5	0.061	2.163	9.1	29.7	101.2
3	2.5	0.062	2.203	9.1	29.8	103.3
	2.5	0.061	2.153	9.1	29.8	100.9
4	2.5	0.057	2.025	9.1	29.8	95.1
	2.5	0.062	2.173	9.1	29.9	102.2
5	2.5	0.056	1.990	8.7	28.5	98.6
	2.5	0.056	1.980	8.5	27.9	101.2
6	2.5	0.057	2.015	8.7	28.7	100.2
	2.5	0.057	2.015	8.8	28.8	100.6
7	2.5	0.057	2.000	8.5	27.8	101.7
	2.5	0.057	2.010	8.5	27.9	102.5
8	2.5	0.055	1.926	8.5	27.9	98.5
	2.5	0.056	1.985	8.5	28.0	101.5
W 1	2.5	0.061	2.163	9.6	31.4	97.3
	2.5	0.065	2.311	9.8	32.1	102.0
2	2.5	0.062	2.203	9.6	31.5	99.4
	2.5	0.066	2.321	9.6	31.5	104.7
3	2.5	0.060	2.124	9.6	31.6	96.1
	2.5	0.064	2.262	9.6	31.4	101.8
4	2.5	0.060	2.114	9.2	30.0	99.5
	2.5	0.061	2.148	9.2	30.1	101.4
5	2.5	0.061	2.158	9.2	30.1	101.9
	2.5	0.060	2.133	9.2	30.1	100.6
6	2.5	0.060	2.104	8.9	29.3	101.5
	2.5	0.060	2.114	9.0	29.4	102.3
7	2.5	0.057	2.005	8.7	28.7	99.4
	2.5	0.057	2.000	8.5	27.8	101.3
8	2.5	0.058	2.040	8.7	28.6	100.8
	2.5	0.058	2.061	8.7	28.5	101.7

Run #5
19-Jun-24
10:23 - 11:47

Point	Period	Sample Volume		Stack Velocity		Isokineticity
	min	m^3	ft^3	m/s	ft/s	%
W 1	2.5	0.062	2.173	9.4	30.8	99.9
	2.5	0.061	2.163	9.2	30.1	101.9
2	2.5	0.060	2.119	9.2	30.1	99.8
	2.5	0.061	2.153	9.2	30.1	101.4
3	2.5	0.061	2.158	9.2	30.2	101.7
	2.5	0.060	2.124	9.2	30.1	99.8
4	2.5	0.060	2.114	9.0	29.4	102.1
	2.5	0.060	2.109	9.0	29.4	101.8
5	2.5	0.058	2.035	8.7	28.6	100.5
	2.5	0.056	1.995	8.5	27.8	101.1
6	2.5	0.056	1.995	8.5	27.8	101.0
	2.5	0.058	2.040	8.5	27.9	103.5
7	2.5	0.055	1.956	8.0	26.2	98.4
	2.5	0.055	1.941	7.9	25.8	102.1
8	2.5	0.056	1.990	8.1	26.6	101.7
	2.5	0.056	1.990	8.1	26.5	101.5
S 1	2.5	0.061	2.153	9.1	29.8	100.0
	2.5	0.062	2.173	9.1	29.9	101.1
2	2.5	0.060	2.133	9.1	29.8	98.9
	2.5	0.062	2.173	9.1	29.9	101.0
3	2.5	0.059	2.069	8.7	28.4	101.0
	2.5	0.058	2.040	8.5	27.8	102.6
4	2.5	0.057	2.025	8.7	28.5	99.0
	2.5	0.061	2.143	8.7	28.5	104.8
5	2.5	0.058	2.045	8.7	28.5	99.9
	2.5	0.055	1.946	8.3	27.2	101.3
6	2.5	0.054	1.901	8.1	26.5	102.5
	2.5	0.053	1.872	8.1	26.4	100.6
7	2.5	0.054	1.896	8.1	26.4	102.0
	2.5	0.053	1.877	8.1	26.5	101.2
8	2.5	0.053	1.872	8.1	26.4	100.5
	2.5	0.052	1.854	7.8	25.7	103.4

Run #6
19-Jun-24
13:25 - 14:48

Point	Period	Sample Volume		Stack Velocity		Isokineticity
	min	m^3	ft^3	m/s	ft/s	%
S 1	2.5	0.056	1.967	8.3	27.1	99.7
	2.5	0.057	2.000	8.5	27.9	98.5
2	2.5	0.056	1.966	8.2	27.0	99.5
	2.5	0.056	1.990	8.5	27.8	97.8
3	2.5	0.055	1.926	8.0	26.3	100.5
	2.5	0.056	1.995	8.4	27.7	97.5
4	2.5	0.055	1.946	8.0	26.4	101.7
	2.5	0.057	2.015	8.5	27.8	98.7
5	2.5	0.056	1.975	8.2	27.0	99.7
	2.5	0.052	1.842	7.8	25.6	99.9
6	2.5	0.052	1.842	7.8	25.6	99.6
	2.5	0.051	1.798	7.8	25.7	97.4
7	2.5	0.052	1.837	7.8	25.6	99.4
	2.5	0.052	1.827	7.5	24.8	102.3
8	2.5	0.051	1.812	7.8	25.6	98.1
	2.5	0.053	1.887	8.1	26.5	99.1
W 1	2.5	0.058	2.054	8.7	28.7	98.2
	2.5	0.062	2.178	9.0	29.5	101.7
2	2.5	0.057	2.025	8.8	28.9	97.3
	2.5	0.057	2.000	8.5	28.0	98.3
3	2.5	0.057	2.030	8.5	28.0	99.7
	2.5	0.058	2.064	8.8	28.7	98.8
4	2.5	0.058	2.054	8.3	27.3	104.3
	2.5	0.055	1.956	8.5	28.0	95.9
5	2.5	0.058	2.035	8.5	27.9	99.7
	2.5	0.053	1.887	7.8	25.5	101.2
6	2.5	0.055	1.926	8.2	27.0	96.6
	2.5	0.048	1.684	7.8	25.5	90.4
7	2.5	0.056	1.961	8.3	27.1	98.6
	2.5	0.056	1.990	8.3	27.1	100.3
8	2.5	0.057	2.010	8.3	27.1	101.3
	2.5	0.054	1.906	8.0	26.2	98.5

Montrose Environmental Group, Ltd.

Effluent Calculation Summary

Client: Owens Corning
Facility: Guelph Glass
Source: Forehearth B38
Project No.: 032615
Reviewed By: MH
Notes:

Measurement Parameter		Use Run #1 18-Jun-24 08:33 - 09:57	Use Run #2 18-Jun-24 11:08 - 12:34	Use Run #3 18-Jun-24 15:02 - 16:25	Use Run #4 19-Jun-24 08:07 - 09:31	Use Run #5 19-Jun-24 10:23 - 11:47	Use Run #6 19-Jun-24 13:25 - 14:48	Arithmetic Averages
Effluent Characteristics								
Area of Sample Plane	m^2	0.44	0.44	0.44	0.44	0.44	0.44	
Area of Sample Plane	ft^2	4.75	4.75	4.75	4.75	4.75	4.75	
Average Stack Temperature	ºC	119	121	128	118	119	127	122
Average Stack Temperature	ºF	246	250	262	245	247	260	252
Average Stack Gas Pressure	kPa	98.1	98.2	98.1	98.5	98.5	98.5	98.3
Average Stack Gas Pressure	"Hg	29.0	29.0	29.0	29.1	29.1	29.1	29.0
Average Stack Gas Static Pressure	"H$_2$O	-0.20	-0.19	-0.18	-0.20	-0.21	-0.21	-0.20
Average Stack Gas Velocity	m/s	8.59	8.56	8.31	9.01	8.61	8.24	8.55
Average Stack Gas Velocity	ft/s	28.2	28.1	27.3	29.6	28.2	27.0	28.1
Average Stack Gas Velocity	fpm	1.69E+03	1.69E+03	1.64E+03	1.77E+03	1.69E+03	1.62E+03	1.68E+03
Oxygen Concentration	% vol	21.3	21.5	21.2	21.2	21.3	21.2	21.3
Carbon Dioxide Concentration	% vol	1.20	1.25	1.35	1.15	1.35	1.20	1.25
Effluent Molecular Weight (dry)	g/gmol	29.04	29.06	29.06	29.03	29.07	29.04	29.05
Effluent Molecular Weight (wet)	g/gmol	28.51	28.49	28.51	28.45	28.48	28.72	28.53
Effluent Moisture Content	% vol.	4.83	5.13	5.04	5.28	5.34	2.86	4.75
Dry Gas Fraction	% vol.	95.2	94.9	95.0	94.7	94.7	97.1	95.3
Actual Effluent Flow Rate	A.m^3/s	3.79	3.78	3.67	3.97	3.80	3.63	3.77
Actual Effluent Flow Rate	acfm	8.03E+03	8.00E+03	7.77E+03	8.42E+03	8.04E+03	7.70E+03	7.99E+03
Reference Flow Rate (wet)	R.m^3/s	2.79	2.77	2.64	2.94	2.81	2.63	2.76
Standard Flow Rate (wet)	scfm	5.91E+03	5.87E+03	5.59E+03	6.23E+03	5.94E+03	5.58E+03	5.86E+03
Reference Flow Rate (dry)	**R.m^3/s (dry)**	**2.65**	**2.63**	**2.51**	**2.79**	**2.66**	**2.56**	**2.63**
Standard Flow Rate (dry)	**scfm (dry)**	**5.62E+03**	**5.57E+03**	**5.31E+03**	**5.90E+03**	**5.63E+03**	**5.42E+03**	**5.58E+03**
Sample Parameters								
Sample Period	min	80	80	80	80	80	80	
Sample Volume	A.m^3	1.84	1.83	1.77	1.91	1.85	1.77	1.83
Sample Volume	acf	64.9	64.7	62.6	67.3	65.2	62.4	64.5
Dry Reference Sample Volume	**R.m^3**	**1.78**	**1.75**	**1.67**	**1.86**	**1.79**	**1.69**	**1.76**
Dry Standard Sample Volume	**scf**	**62.9**	**61.8**	**58.9**	**65.8**	**63.1**	**59.5**	**62.0**
Water Vapour Reference Volume	R.m^3	0.091	0.095	0.089	0.104	0.101	0.050	0.088
Water Vapour Standard Volume	scf	3.20	3.35	3.13	3.67	3.56	1.75	3.11
Average Meter Temperature	ºC	26	31	36	25	28	32	30
Average Meter Temperature	ºF	79	88	96	77	83	90	86
Average Absolute Meter Pressure	kPa	98.7	98.8	98.7	99.1	99.1	99.1	98.9
Average Absolute Meter Pressure	in Hg	29.13	29.17	29.14	29.27	29.26	29.25	29.20
Average Delta P	in H$_2$O	0.19	0.18	0.17	0.20	0.19	0.17	0.18
Average Delta H	in H$_2$O	2.05	2.02	1.88	2.27	2.10	1.91	2.04
Average Sample Rate	Lpm	23.0	22.9	22.2	23.8	23.1	22.1	22.8
Average Sample Rate	cfm	0.81	0.81	0.78	0.84	0.82	0.78	0.81
Average Isokinetic Variation	%	101	100	100	101	101	99.1	100

Montrose Environmental Group, Ltd.

Client: Owens Corning
Facility: Guelph Glass
Source: Forehearth B38
Method: Method 0061
Project No.: 032615
Operators: MH
Data Entry: MH/GB
Reviewed By: GB
Notes:

Hexavalent Chromium Analytical		Run #1	Run #2	Run #3	Run #4	Run #5	Run #6
Lab Report ID: *BU2400112*		18-Jun-24	18-Jun-24	18-Jun-24	19-Jun-24	19-Jun-24	19-Jun-24
		08:33 - 09:57	11:08 - 12:34	15:02 - 16:25	08:07 - 09:31	10:23 - 11:47	13:25 - 14:48
Chromium (Cr^{6+})	µg	55.7	43.5	63.4	56.5	58.0	46.3

Method 0061 Blank Analyses

Montrose Sample ID Number(s)

0.1 N KOH Blank	µg	*0.30*

italics indicate result less than reportable detection limit (RDL)

Montrose Environmental Group, Ltd.

Client: Owens Corning
Facility: Guelph Glass
Source: Forehearth B38
Method: Method 0061
Project No.: 032615
Reviewed By: GB

	Test Selector	**Use**	**Use**	**Use**	**Use**	**Use**	**Use**	
Measurement Parameter		Run #1 18-Jun-24 08:33 - 09:57	Run #2 18-Jun-24 11:08 - 12:34	Run #3 18-Jun-24 15:02 - 16:25	Run #4 19-Jun-24 08:07 - 09:31	Run #5 19-Jun-24 10:23 - 11:47	Run #6 19-Jun-24 13:25 - 14:48	Average for Source
Hexavalent Chromium Concentration	µg/R.m^3	31.3	24.8	38.0	30.3	32.5	27.5	30.7
Hexavalent Chromium Mass Rate	µg/s	83.0	65.3	95.3	84.5	86.2	70.3	80.8
	g/s	8.30E-05	6.53E-05	9.53E-05	8.45E-05	8.62E-05	7.03E-05	8.08E-05
	kg/hr	2.99E-04	2.35E-04	3.43E-04	3.04E-04	3.10E-04	2.53E-04	2.91E-04
	lb/hr	6.58E-04	5.18E-04	7.56E-04	6.70E-04	6.84E-04	5.57E-04	6.41E-04
Effluent Characteristics								
Average Stack Temperature	ºC	119	121	128	118	119	127	122
Average Stack Temperature	ºF	246	250	262	245	247	260	252
Effluent Moisture Content	% vol.	4.83	5.13	5.04	5.28	5.34	2.86	4.75
Oxygen Concentration	% vol	21.3	21.5	21.2	21.2	21.3	21.2	21.3
Carbon Dioxide Concentration	% vol	1.20	1.25	1.35	1.15	1.35	1.20	1.25
Actual Effluent Flow Rate	A.m^3/s	3.79	3.78	3.67	3.97	3.80	3.63	3.77
Actual Effluent Flow Rate	acfm	8.03E+03	8.00E+03	7.77E+03	8.42E+03	8.04E+03	7.70E+03	7.99E+03
Reference Flow Rate (wet)	R.m^3/s	2.79	2.77	2.64	2.94	2.81	2.63	2.76
Standard Flow Rate (wet)	scfm	5.91E+03	5.87E+03	5.59E+03	6.23E+03	5.94E+03	5.58E+03	5.86E+03
Reference Flow Rate (dry)	**R.m^3/s (dry)**	**2.65**	**2.63**	**2.51**	**2.79**	**2.66**	**2.56**	**2.63**
Standard Flow Rate (dry)	**scfm (dry)**	**5.62E+03**	**5.57E+03**	**5.31E+03**	**5.90E+03**	**5.63E+03**	**5.42E+03**	**5.58E+03**
Sample Parameters								
Chromium (Cr6+)	**µg**	**55.7**	**43.5**	**63.4**	**56.5**	**58.0**	**46.3**	**53.9**
Sample Volume	A.m^3	1.84	1.83	1.77	1.91	1.85	1.77	1.83
Sample Volume	acf	64.9	64.7	62.6	67.3	65.2	62.4	64.5
Dry Reference Sample Volume	**R.m^3**	**1.78**	**1.75**	**1.67**	**1.86**	**1.79**	**1.69**	**1.76**
Dry Standard Sample Volume	**scf**	**62.9**	**61.8**	**58.9**	**65.8**	**63.1**	**59.5**	**62.0**
Average Isokinetic Variation	%	101	100	100	101	101	99.1	100

MONTROSE ENVIRONMENTAL GROUP, LTD.

MOISTURE DATA

Client: Owens Corning
Facility: Guelph
Source: Roof Vent B33
Runs: Runs 1 - 3
Date: Jun 18 - 20, 2024

Project No.: 032615
Operator: GB/MH/MM
Data Entry: MH
Comments:

Dry Gas Meter I.D.: 17

Test Number		1	2	3
Test Date		18-Jun-24	19-Jun-24	20-Jun-24
Time On		7:42	7:30	7:52
Time Off		14:43	14:31	14:52
DGM Unit y		0.9985	0.9985	0.9985
Barometric Pressure	"Hg	28.98	29.08	29.15
DGM Initial Volume	ft^3	925.720	255.795	585.950
DGM Initial Temperature	^oF	83	82	70
DGM Initial Meter Pressure	"H_2O	1.90	1.90	1.90
DGM Final Volume	ft^3	1253.304	584.930	915.111
DGM Final Temperature	^oF	105	107	105
DGM Final Meter Pressure	"H_2O	1.90	1.90	1.90
Silica Gel Moisture Gain	g	73.0	80.1	70.6
Impinger Moisture Gain	g	79.5	36.6	79.0
Total Moisture Gain	g	152.5	116.7	149.6
DGM Pressure	"Hg	29.12	29.22	29.29
Vw Reference	ft^3	7.32	5.60	7.18
Vm Reference	ft^3	309	311	316
Bws		0.023	0.018	0.022
Percent Moisture	%	2.32	1.77	2.22

Reference Conditions: 77 ^{o} F and 29.92"Hg (25 ^{o} C and 760 mmHg)

MONTROSE ENVIRONMENTAL GROUP, LTD.

MOISTURE DATA

Client: Owens Corning
Facility: Guelph
Source: Roof Vent B34
Runs: Runs 1 - 3
Date: Jun 18 - 20, 2024

Project No.: 032615
Operator: GB/MH/MM
Data Entry: MH
Comments:

Dry Gas Meter I.D.: 11

Test Number		1	2	3
Test Date		18-Jun-24	19-Jun-24	20-Jun-24
Time On		7:38	7:27	7:35
Time Off		14:38	14:27	14:35
DGM Unit y		1.0353	1.0353	1.0353
Barometric Pressure	"Hg	28.98	29.08	29.15
DGM Initial Volume	ft^3	455.390	782.900	104.400
DGM Initial Temperature	°F	89	84	68
DGM Initial Meter Pressure	"H_2O	1.80	1.70	1.70
DGM Final Volume	ft^3	782.590	1103.546	419.344
DGM Final Temperature	°F	107	102	102
DGM Final Meter Pressure	"H_2O	1.80	1.70	1.70
Silica Gel Moisture Gain	g	146.5	80.2	119.6
Impinger Moisture Gain	g	-1.2	54.5	21.9
Total Moisture Gain	g	145.3	134.7	141.5
DGM Pressure	"Hg	29.11	29.21	29.28
Vw Reference	ft^3	6.97	6.47	6.79
Vm Reference	ft^3	317	315	314
Bws		0.022	0.020	0.021
Percent Moisture	%	2.15	2.01	2.11

Reference Conditions: 77° F and 29.92"Hg (25° C and 760 mmHg)

MONTROSE ENVIRONMENTAL GROUP, LTD.

MOISTURE DATA

Client: Owens Corning
Facility: Guelph
Source: Roof Vent C79
Runs: Runs 1 - 3
Date: Jun 18 - 20, 2024

Project No.: 032615
Operator: GB/MH/MM
Data Entry: MH
Comments:

Dry Gas Meter I.D.: 20

Test Number		1	2	3
Test Date		18-Jun-24	19-Jun-24	20-Jun-24
Time On		7:28	7:29	7:58
Time Off		14:28	14:29	15:02
DGM Unity		0.9897	0.9897	0.9897
Barometric Pressure	"Hg	28.98	29.08	29.15
DGM Initial Volume	ft^3	168.815	484.205	800.425
DGM Initial Temperature	^oF	87	87	78
DGM Initial Meter Pressure	"H_2O	1.90	1.90	1.90
DGM Final Volume	ft^3	484.040	798.139	1113.300
DGM Final Temperature	^oF	106	109	103
DGM Final Meter Pressure	"H_2O	1.90	1.90	1.90
Silica Gel Moisture Gain	g	65.7	69.7	65.8
Impinger Moisture Gain	g	75.8	53.7	72.4
Total Moisture Gain	g	141.5	123.4	138.2
DGM Pressure	"Hg	29.12	29.22	29.29
Vw Reference	ft^3	6.79	5.92	6.63
Vm Reference	ft^3	293	292	296
Bws		0.023	0.020	0.022
Percent Moisture	%	2.26	1.99	2.19

Reference Conditions: 77^o F and 29.92"Hg (25^o C and 760 mmHg)

Table 4: Measured and Theoretical Flow Rates Vs. Speed Setting for Exhauster with Silencer

VFD Frequency	Measured Flow rate	Theoretical Flow Rate
(Hz)	CFM	CFM
60	48421	48421
56.5	45614	45597
53	42167	42772
49.5	38994	39948
46	36133	37123
42.5	32315	34298
39	33995	31474
35.5	29821	28649

Maximum Flowrate	Maximum Flowrate (m3/s)
CFM	
48421	22.9
45614	21.5
42772	20.2
39948	18.9
37123	17.5
34298	16.2
33995	16.1
29821	14.1

VFD Frequency	Max flow (m3/s)	acfm
(Hz)		
35.5	14.08	29821
39	16.05	33995
42.5	16.19	34298
46	17.53	37123
49.5	18.86	39948
53	20.19	42772
56.5	21.54	45614
60	22.86	48421

Table from Flowcare Engineering Report, December 20, 2019.
These data will be applied to sources:
B33, B34, C79 and C80

Montrose Environmental Group, Ltd.

Client:	Owens Corning
Facility:	Guelph Glass
Source:	Roof Vent B33
Method:	Method 0061
Project No.:	032615
Operators:	GB/MH/MM
Data Entry:	GB
Reviewed By:	GB
Notes:	Includes plant temperature and roof vent volumetric flow rate data provided by facility (not measured in field)

Hexavalent Chromium Analytical		B33 Run #1	B33 Run #2	B33 Run #3
Lab Report ID: BU2400112		18-Jun-24	19-Jun-24	20-Jun-24
		7:42 - 14:43	7:30 - 14:31	7:52 - 14:52
Chromium (Cr^{6+})	**µg**	2.45	0.81	0.95

Method 0061 Blank Analyses				
0.1 N KOH Blank	µg		*0.30*	

italics indicate result less than reportable detection limit (RDL)

Montrose Environmental Group, Ltd.

Client: Owens Corning
Facility: Guelph Glass
Source: Roof Vent B33
Method: Method 0061
Project No.: 032615
Reviewed By: GB

Measurement Parameter		B33 Run #1 18-Jun-24 7:42 - 14:43	B33 Run #2 19-Jun-24 7:30 - 14:31	B33 Run #3 20-Jun-24 7:52 - 14:52	B33 Averages
Raw Hexavalent Chromium Concentration	µg/R.m^3	0.28	0.092	0.11	0.16
Raw Hexavalent Chromium Mass Rate	µg/s	5.38	1.77	2.03	3.06
	g/s	5.38E-06	1.77E-06	2.03E-06	3.06E-06
	kg/hr	1.94E-05	6.36E-06	7.32E-06	1.10E-05
Effluent Characteristics					
Average Stack Temperature (estimated)	ºC	53	55	54	54
Average Stack Temperature (estimated)	ºF	128	131	130	130
Effluent Moisture Content	% vol.	2.32	1.77	2.22	2.10
Oxygen Concentration	% vol	20.9	20.9	20.9	20.9
Carbon Dioxide Concentration	% vol	0.0	0.0	0.0	0.0
Actual Effluent Flow Rate (using fan VFD data)	A.m^3/s	21.5	21.5	21.5	21.5
Actual Effluent Flow Rate (using fan VFD data)	acfm	4.56E+04	4.56E+04	4.56E+04	4.56E+04
Reference Flow Rate (wet)	R.m^3/s	19.7	19.6	19.6	19.6
Standard Flow Rate (wet)	scfm	4.17E+04	4.14E+04	4.15E+04	4.15E+04
Reference Flow Rate (dry)	**R.m^3/s (dry)**	19.2	19.2	19.2	19.2
Standard Flow Rate (dry)	**scfm (dry)**	4.07E+04	4.07E+04	4.06E+04	4.07E+04
Sample Parameters					
Chromium (Cr6+)	**µg**	**2.45**	**0.81**	**0.95**	**1.40**
Dry Reference Sample Volume	**R.m^3**	**8.75**	**8.81**	**8.95**	**8.84**
Dry Standard Sample Volume	**scf**	**309**	**311**	**316**	**312**

Montrose Environmental Group, Ltd.

Client: Owens Corning
Facility: Guelph Glass
Source: Roof Vent B34
Method: Method 0061
Project No.: 032615
Operators: GB/MH/MM
Data Entry: GB
Reviewed By: GB
Notes: Includes plant temperature and roof vent volumetric flow rate data provided by facility (not measured in field)

Hexavalent Chromium Analytical		B34 Run #1	B34 Run #2	B34 Run #3
Lab Report ID: BU2400112		18-Jun-24	19-Jun-24	20-Jun-24
		7:38 - 14:38	7:27 - 14:27	7:35 - 14:35
Chromium (Cr^{6+})	**µg**	1.90	1.96	2.01

Method 0061 Blank Analyses

0.1 N KOH Blank	µg	*0.30*

italics indicate result less than reportable detection limit (RDL)

Montrose Environmental Group, Ltd.

Client: Owens Corning
Facility: Guelph Glass
Source: Roof Vent B34
Method: Method 0061
Project No.: 032615
Reviewed By: GB

		B34	B34	B34	
Measurement Parameter		Run #1 18-Jun-24 7:38 - 14:38	Run #2 19-Jun-24 7:27 - 14:27	Run #3 20-Jun-24 7:35 - 14:35	B34 Averages
Raw Hexavalent Chromium Concentration	µg/R.m^3	0.21	0.22	0.23	0.22
Raw Hexavalent Chromium Mass Rate	µg/s	4.15	3.74	4.43	4.11
	g/s	4.15E-06	3.74E-06	4.43E-06	4.11E-06
	kg/hr	1.49E-05	1.35E-05	1.59E-05	1.48E-05
Effluent Characteristics					
Average Stack Temperature (estimated)	ºC	47	49	47	48
Average Stack Temperature (estimated)	ºF	117	121	117	118
Effluent Moisture Content	% vol.	2.15	2.01	2.11	2.09
Oxygen Concentration	% vol	20.9	20.9	20.9	20.9
Carbon Dioxide Concentration	% vol	0.0	0.0	0.0	0.0
Actual Effluent Flow Rate (using fan VFD data)	A.m^3/s	21.5	18.8	21.5	20.6
Actual Effluent Flow Rate (using fan VFD data)	acfm	4.56E+04	3.98E+04	4.56E+04	4.37E+04
Reference Flow Rate (wet)	R.m^3/s	20.1	17.4	20.1	19.2
Standard Flow Rate (wet)	scfm	4.25E+04	3.68E+04	4.25E+04	4.06E+04
Reference Flow Rate (dry)	**R.m^3/s (dry)**	19.6	17.0	19.6	18.8
Standard Flow Rate (dry)	**scfm (dry)**	4.15E+04	3.61E+04	4.16E+04	3.97E+04
Sample Parameters					
Chromium (Cr6+)	**µg**	**1.90**	**1.96**	**2.01**	**1.96**
Dry Reference Sample Volume	**R.m^3**	**8.99**	**8.92**	**8.91**	**8.94**
Dry Standard Sample Volume	**scf**	**317**	**315**	**314**	**315**

Montrose Environmental Group, Ltd.

Client: Owens Corning
Facility: Guelph Glass
Source: Roof Vent C79
Method: Method 0061
Project No.: 032615
Operators: GB/MH/MM
Data Entry: GB
Reviewed By: GB
Notes: Includes plant temperature and roof vent volumetric flow rate data provided by facility (not measured in field)

Hexavalent Chromium Analytical		C79 Run #1	C79 Run #2	C79 Run #3
Lab Report ID: BU2400112		18-Jun-24	19-Jun-24	20-Jun-24
		7:28 - 14:28	7:29 - 14:29	7:58 - 15:02
Chromium (Cr^{6+})	**µg**	1.02	*0.84*	*0.85*

Method 0061 Blank Analyses

0.1 N KOH Blank	µg	*0.30*

italics indicate result less than reportable detection limit (RDL)

Montrose Environmental Group, Ltd.

Client: Owens Corning
Facility: Guelph Glass
Source: Roof Vent C79
Method: Method 0061
Project No.: 032615
Reviewed By: GB

		C79	C79	C79	
Measurement Parameter		Run #1 18-Jun-24 7:28 - 14:28	Run #2 19-Jun-24 7:29 - 14:29	Run #3 20-Jun-24 7:58 - 15:02	C79 Averages
Raw Hexavalent Chromium Concentration	µg/R.m^3	0.12	*0.10*	*0.10*	*0.11*
Raw Hexavalent Chromium Mass Rate	µg/s	2.34	*1.93*	*1.93*	*2.07*
	g/s	2.34E-06	*1.93E-06*	*1.93E-06*	*2.07E-06*
	kg/hr	8.41E-06	*6.96E-06*	*6.96E-06*	*7.44E-06*
Effluent Characteristics					
Average Stack Temperature (estimated)	ºC	57	57	57	57
Average Stack Temperature (estimated)	ºF	134	135	134	134
Effluent Moisture Content	% vol.	2.26	1.99	2.19	2.15
Oxygen Concentration	% vol	20.9	20.9	20.9	20.9
Carbon Dioxide Concentration	% vol	0.0	0.0	0.0	0.0
Actual Effluent Flow Rate (using fan VFD data)	A.m^3/s	21.5	21.5	21.5	21.5
Actual Effluent Flow Rate (using fan VFD data)	acfm	4.56E+04	4.56E+04	4.56E+04	4.56E+04
Reference Flow Rate (wet)	R.m^3/s	19.5	19.5	19.5	19.5
Standard Flow Rate (wet)	scfm	4.12E+04	4.12E+04	4.13E+04	4.12E+04
Reference Flow Rate (dry)	**R.m^3/s (dry)**	19.0	19.1	19.1	19.1
Standard Flow Rate (dry)	**scfm (dry)**	4.03E+04	4.04E+04	4.04E+04	4.03E+04
Sample Parameters					
Chromium (Cr6+)	**µg**	**1.02**	***0.84***	***0.85***	***0.90***
Dry Reference Sample Volume	**R.m^3**	**8.31**	**8.28**	**8.38**	**8.33**
Dry Standard Sample Volume	**scf**	**293**	**292**	**296**	**294**

Appendix D

Laboratory Analytical Report

CERTIFICATE OF ABALYSIS

Work Order	: **BU2400112**	Page	: 1 of 6
Client	: **Montrose Environmental Group Ltd.**	Laboratory	: ALS Environmental - Burlington
Contact	: Guy Bastien	Account Manager	: Breanne Dusureault
Address	: 704 Mara Street Point Edward ON Canada N7V 1X4	Address	: 1435 Norjohn Court, Unit 1 Burlington ON Canada L7L 0E6
Telephone	: ----	Telephone	: +1 905 331 3111
Project	: PROJ-032615	Date Samples Received	: 21-Jun-2024 14:00
PO	: PO-066369	Date Analysis Commenced	: 25-Jun-2024
C-O-C number	: ----	Issue Date	: 28-Jun-2024 10:50
Sampler	: Paul Baker		
Site	: ----		
Quote number	: Burlington Standing Offer Stack		
No. of samples received	: 32		
No. of samples analysed	: 32		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Greg Pokocky	Manager - Inorganics	Metals, Waterloo, Ontario

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
µg	micrograms
mL	millilitres

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Impinger**

(Matrix: **Air**)

				Client sample ID	032615-Cr1 Run1 B25 E Furnace	032615-Cr2 Run2 B25 E Furnace	032615-Cr3 Run3 B25 E Furnace	032615-Cr4 Run4 B25 E Furnace	032615-Cr5 Run5 B25 E Furnace
				Client sampling date / time	18-Jun-2024 00:00	18-Jun-2024 00:00	18-Jun-2024 00:00	19-Jun-2024 00:00	19-Jun-2024 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	BU2400112-001	BU2400112-002	BU2400112-003	BU2400112-004	BU2400112-005
					Result	Result	Result	Result	Result
Sample Preparation									
Volume, impinger	n/a	EP532C/WT	0.1	mL	900	900	880	840	800
Speciated Metals									
Chromium, hexavalent [Cr VI]	18540-29-9	E532C/WT	0.20	µg	32.6	9.36	29.9	12.8	29.8

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Impinger**

(Matrix: **Air**)

				Client sample ID	032615-Cr6 Run6 B25 E Furnace	032615-Cr7 Run1 B24 W Furnace	032615-Cr8 Run2 B24 W Furnace	032615-Cr9 Run3 B24 W Furnace	032615-Cr10 Run4 B24 W Furnace
				Client sampling date / time	19-Jun-2024 00:00	18-Jun-2024 00:00	18-Jun-2024 00:00	18-Jun-2024 00:00	19-Jun-2024 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	BU2400112-006	BU2400112-007	BU2400112-008	BU2400112-009	BU2400112-010
					Result	Result	Result	Result	Result
Sample Preparation									
Volume, impinger	n/a	EP532C/WT	0.1	mL	905	915	851	870	800
Speciated Metals									
Chromium, hexavalent [Cr VI]	18540-29-9	E532C/WT	0.20	µg	23.2	22.3	7.04	20.6	4.63

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Impinger**

(Matrix: **Air**)

				Client sample ID	**032615-Cr11 Run5 B24 W Furnace**	**032615-Cr12 Run6 B24 W Furnace**	**032615-Cr13 Run1 B38 Forehearth**	**032615-Cr14 Run2 B38 Forehearth**	**032615-Cr15 Run3 B38 Forehearth**
				Client sampling date / time	19-Jun-2024 00:00	19-Jun-2024 00:00	18-Jun-2024 00:00	18-Jun-2024 00:00	18-Jun-2024 00:00
Analyte	*CAS Number*	*Method/Lab*	*LOR*	*Unit*	**BU2400112-011**	**BU2400112-012**	**BU2400112-013**	**BU2400112-014**	**BU2400112-015**
					Result	Result	Result	Result	Result
Sample Preparation									
Volume, impinger	n/a	EP532C/WT	0.1	mL	830	880	935	857	830
Speciated Metals									
Chromium, hexavalent [Cr VI]	18540-29-9	E532C/WT	0.20	µg	9.60	17.7	55.7	43.5	63.4

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Impinger**

(Matrix: **Air**)

				Client sample ID	**032615-Cr16 Run4 B38 Forehearth**	**032615-Cr17 Run5 B38 Forehearth**	**032615-Cr18 Run6 B38 Forehearth**	**032615-Cr19 Run1 C79 Roof Vent**	**032615-Cr20 Run2 C79 Roof Vent**
				Client sampling date / time	19-Jun-2024 00:00	19-Jun-2024 00:00	19-Jun-2024 00:00	18-Jun-2024 00:00	19-Jun-2024 00:00
Analyte	*CAS Number*	*Method/Lab*	*LOR*	*Unit*	**BU2400112-016**	**BU2400112-017**	**BU2400112-018**	**BU2400112-019**	**BU2400112-020**
					Result	Result	Result	Result	Result
Sample Preparation									
Volume, impinger	n/a	EP532C/WT	0.1	mL	841	779	817	940	842
Speciated Metals									
Chromium, hexavalent [Cr VI]	18540-29-9	E532C/WT	0.20	µg	56.5	58.0	46.3	1.02	<0.84

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Impinger**
(Matrix: **Air**)

Analyte	CAS Number	Method/Lab	LOR	Unit	032615-Cr21 Run3 C79 Roof Vent	032615-Cr22 Run1 B33 Roof Vent	032615-Cr23 Run2 B33 Roof Vent	032615-Cr24 Run3 B33 Roof Vent	032615-Cr25 Run1 B34 Roof Vent
Client sampling date / time					20-Jun-2024 00:00	18-Jun-2024 00:00	19-Jun-2024 00:00	20-Jun-2024 00:00	18-Jun-2024 00:00
					BU2400112-021	BU2400112-022	BU2400112-023	BU2400112-024	BU2400112-025
					Result	Result	Result	Result	Result
Sample Preparation									
Volume, impinger	n/a	EP532C/WT	0.1	mL	849	885	803	903	866
Speciated Metals									
Chromium, hexavalent [Cr VI]	18540-29-9	E532C/WT	0.20	µg	<0.85	2.45	0.81	0.95	1.90

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Impinger**
(Matrix: **Air**)

Analyte	CAS Number	Method/Lab	LOR	Unit	032615-Cr26 Run2 B34 Roof Vent	032615-Cr27 Run3 B34 Roof Vent	032615-Cr28 0.1N KOH Blank	032615-Cr29 H2O Blank	032615-Cr30 0.5N KOH Blank
Client sampling date / time					19-Jun-2024 00:00	20-Jun-2024 00:00	18-Jun-2024 00:00	18-Jun-2024 00:00	18-Jun-2024 00:00
					BU2400112-026	BU2400112-027	BU2400112-028	BU2400112-029	BU2400112-030
					Result	Result	Result	Result	Result
Sample Preparation									
Volume, impinger	n/a	EP532C/WT	0.1	mL	770	825	301	100	300
Speciated Metals									
Chromium, hexavalent [Cr VI]	18540-29-9	E532C/WT	0.20	µg	1.96	2.01	<0.30	<0.20	0.52

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Impinger**

(Matrix: **Air**)

				Client sample ID	**032615-Cr31 Run7 B25 E Furnace**	**032615-Cr32 Run7 B24 W Furnace**	----	----	----
				Client sampling date / time	19-Jun-2024 00:00	19-Jun-2024 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	**BU2400112-031**	**BU2400112-032**	--------	--------	--------
					Result	Result	----	----	----
Sample Preparation									
Volume, impinger	n/a	EP532C/WT	0.1	mL	855	845	----	----	----
Speciated Metals									
Chromium, hexavalent [Cr VI]	18540-29-9	E532C/WT	0.20	µg	39.5	15.9	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

ALS Canada Ltd.

right solutions.
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QUALITY CONTROL INTERPRETIVE REPORT

Work Order : **BU2400112**
Client : **Montrose Environmental Group Ltd.**
Contact : Guy Bastien
Address : 704 Mara Street
Point Edward ON Canada N7V 1X4
Telephone : ----
Project : PROJ-032615
PO : PO-066369
C-O-C number : ----
Sampler : Paul Baker
Site : ----
Quote number : Burlington Standing Offer Stack
No. of samples received : 32
No. of samples analysed : 32

Page : 1 of 8
Laboratory : ALS Environmental - Burlington
Account Manager : Breanne Dusureault
Address : 1435 Norjohn Court, Unit 1
Burlington, Ontario Canada L7L 0E6
Telephone : +1 905 331 3111
Date Samples Received : 21-Jun-2024 14:00
Issue Date : 28-Jun-2024 10:50

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Air**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method **Container / Client Sample ID(s)**	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr27 Run3 B34 Roof Vent	E532C	20-Jun-2024	25-Jun-2024	14 days	5 days	✓	25-Jun-2024	14 days	6 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr21 Run3 C79 Roof Vent	E532C	20-Jun-2024	26-Jun-2024	14 days	6 days	✓	26-Jun-2024	14 days	6 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr10 Run4 B24 W Furnace	E532C	19-Jun-2024	25-Jun-2024	14 days	6 days	✓	25-Jun-2024	14 days	7 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr11 Run5 B24 W Furnace	E532C	19-Jun-2024	25-Jun-2024	14 days	6 days	✓	25-Jun-2024	14 days	7 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr12 Run6 B24 W Furnace	E532C	19-Jun-2024	25-Jun-2024	14 days	6 days	✓	25-Jun-2024	14 days	7 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr26 Run2 B34 Roof Vent	E532C	19-Jun-2024	25-Jun-2024	14 days	6 days	✓	25-Jun-2024	14 days	7 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr31 Run7 B25 E Furnace	E532C	19-Jun-2024	25-Jun-2024	14 days	6 days	✓	25-Jun-2024	14 days	7 days	✓

Matrix: **Air**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method **Container / Client Sample ID(s)**	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr4 Run4 B25 E Furnace	E532C	19-Jun-2024	25-Jun-2024	14 days	6 days	✓	25-Jun-2024	14 days	7 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr5 Run5 B25 E Furnace	E532C	19-Jun-2024	25-Jun-2024	14 days	6 days	✓	25-Jun-2024	14 days	7 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr6 Run6 B25 E Furnace	E532C	19-Jun-2024	25-Jun-2024	14 days	6 days	✓	25-Jun-2024	14 days	7 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr17 Run5 B38 Forehearth	E532C	19-Jun-2024	26-Jun-2024	14 days	7 days	✓	26-Jun-2024	14 days	7 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr18 Run6 B38 Forehearth	E532C	19-Jun-2024	26-Jun-2024	14 days	7 days	✓	26-Jun-2024	14 days	7 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr20 Run2 C79 Roof Vent	E532C	19-Jun-2024	26-Jun-2024	14 days	7 days	✓	26-Jun-2024	14 days	7 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr32 Run7 B24 W Furnace	E532C	19-Jun-2024	26-Jun-2024	14 days	7 days	✓	26-Jun-2024	14 days	7 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr1 Run1 B25 E Furnace	E532C	18-Jun-2024	25-Jun-2024	14 days	7 days	✓	25-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr2 Run2 B25 E Furnace	E532C	18-Jun-2024	25-Jun-2024	14 days	7 days	✓	25-Jun-2024	14 days	8 days	✓

Matrix: **Air**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method **Container / Client Sample ID(s)**	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr24 Run3 B33 Roof Vent	E532C	20-Jun-2024	27-Jun-2024	14 days	7 days	✓	27-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr29 H2O Blank	E532C	18-Jun-2024	25-Jun-2024	14 days	7 days	✓	25-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr3 Run3 B25 E Furnace	E532C	18-Jun-2024	25-Jun-2024	14 days	7 days	✓	25-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr30 0.5N KOH Blank	E532C	18-Jun-2024	25-Jun-2024	14 days	7 days	✓	25-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr7 Run1 B24 W Furnace	E532C	18-Jun-2024	25-Jun-2024	14 days	7 days	✓	25-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr8 Run2 B24 W Furnace	E532C	18-Jun-2024	25-Jun-2024	14 days	7 days	✓	25-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr9 Run3 B24 W Furnace	E532C	18-Jun-2024	25-Jun-2024	14 days	7 days	✓	25-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr13 Run1 B38 Forehearth	E532C	18-Jun-2024	26-Jun-2024	14 days	8 days	✓	26-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr14 Run2 B38 Forehearth	E532C	18-Jun-2024	26-Jun-2024	14 days	8 days	✓	26-Jun-2024	14 days	8 days	✓

Matrix: **Air**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
Container / Client Sample ID(s)			*Preparation Date*	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr19 Run1 C79 Roof Vent	E532C	18-Jun-2024	26-Jun-2024	14 days	8 days	✓	26-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr25 Run1 B34 Roof Vent	E532C	18-Jun-2024	26-Jun-2024	14 days	8 days	✓	26-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr28 0.1N KOH Blank	E532C	18-Jun-2024	26-Jun-2024	14 days	8 days	✓	26-Jun-2024	14 days	8 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr16 Run4 B38 Forehearth	E532C	19-Jun-2024	27-Jun-2024	14 days	8 days	✓	27-Jun-2024	14 days	9 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr23 Run2 B33 Roof Vent	E532C	19-Jun-2024	27-Jun-2024	14 days	8 days	✓	27-Jun-2024	14 days	9 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr15 Run3 B38 Forehearth	E532C	18-Jun-2024	27-Jun-2024	14 days	9 days	✓	27-Jun-2024	14 days	10 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)										
HDPE 032615-Cr22 Run1 B33 Roof Vent	E532C	18-Jun-2024	27-Jun-2024	14 days	9 days	✓	27-Jun-2024	14 days	10 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Air**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)	E532C	1512453	3	41	7.3	5.0	✓
Laboratory Control Samples (LCS)							
Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)	E532C	1512453	3	41	7.3	5.0	✓
Method Blanks (MB)							
Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)	E532C	1512453	3	41	7.3	5.0	✓
Matrix Spikes (MS)							
Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)	E532C	1512453	3	41	7.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by “mod”).

Analytical Methods	*Method / Lab*	*Matrix*	*Method Reference*	*Method Descriptions*
Hexavalent Chromium (Cr VI) by IC (Impinger, ug/sample)	E532C ALS Environmental - Waterloo	Air	EPA 7199 / EPA 306	Impinger samples are analyzed by ion chromatography with UV/Vis detector using diphenylcarbazide in a sulphuric acid solution.

Preparation Methods	*Method / Lab*	*Matrix*	*Method Reference*	*Method Descriptions*
Preparation of Hexavalent Chromium (Impinger)	EP532C ALS Environmental - Waterloo	Air	APHA 3500-Cr C (Ion Chromatography)	pH of a homogenized impinger sample is adjusted to pH 9 by NaOH for Ion Chromatography analysis.

QUALITY CONTROL REPORT

Work Order	: **BU2400112**	Page	: 1 of 5
Client	: Montrose Environmental Group Ltd.	Laboratory	: ALS Environmental - Burlington
Contact	: Guy Bastien	Account Manager	: Breanne Dusureault
Address	: 704 Mara Street Point Edward ON Canada N7V 1X4	Address	: 1435 Norjohn Court, Unit 1 Burlington, Ontario Canada L7L 0E6
Telephone	: ----	Telephone	: +1 905 331 3111
Project	: PROJ-032615	Date Samples Received	: 21-Jun-2024 14:00
PO	: PO-066369	Date Analysis Commenced	: 25-Jun-2024
C-O-C number	: ----	Issue Date	: 28-Jun-2024 10:56
Sampler	: Paul Baker		
Site	: ----		
Quote number	: Burlington Standing Offer Stack		
No. of samples received	: 32		
No. of samples analysed	: 32		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Greg Pokocky	Manager - Inorganics	Waterloo Metals, Waterloo, Ontario

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Air**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	**Client sample ID**	**Analyte**	**CAS Number**	**Method**	**LOR**	**Unit**	**Original Result**	**Duplicate Result**	**RPD(%) or Difference**	**Duplicate Limits**	**Qualifier**
Sample Preparation (QC Lot: 1512453)											
BU2400112-001	032615-Cr1 Run1 B25 E Furnace	Volume, impinger	n/a	EP532C	0.1	mL	900	900		Diff <2x LOR	----
Sample Preparation (QC Lot: 1514591)											
BU2400111-001	Anonymous	Volume, impinger	n/a	EP532C	0.1	mL	809	809		Diff <2x LOR	----
Sample Preparation (QC Lot: 1517166)											
BU2400112-015	032615-Cr15 Run3 B38 Forehearth	Volume, impinger	n/a	EP532C	0.1	mL	830	830		Diff <2x LOR	----
Speciated Metals (QC Lot: 1512453)											
BU2400112-001	032615-Cr1 Run1 B25 E Furnace	Chromium, hexavalent [Cr VI]	18540-29-9	E532C	0.90	µg	32.6	32.8	0.598%	10%	----
Speciated Metals (QC Lot: 1514591)											
BU2400111-001	Anonymous	Chromium, hexavalent [Cr VI]	18540-29-9	E532C	0.81	µg	53.7	52.3	2.69%	10%	----
Speciated Metals (QC Lot: 1517166)											
BU2400112-015	032615-Cr15 Run3 B38 Forehearth	Chromium, hexavalent [Cr VI]	18540-29-9	E532C	0.83	µg	63.4	64.0	0.851%	10%	----

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Air**

Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Result*	*Qualifier*
Sample Preparation (QCLot: 1512453)						
Volume, impinger	n/a	EP532C	0.1	mL	200	----
Sample Preparation (QCLot: 1514591)						
Volume, impinger	n/a	EP532C	0.1	mL	200	----
Sample Preparation (QCLot: 1517166)						
Volume, impinger	n/a	EP532C	0.1	mL	200	----
Speciated Metals (QCLot: 1512453)						
Chromium, hexavalent [Cr VI]	18540-29-9	E532C	0.2	µg	<0.20	----
Speciated Metals (QCLot: 1514591)						
Chromium, hexavalent [Cr VI]	18540-29-9	E532C	0.2	µg	<0.20	----
Speciated Metals (QCLot: 1517166)						
Chromium, hexavalent [Cr VI]	18540-29-9	E532C	0.2	µg	<0.20	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Air**

					Laboratory Control Sample (LCS) Report				
					Spike	*Recovery (%)*	*Recovery Limits (%)*		
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*	*Target Concentration*	*LCS*	*Low*	*High*	*Qualifier*
Speciated Metals (QCLot: 1512453)									
Chromium, hexavalent [Cr VI]	18540-29-9	E532C	0.2	µg	10 µg	97.0	90.0	110	----
Speciated Metals (QCLot: 1514591)									
Chromium, hexavalent [Cr VI]	18540-29-9	E532C	0.2	µg	10 µg	97.1	90.0	110	----
Speciated Metals (QCLot: 1517166)									
Chromium, hexavalent [Cr VI]	18540-29-9	E532C	0.2	µg	10 µg	100	90.0	110	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Air**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Sample Preparation (QCLot: 1512453)										
BU2400112-001	032615-Cr1 Run1 B25 E Furnace	Volume, impinger	n/a	EP532C	----	----		0	0	----
Sample Preparation (QCLot: 1514591)										
BU2400111-001	Anonymous	Volume, impinger	n/a	EP532C	----	----		0	0	----
Sample Preparation (QCLot: 1517166)										
BU2400112-015	032615-Cr15 Run3 B38 Forehearth	Volume, impinger	n/a	EP532C	----	----		0	0	----
Speciated Metals (QCLot: 1512453)										
BU2400112-001	032615-Cr1 Run1 B25 E Furnace	Chromium, hexavalent [Cr VI]	18540-29-9	E532C	35.8 µg	36 µg	99.5	75.0	125	----
Speciated Metals (QCLot: 1514591)										
BU2400111-001	Anonymous	Chromium, hexavalent [Cr VI]	18540-29-9	E532C	ND µg	----	ND	75.0	125	----
Speciated Metals (QCLot: 1517166)										
BU2400112-015	032615-Cr15 Run3 B38 Forehearth	Chromium, hexavalent [Cr VI]	18540-29-9	E532C	ND µg	----	ND	75.0	125	----

MONTROSE
ENVIRONMENTAL

Montrose Environmental Group, Ltd.
704 Mara St., Suite 210
Point Edward, ON N7V 1X4
www.montrose-env.com

Chain of Custody Record for Test Samples

C.O.C. ID: 032615- 3

Project No.: PROJ-032615 **Client:** OC Guelph **Analytical Laboratory:** ALS Environmental
Remit Results To: gubastien@montrose-env.com **Lab Quotation:** ALSEQ24-086
mihendrikx@montrose-env.com **Purchase Order Ref.:** PO-066369

Sample No.	Run No.	Source	Sample Matrix Description	Analysis Required	Sample Date
032615-Cr1	1	B25 E Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr2	2	B25 E Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr3	3	B25 E Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr4	4	B25 E Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 19, 2024
032615-Cr5	5	B25 E Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 19, 2024
032615-Cr6	6	B25 E Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 19, 2024
032615-Cr7	1	B24 W Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr8	2	B24 W Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr9	3	B24 W Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr10	4	B24 W Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 19, 2024
032615-Cr11	5	B24 W Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 19, 2024
032615-Cr12	6	B24 W Furnace	0.5 N KOH + H2O	Cr6+ as per M0061	Jun. 19, 2024
032615-Cr13	1	B38 Forehearth	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr14	2	B38 Forehearth	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr15	3	B38 Forehearth	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr16	4	B38 Forehearth	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 19, 2024
032615-Cr17	5	B38 Forehearth	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 19, 2024
032615-Cr18	6	B38 Forehearth	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 19, 2024
032615-Cr19	1	C79 Roof Vent	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 18 2024
032615-Cr20	2	C79 Roof Vent	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 19 2024
032615-Cr21	3	C79 Roof Vent	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 20 2024
032615-Cr22	1	B33 Roof Vent	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr23	2	B33 Roof Vent	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 19, 2024
032615-Cr24	3	B33 Roof Vent	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 20, 2024
032615-Cr25	1	B34 Roof Vent	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr26	2	B34 Roof Vent	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr27	3	B34 Roof Vent	0.1 N KOH + H2O	Cr6+ as per M0061	Jun. 20, 2024
032615-Cr28	Blank	All Sources	0.1 N KOH	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr29	Blank	All Sources	d.d. H2O	Cr6+ as per M0061	Jun. 18, 2024
032615-Cr30	Blank	All Sources	0.5 N KOH	Cr6+ as per M0061	Jun. 18, 2024

Sample Originator: Name [illegible] Signature
Date June 21/24 Time

Relinquished To: Name [illegible] Signature
Date June 21 2024 Time

Relinquished To: Name Aakash Barton Signature
Date 21-June-2024 Time 14:00 14.8°C

Additional Notes: Report Hex Cr results as total µg/sample.

Environmental Division
Burlington
Work Order Reference
BU2400112

Telephone : +1 905 331 3111

9.5, 16.8. 10.5, 4.1, 15
BB 06/21/24 8:20

Appendix E

QA/QC Information

DGM Calibration (Montrose ON) 4-June-2024

Montrose Environmental Group, Ltd. (CANADA)

DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at maximum attainable vacuum (open coarse valve, close fine valve),
   for period of 5 minutes minimum for large orifice up to 10 minutes for smallest orifice.
4) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 4-Apr-24

METER PART #: - -

METER SERIAL #: 11

CRITICAL ORIFICE SET SERIAL #: 1477

	INITIAL	FINAL	AVG (P_{bar})
BAROMETRIC PRESSURE (in Hg):	29.04	29.10	29.07

IF Y VARIATION EXCEEDS 2.00%,
ORIFICE SHOULD BE RECALIBRATED

		K'	TESTED	DGM READINGS (FT^3)			TEMPERATURES °F						ELAPSED							
		FACTOR	VACUUM				AMBIENT	DGM INLET		DGM OUTLET		DGM	TIME (MIN)	DGM ΔH	(1)	(2)	(3)	% Y		
ORIFICE #	RUN #	(AVG)	(in Hg)	INITIAL	FINAL	NET (V_m)		INITIAL	FINAL	INITIAL	FINAL	AVG	θ	(in H_2O)	V_m (STD)	V_{cr} (STD)	Y	VARIATION	Ko	dH@
11	1	0.3044	19.0	95.80	100.84	5.04	72	76	75	72	73	74	13	0.41	4.848	4.989	1.0291		0.7831	1.614
	2	0.3044	19.0	100.84	105.85	5.01	72	75	74	73	73	74	13	0.41	4.821	4.989	1.0348		0.7823	1.612
	3	0.3044	19.0	105.85	110.89	5.04	72	74	74	73	73	74	13	0.41	4.852	4.989	1.0282		0.7820	1.612
															AVG =		1.0307	-0.44	0.7825	1.613
19	1	0.5266	16.0	58.30	63.50	5.20	71	75	75	73	73	74	8	1.35	5.013	5.316	1.0604		0.7460	1.764
	2	0.5266	16.5	63.50	68.74	5.24	72	75	75	73	73	74	8	1.35	5.052	5.311	1.0513		0.7453	1.774
	3	0.5266	17.0	68.74	74.00	5.26	72	75	75	73	73	74	8	1.35	5.071	5.311	1.0473		0.7453	1.774
															AVG =		1.0530	1.71	0.7456	1.770
24	1	0.6585	15.0	74.15	79.20	5.05	72	74	76	73	73	74	6	2.10	4.878	4.981	1.0211		0.7466	1.764
	2	0.6585	15.0	85.30	90.36	5.06	72	76	76	73	73	75	6	2.10	4.883	4.981	1.0201		0.7473	1.764
	3	0.6585	15.0	90.36	95.40	5.04	72	76	78	73	73	75	6	2.10	4.859	4.981	1.0251		0.7480	1.764
															AVG =		1.0221	-1.27	0.7473	1.764

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 1.0353

AVERAGE DRY GAS METER ORIFICE COEFFICIENT, Ko= 0.7584

dH@= 1.716

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

(1) $$V_m\text{ (std)} = K_1\ V_m\ \frac{P_{bar} + (\Delta H/13.6)}{T_m}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$V_{cr}\text{ (std)} = K'\ \sqrt{\frac{P_{bar}\ \theta}{T_{amb}}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{V_{cr}\text{ (std)}}{V_m\text{ (std)}}$$

= DGM calibration factor

Signature of Calibrator:

Calibration performed by (Initials): GK

#11

Montrose Environmental Group, Ltd. (CANADA)

Quality - Service - Reliability

DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at maximum attainable vacuum (open coarse valve, close fine valve),
   for period of 5 minutes minimum for large orifice up to 10 minutes for smallest orifice.
4) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 16-Apr-24

METER PART #: - -

METER SERIAL #: 14

CRITICAL ORIFICE SET SERIAL #: 1477

	INITIAL	FINAL	AVG (P_{bar})
BAROMETRIC PRESSURE (in Hg):	29.57	29.57	29.57

IF Y VARIATION EXCEEDS 2.00%,
ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	% Y VARIATION	Ko	dH@
11	1	0.3044	23.5	663.79	668.89	5.10	70	67	69	67	68	68	13	0.48	5.045	5.084	1.0078		0.7261	1.791
	2	0.3044	23.5	668.89	673.99	5.10	70	69	70	68	69	69	13	0.47	5.038	5.084	1.0093		0.7348	1.751
	3	0.3044	23.5	673.99	679.09	5.10	70	70	70	69	69	70	13	0.47	5.036	5.084	1.0096		0.7352	1.749
															AVG =		1.0089	0.41	0.7320	1.764
19	1	0.5266	20.5	679.09	684.52	5.43	70	70	71	69	69	70	8	1.50	5.372	5.413	1.0076		0.7113	1.865
	2	0.5266	20.5	684.52	689.99	5.47	70	71	72	69	70	71	8	1.50	5.402	5.413	1.0020		0.7120	1.864
	3	0.5266	20.5	689.99	695.45	5.46	70	72	72	70	70	71	8	1.50	5.390	5.413	1.0043		0.7124	1.862
															AVG =		1.0047	-0.01	0.7119	1.864
24	1	0.6585	18.5	695.45	700.60	5.15	70	72	73	70	70	71	6	2.30	5.086	5.076	0.9982		0.7190	1.826
	2	0.6585	18.5	700.60	705.74	5.13	70	73	74	70	70	72	6	2.30	5.069	5.076	1.0015		0.7197	1.826
	3	0.6585	18.5	705.74	710.87	5.13	70	74	74	70	71	72	6	2.30	5.064	5.076	1.0024		0.7200	1.824
															AVG =		1.0007	-0.40	0.7196	1.825

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y =	1.0047
AVERAGE DRY GAS METER ORIFICE COEFFICIENT, Ko=	0.7212
dH@=	1.817

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

(1) $$V_m\ (\text{std}) = K_1\ V_m \frac{P_{bar} + (\Delta H/13.6)}{T_m}$$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)
T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$V_{cr}\ (\text{std}) = K' \frac{P_{bar}\ \theta}{\sqrt{T_{amb}}}$$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)
K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{V_{cr}\ (\text{std})}{V_m\ (\text{std})}$$ = DGM calibration factor

Signature of Calibrator:

Calibration performed by (Initials): MH

#14

Montrose Environmental Group, Ltd. (CANADA)

DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at maximum attainable vacuum (open coarse valve, close fine valve), for period of 5 minutes minimum for large orifice up to 10 minutes for smallest orifice.
4) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 1-Apr-24

METER PART #: - -

METER SERIAL #: 17

CRITICAL ORIFICE SET SERIAL #: 1477

	INITIAL	FINAL	AVG (P_{bar})
BAROMETRIC PRESSURE (in Hg):	29.38	29.40	29.39

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	FINAL	NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	FINAL	DGM OUTLET INITIAL	FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	% Y VARIATION	Ko	dH@
11	1	0.3044	23.0	43.05	48.23	5.18	72	74	74	72	73	73	13	0.49	5.045	5.044	0.9997		0.7192	1.866
	2	0.3044	23.0	48.23	53.39	5.16	72	74	74	73	73	74	13	0.49	5.023	5.044	1.0041		0.7192	1.864
	3	0.3044	23.0	53.39	58.56	5.17	73	74	74	73	73	74	13	0.49	5.033	5.039	1.0012		0.7185	1.875
															AVG =		1.0017	0.31	0.7189	1.868
19	1	0.5266	21.0	26.26	31.76	5.50	71	73	75	71	72	73	8	1.50	5.375	5.375	0.9998		0.7108	1.902
	2	0.5266	20.5	31.76	37.27	5.51	71	75	75	72	72	74	8	1.50	5.378	5.375	0.9994		0.7115	1.900
	3	0.5266	20.5	37.27	42.78	5.51	71	75	74	72	73	74	8	1.50	5.378	5.375	0.9994		0.7112	1.898
															AVG =		0.9996	0.10	0.7112	1.900
24	1	0.6585	19.5	10.02	15.18	5.16	70	71	73	70	70	71	6	2.40	5.071	5.045	0.9949		0.7013	1.940
	2	0.6585	19.0	15.18	20.37	5.19	71	73	74	70	71	72	6	2.40	5.086	5.041	0.9911		0.7016	1.949
	3	0.6585	19.0	20.37	25.53	5.17	70	74	75	71	71	73	6	2.40	5.059	5.045	0.9972		0.7029	1.937
															AVG =		0.9944	-0.41	0.7019	1.942

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y =	0.9985
AVERAGE DRY GAS METER ORIFICE COEFFICIENT, Ko=	0.7107
dH@=	1.903

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

(1) $V_m \text{ (std)} = K_1 \, V_m \dfrac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $V_{cr} \text{ (std)} = K' \sqrt{\dfrac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $Y = \dfrac{V_{cr} \text{ (std)}}{V_m \text{ (std)}}$ in = DGM calibration factor

Signature of Calibrator:

Calibration performed by (Initials): TC

#17

Montrose Environmental Group, Ltd. (CANADA)

Quality - Service - Reliability

DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at maximum attainable vacuum (open coarse valve, close fine valve),
   for period of 5 minutes minimum for large orifice up to 10 minutes for smallest orifice.
4) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 4-Jun-24

METER PART #: - -

METER SERIAL #: 18

CRITICAL ORIFICE SET SERIAL #: 1477

	INITIAL	FINAL	AVG (P_{bar})
BAROMETRIC PRESSURE (in Hg):	29.28	29.27	29.28

IF Y VARIATION EXCEEDS 2.00%,
ORIFICE SHOULD BE RECALIBRATED

		K'	TESTED	DGM READINGS (FT^3)			TEMPERATURES °F						ELAPSED							
		FACTOR	VACUUM				AMBIENT	DGM INLET		DGM OUTLET		DGM	TIME (MIN)	DGM ΔH	(1)	(2)	(3)	% Y		
ORIFICE #	RUN #	(AVG)	(in Hg)	INITIAL	FINAL	NET (V_m)		INITIAL	FINAL	INITIAL	FINAL	AVG	θ	(in H_2O)	V_m (STD)	V_{cr} (STD)	Y	VARIATION	Ko	dH@
11	1	0.3044	25.5	23.05	28.19	5.14	71	69	69	69	69	69	13	0.47	5.027	5.030	1.0007		0.7303	1.810
	2	0.3044	24.5	28.19	33.33	5.14	71	69	70	69	70	70	13	0.47	5.022	5.031	1.0019		0.7308	1.806
	3	0.3044	24.0	33.33	38.48	5.15	70	70	70	70	70	70	13	0.47	5.027	5.032	1.0010		0.7312	1.803
															AVG =		1.0012	0.79	0.7308	1.806
19	1	0.5266	22.0	40.73	46.24	5.51	70	70	70	70	70	70	8	1.50	5.392	5.359	0.9938		0.7074	1.919
	2	0.5266	21.0	46.24	51.77	5.53	70	70	70	70	70	70	8	1.40	5.410	5.357	0.9902		0.7322	1.794
	3	0.5266	21.0	51.77	57.29	5.52	70	70	70	70	70	70	8	1.40	5.401	5.357	0.9920		0.7322	1.794
															AVG =		0.9920	-0.13	0.7239	1.836
24	1	0.6585	20.0	60.11	65.30	5.19	70	70	70	70	70	70	6	2.30	5.089	5.025	0.9873		0.7136	1.884
	2	0.6585	19.5	65.30	70.48	5.18	70	70	70	70	70	70	6	2.30	5.079	5.025	0.9892		0.7136	1.884
	3	0.6585	19.0	70.48	75.69	5.21	70	70	70	70	70	70	6	2.20	5.107	5.024	0.9837		0.7296	1.803
															AVG =		0.9868	-0.66	0.7189	1.857

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.9933

AVERAGE DRY GAS METER ORIFICE COEFFICIENT, Ko= 0.7245

dH@= 1.833

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

(1) $$V_m\,(std) = K_1\,V_m\,\frac{P_{bar} + (\Delta H/13.6)}{T_m}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$V_{cr}\,(std) = K'\sqrt{\frac{P_{bar}\,\theta}{T_{amb}}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{V_{cr}\,(std)}{V_m\,(std)}\ \text{in}$$

= DGM calibration factor

Signature of Calibrator:

Calibration performed by (Initials): TC

#18

DGM Calibration (Montrose ON) 4-June-2024

Montrose Environmental Group, Ltd. (CANADA)

DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at maximum attainable vacuum (open coarse valve, close fine valve),
   for period of 5 minutes minimum for large orifice up to 10 minutes for smallest orifice.
4) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 4-Jun-24

METER PART #: - -

METER SERIAL #: 19

CRITICAL ORIFICE SET SERIAL #: 1477

BAROMETRIC PRESSURE (in Hg): INITIAL 29.28 FINAL 29.26 AVG (P_{bar}) 29.27

IF Y VARIATION EXCEEDS 2.00%,
ORIFICE SHOULD BE RECALIBRATED

		K'	TESTED				TEMPERATURES °F						ELAPSED							
		FACTOR	VACUUM	DGM READINGS (FT^3)			AMBIENT	DGM INLET		DGM OUTLET		DGM	TIME (MIN)	DGM ΔH	(1)	(2)	(3)	% Y		
ORIFICE #	RUN #	(AVG)	(in Hg)	INITIAL	FINAL	NET (V_m)		INITIAL	FINAL	INITIAL	FINAL	AVG	θ	(in H_2O)	V_m (STD)	V_{cr} (STD)	Y	VARIATION	Ko	dH@
11	1	0.3044	23.0	51.65	56.84	5.19	71	71	70	71	70	71	13	0.47	5.060	5.030	0.9941		0.7314	1.804
	2	0.3044	23.5	56.84	62.02	5.18	71	70	70	70	70	70	13	0.47	5.055	5.030	0.9951		0.7311	1.805
	3	0.3044	23.5	62.02	67.21	5.19	71	70	70	70	70	70	13	0.47	5.065	5.028	0.9927		0.7307	1.810
																AVG =	0.9939	0.63	0.7311	1.806
19	1	0.5266	21.0	7.81	13.32	5.51	72	70	70	70	70	70	8	1.45	5.391	5.348	0.9921		0.7182	1.877
	2	0.5266	21.0	13.32	18.84	5.52	73	70	70	70	70	70	8	1.45	5.400	5.343	0.9893		0.7175	1.887
	3	0.5266	21.0	18.84	24.36	5.52	73	70	71	70	71	71	8	1.45	5.395	5.343	0.9903		0.7178	1.886
																AVG =	0.9905	0.29	0.7178	1.883
24	1	0.6585	19.5	735.26	740.49	5.23	71	70	70	70	70	70	6	2.30	5.127	5.022	0.9795		0.7133	1.888
	2	0.6585	19.5	740.49	745.72	5.23	71	70	70	70	70	70	6	2.30	5.127	5.022	0.9795		0.7133	1.888
	3	0.6585	19.5	745.72	750.97	5.25	70	70	71	70	71	71	6	2.30	5.142	5.023	0.9768		0.7137	1.885
																AVG =	0.9786	-0.92	0.7134	1.887

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.9877

AVERAGE DRY GAS METER ORIFICE COEFFICIENT, Ko= 0.7208

dH@= 1.859

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

(1) $V_m \text{(std)} = K_1\ V_m \dfrac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $V_{cr} \text{(std)} = K' \sqrt{\dfrac{P_{bar}\ \theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $Y = \dfrac{V_{cr} \text{(std)}}{V_m \text{(std)}}$ in = DGM calibration factor

Signature of Calibrator:

Calibration performed by (Initials): TC

#19

Montrose Environmental Group, Ltd. (CANADA)

Quality - Service - Reliability

DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at maximum attainable vacuum (open coarse valve, close fine valve), for period of 5 minutes minimum for large orifice up to 10 minutes for smallest orifice.
4) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 31-May-24

METER PART #: - -

METER SERIAL #: 20

CRITICAL ORIFICE SET SERIAL #: 1477

	INITIAL	FINAL	AVG (P_{bar})
BAROMETRIC PRESSURE (in Hg):	29.63	29.60	29.62

IF Y VARIATION EXCEEDS 2.00%,
ORIFICE SHOULD BE RECALIBRATED

		K'	TESTED	DGM READINGS (FT^3)			TEMPERATURES °F						ELAPSED							
		FACTOR	VACUUM				AMBIENT	DGM INLET		DGM OUTLET		DGM	TIME (MIN)	DGM ΔH	(1)	(2)	(3)	% Y		
ORIFICE #	RUN #	(AVG)	(in Hg)	INITIAL	FINAL	NET (V_m)		INITIAL	FINAL	INITIAL	FINAL	AVG	θ	(in H_2O)	V_m (STD)	V_{cr} (STD)	Y	VARIATION	Ko	dH@
11	1	0.3044	23.0	120.05	125.22	5.17	68	71	72	69	70	71	13	0.49	5.100	5.100	0.9999		0.7227	1.797
	2	0.3044	23.0	125.22	130.40	5.18	69	72	71	70	70	71	13	0.49	5.108	5.097	0.9979		0.7222	1.802
	3	0.3044	23.0	130.40	135.56	5.16	70	71	71	70	70	71	13	0.49	5.090	5.091	1.0000		0.7210	1.815
															AVG =		0.9993	0.96	0.7220	1.805
19	1	0.5266	20.0	135.65	141.19	5.54	71	71	71	70	70	71	8	1.60	5.480	5.418	0.9887		0.6892	1.982
	2	0.5266	20.0	141.19	146.75	5.56	71	71	72	70	71	71	8	1.60	5.495	5.416	0.9856		0.6892	1.986
	3	0.5266	20.0	146.75	152.30	5.55	71	72	72	71	71	72	8	1.60	5.480	5.415	0.9882		0.6895	1.985
															AVG =		0.9875	-0.23	0.6893	1.985
24	1	0.6585	18.5	152.45	157.68	5.23	70	72	72	71	71	72	6	2.50	5.175	5.085	0.9826		0.6899	1.968
	2	0.6585	19.0	157.68	162.91	5.23	70	72	73	71	71	72	6	2.50	5.173	5.085	0.9830		0.6901	1.969
	3	0.6585	19.0	162.91	168.15	5.24	70	73	74	71	71	72	6	2.50	5.178	5.084	0.9817		0.6906	1.973
															AVG =		0.9824	-0.74	0.6902	1.970

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:
The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.9897

AVERAGE DRY GAS METER ORIFICE COEFFICIENT, Ko= 0.7005

dH@= 1.920

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

(1) $$V_m\text{ (std)} = K_1\ V_m\ \frac{P_{bar} + (\Delta H/13.6)}{T_m}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)
T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$V_{cr}\text{ (std)} = K' \sqrt{\frac{P_{bar}\ \theta}{T_{amb}}}$$

= Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)
K' = Average K' factor from Critical Orifice Calibration

(3) $$Y = \frac{V_{cr}\text{ (std)}}{V_m\text{ (std)}}\ \text{in}$$

= DGM calibration factor

Signature of Calibrator:

Calibration performed by (Initials): TC

MONTROSE ENVIRONMENTAL GROUP, LTD. (CANADA)

PITOT TUBE CALIBRATION

DATE: 3-Jun-24
LOCATION: Wind Tunnel
OPERATORS: PB

Barometric: 29.34 **"Hg**
Temperature: 74 **°F**
Cp_{std}: 1

$Cp_s = Cp_{std}$ X SQRT (delta P_{std} / delta P_s)

Cp_s = S-type pitot coefficient
Cp_{std} = Standard pitot coefficient
P_{std} = Standard pitot velocity pressure head
P_s = S-Type pitot velocity pressure head

PITOT TUBE I.D.: 5E

Nozzle Size inches	**Tunnel Setting** Hz	**Standard Pitot Reading (delta P_{std})** "H_2O	**S-Type Pitot Reading (delta P_s)** "H_2O	**S-Type Pitot Coefficient Cp_s**	**Deviation** **$\lvert Cp_s - Cp_{avg} \rvert$**
0.1875	49.2	0.360	0.520	0.832	0.0023
	51.8	0.398	0.564	0.840	0.0057
	54.5	0.442	0.630	0.838	0.0033
	56.5	0.464	0.672	0.831	0.0034
	59.3	0.504	0.730	0.831	0.0034
			0.750	**0.834**	**0.0036**
0.3125	30.2	0.130	0.190	0.827	0.0038
	32.7	0.152	0.220	0.831	0.0002
	34.8	0.180	0.256	0.839	0.0075
	36.7	0.198	0.288	0.829	0.0018
	39.1	0.224	0.326	0.829	0.0021
			Average	**0.831**	**0.0031**
0.5000	12.3	0.024	0.034	0.840	0.0086
	14.4	0.030	0.044	0.826	0.0059
	17.0	0.044	0.064	0.829	0.0025
	19.5	0.058	0.084	0.831	0.0007
	21.8	0.072	0.104	0.832	0.0004
			Average	**0.832**	**0.0036**

The pitot tube must have an average deviation (σ) value of ≤0.01. The above calibration values were obtained by calibrating the s-type pitot against a standard pitot tube. The standard pitot tube used was series 160, with an assigned calibration factor of "1". The standard pitot tube was manufactured by Dwyer Instuments according to ASME specifications.

5E

MONTROSE ENVIRONMENTAL GROUP, LTD. (CANADA)

PITOT TUBE CALIBRATION

DATE: 3-Jun-24
LOCATION: Wind Tunnel
OPERATORS: PB

Barometric: 29.34 "Hg
Temperature: 74 °F
Cp_{std}: 1

$Cp_s = Cp_{std}$ X SQRT (delta P_{std} / delta P_s)

Cp_s = S-type pitot coefficient
Cp_{std} = Standard pitot coefficient
P_{std} = Standard pitot velocity pressure head
P_s = S-Type pitot velocity pressure head

PITOT TUBE I.D.: 7C

Nozzle Size inches	Tunnel Setting Hz	Standard Pitot Reading (delta P_{std}) "H_2O	S-Type Pitot Reading (delta P_s) "H_2O	S-Type Pitot Coefficient Cp_s	Deviation $\lvert Cp_s - Cp_{avg}\rvert$
0.1875	49.2	0.354	0.506	0.836	0.0042
	51.8	0.390	0.550	0.842	0.0015
	54.5	0.432	0.610	0.842	0.0010
	56.5	0.460	0.650	0.841	0.0007
	59.3	0.510	0.720	0.842	0.0010
			Average	**0.841**	**0.0017**
0.3125	30.2	0.130	0.186	0.836	0.0049
	32.7	0.154	0.224	0.829	0.0019
	34.8	0.174	0.256	0.824	0.0067
	36.7	0.196	0.280	0.837	0.0056
	39.1	0.220	0.320	0.829	0.0019
			Average	**0.831**	**0.0042**
0.5000	12.3	0.024	0.034	0.840	0.0013
	14.4	0.032	0.046	0.834	0.0048
	17.0	0.044	0.062	0.842	0.0036
	19.5	0.058	0.082	0.841	0.0022
	21.8	0.070	0.100	0.837	0.0022
			Average	**0.839**	**0.0028**

The pitot tube must have an average deviation (σ) value of ≤0.01. The above calibration values were obtained by calibrating the s-type pitot against a standard pitot tube. The standard pitot tube used was series 160, with an assigned calibration factor of "1". The standard pitot tube was manufactured by Dwyer Instuments according to ASME specifications.

7C

MONTROSE ENVIRONMENTAL GROUP, LTD. (CANADA)

PITOT TUBE CALIBRATION

DATE: 3-Jun-24
LOCATION: Wind Tunnel
OPERATORS: PB

Barometric: 29.34 **"Hg**
Temperature: 74 **°F**
Cp_{std}: 1

$Cp_s = Cp_{std}$ X SQRT (delta P_{std} / delta P_s)

Cp_s = S-type pitot coefficient
Cp_{std} = Standard pitot coefficient
P_{std} = Standard pitot velocity pressure head
P_s = S-Type pitot velocity pressure head

PITOT TUBE I.D.: 7E

Nozzle Size inches	Tunnel Setting Hz	Standard Pitot Reading (delta P_{std}) "H_2O	S-Type Pitot Reading (delta P_s) "H_2O	S-Type Pitot Coefficient Cp_s	Deviation $\lvert Cp_s - Cp_{avg} \rvert$
0.1875	49.2	0.350	0.510	0.828	0.0021
	51.8	0.392	0.570	0.829	0.0029
	54.5	0.430	0.636	0.822	0.0041
	56.5	0.460	0.680	0.822	0.0039
	59.3	0.502	0.730	0.829	0.0029
			Average	**0.826**	**0.0032**
0.3125	30.2	0.132	0.200	0.812	0.0066
	32.7	0.154	0.230	0.818	0.0007
	34.8	0.176	0.260	0.823	0.0038
	36.7	0.196	0.288	0.825	0.0060
	39.1	0.220	0.330	0.816	0.0025
			Average	**0.819**	**0.0039**
0.5000	12.3	0.024	0.034	0.840	0.0065
	14.4	0.032	0.046	0.834	0.0004
	17.0	0.046	0.066	0.835	0.0011
	19.5	0.060	0.086	0.835	0.0016
	21.8	0.072	0.106	0.824	0.0095
			Average	**0.834**	**0.0038**

The pitot tube must have an average deviation (σ) value of ≤0.01. The above calibration values were obtained by calibrating the s-type pitot against a standard pitot tube. The standard pitot tube used was series 160, with an assigned calibration factor of "1". The standard pitot tube was manufactured by Dwyer Instuments according to ASME specifications.

Montrose Environmental Group, Ltd. (CANADA)

Glass Nozzle Measurement Verification Summary
Suite 210, 704 Mara Street, Point Edward, Ontario, N7V1X4
Tel (519) 336 4101

Case ID: Glass Nozzle Case A
Calibrator: MM
Date: 16-Jan-24

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

Nozzle ID	Measurements			Average Diameter
	#1	#2	#3	
A1	0.1440	0.1450	0.1460	**0.1450**
A2	0.1525	0.1540	0.1545	**0.1537**
A3	0.1810	0.1815	0.1830	**0.1818**
A4a	0.1895	0.1890	0.1885	**0.1890**
A5	0.2215	0.2200	0.2225	**0.2213**
A6	0.2595	0.2605	0.2600	**0.2600**
A7	0.2540	0.2510	0.2530	**0.2527**
A8a	0.2850	0.2850	0.2850	**0.2850**
A9	0.3090	0.3080	0.3085	**0.3085**
A10a	0.3150	0.3150	0.3150	**0.3150**
A11	0.3380	0.3390	0.3390	**0.3387**
A12	0.3390	0.3375	0.3365	**0.3377**
A13	0.3775	0.3760	0.3790	**0.3775**
A14	0.3785	0.3805	0.3790	**0.3793**
A15	0.3900	0.3915	0.3920	**0.3912**
A16	0.3800	0.3790	0.3790	**0.3793**
A16a	0.4130	0.4115	0.4140	**0.4128**
A17	0.4355	0.4325	0.4340	**0.4340**
A18	0.4390	0.4410	0.4380	**0.4393**
A19	0.4685	0.4670	0.4660	**0.4672**
A20	0.4995	0.5030	0.5015	**0.5013**
A21	0.5070	0.5040	0.5045	**0.5052**

The difference between the low measurement and high measurement shall not exceed 0.004 inches (0.1 mm)

References:

1. QAC-007 (Nozzles)
2. Alberta Stack sampling code (Publication REF:89) Method 5, Section 2.1.1
3. USEPA Method 5, Sections 6.1.1.1 and 10.1
4. Ontario Source Testing Code Method ON-5 Section 3.1(a), Section 9.1.1

Montrose Environmental Group, Ltd. (CANADA)

Glass Nozzle Measurement Verification Summary
Suite 210, 704 Mara Street, Point Edward, Ontario, N7V1X4
Tel (519) 336 4101

Case ID: Glass Nozzle Case D
Calibrator: MM
Date: 16-Jan-24

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

Nozzle ID	Measurements			Average Diameter
	#1	#2	#3	
D1	0.1210	0.1215	0.1215	**0.1213**
D2	0.1570	0.1590	0.1580	**0.1580**
D3	0.1940	0.1940	0.1945	**0.1942**
D4	0.1965	0.1970	0.1955	**0.1963**
D5	0.2550	0.2555	0.2545	**0.2550**
D6	0.2560	0.2560	0.2570	**0.2563**
D7	0.2730	0.2750	0.2740	**0.2740**
D9a	0.3100	0.3100	0.3100	**0.3100**
D10	0.3225	0.3200	0.3205	**0.3210**
D11	0.3390	0.3385	0.3390	**0.3388**
D12	0.2560	0.2535	0.2555	**0.2550**
D13	0.3805	0.3810	0.3800	**0.3805**
D14	0.3850	0.3865	0.3845	**0.3853**
D15	0.3940	0.3950	0.3950	**0.3947**
D16	0.4110	0.4110	0.4105	**0.4108**
D17	0.4360	0.4360	0.4370	**0.4363**
D18	0.4405	0.4420	0.4405	**0.4410**
D19	0.4625	0.4620	0.4635	**0.4627**
D20	0.4965	0.4980	0.4980	**0.4975**
D21	0.5105	0.5135	0.5120	**0.5120**

The difference between the low measurement and high measurement shall not exceed 0.004 inches (0.1 mm)

References:
1. QAC-007 (Nozzles)
2. Alberta Stack sampling code (Publication REF:89) Method 5, Section 2.1.1
3. USEPA Method 5, Sections 6.1.1.1 and 10.1
4. Ontario Source Testing Code Method ON-5 Section 3.1(a), Section 9.1.1

Montrose Environmental Group, Ltd. (CANADA)

Glass Nozzle Measurement Verification Summary
Suite 210, 704 Mara Street, Point Edward, Ontario, N7V1X4
Tel (519) 336 4101

Case ID: Glass Nozzle Case E
Calibrator: MH
Date: 18-Jan-24

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

Nozzle ID	Measurements			Average Diameter
	#1	#2	#3	
E1	0.0980	0.0970	0.0990	**0.0980**
E2	0.1500	0.1505	0.1515	**0.1507**
E3	0.1900	0.1920	0.1915	**0.1912**
E4	0.1950	0.1965	0.1955	**0.1957**
E5a	0.1985	0.2000	0.2005	**0.1997**
E6	0.2210	0.2210	0.2200	**0.2207**
E7	0.2260	0.2250	0.2260	**0.2257**
E8	0.2630	0.2620	0.2610	**0.2620**
E9	0.2710	0.2730	0.2720	**0.2720**
E10	0.3105	0.3100	0.3110	**0.3105**
E11	0.3130	0.3130	0.3135	**0.3132**
E12	0.3180	0.3180	0.3185	**0.3182**
E13	0.3465	0.3485	0.3470	**0.3473**
E14	0.3385	0.3395	0.3390	**0.3390**
E15	0.3765	0.3755	0.3770	**0.3763**
E16	0.3870	0.3885	0.3885	**0.3880**
E17	0.3920	0.3950	0.3935	**0.3935**
E18	0.4515	0.4515	0.4505	**0.4512**
E19	0.4890	0.4870	0.4880	**0.4880**
E20	0.5015	0.5005	0.5005	**0.5008**
E21	0.5070	0.5100	0.5080	**0.5083**

The difference between the low measurement and high measurement shall not exceed 0.004 inches (0.1 mm)

References:
1. QAC-007 (Nozzles)
2. Alberta Stack sampling code (Publication REF:89) Method 5, Section 2.1.1
3. USEPA Method 5, Sections 6.1.1.1 and 10.1
4. Ontario Source Testing Code Method ON-5 Section 3.1(a), Section 9.1.1

Montrose Environmental Group, Ltd.

Thermocouple Verification - Outlet Stem and Dry Gas Meter Summary

Suite 210, 704 Mara Street, Point Edward, Ontario, N7V1X4
Tel (519) 336 4101

Dry Well Calibrator: FLUKE-9141 S/N: A8B895
Temperature Readerout: FLUKE-725 S/N: 2869136
Thermometer ID: Traceable 6530 S/N: 221211681
Thermometer ID: Digital Thermometer 240 - DT2

Outlet Stem Thermocouples

Thermocouple I.D.	% Difference - Absolute Temperature			Date Checked	Operator
	Ice	Ambient	Boiling		
Outlet Stem 1	0.04	0.06	0.00	16-Jan-24	GK/MH
Outlet Stem 2	0.08	0.04	0.45	16-Jan-24	GK/TC
Outlet Stem 5	0.02	0.09	0.19	16-Jan-24	GK/TC
Outlet Stem 6	0.08	0.24	0.46	16-Jan-24	GK/TC
Outlet Stem 8	0.02	0.00	0.37	16-Jan-24	GK/MH
Outlet Stem 11	0.10	0.04	0.45	16-Jan-24	GK/TC
Outlet Stem 13	0.02	0.00	0.36	16-Jan-24	GK/MH
Outlet Stem 14	0.00	0.02	0.34	16-Jan-24	GK/TC
Outlet Stem 18	0.00	0.09	0.24	16-Jan-24	GK/MH
Outlet Stem 19	0.04	0.02	0.36	16-Jan-24	GK/TC
Outlet Stem 20	0.08	0.06	0.01	16-Jan-24	GK/TC
Outlet Stem 21	0.02	0.06	0.04	16-Jan-24	GK/MH
Outlet Stem 22	0.08	0.04	0.09	16-Jan-24	GK/TC
Outlet Stem 23	0.06	0.02	0.09	16-Jan-24	GK/TC
Outlet Stem 24	0.06	0.04	0.15	16-Jan-24	GK

Dry Gas Meter Thermocouples

Thermocouple I.D.		% Difference - Absolute Temperature			Date Checked	Operator
		Ice	Ambient	Boiling		
Unit #11	**IN**	0.00	0.04	0.09	16-Jan-24	GK/TC
	OUT	0.14	0.02	0.03	16-Jan-24	GK/TC
Unit #14	**IN**	0.02	0.02	0.04	16-Jan-24	GK/TC
	OUT	0.10	0.00	0.06	16-Jan-24	GK/TC
Unit #17	**IN**	0.02	0.11	0.03	16-Jan-24	GK/TC
	OUT	0.00	0.00	0.09	16-Jan-24	GK/TC
Unit #18	**OUT**	0.06	0.07	0.06	16-Jan-24	GK/TC
Unit #19	**OUT**	0.00	0.06	0.15	17-Jan-24	MH

Criteria: ≤1.5% of the absolute temperature of the primary standard or the thermocouple must be replaced.

References:

1. Montrose QAC-002 (DGM Thermocouples) and QAC-006 (Stem Thermocouples)
2. Alberta Stack Sampling Code. Method 2 Section 4.3
3. Ontario Stack Sampling Code, Method ON-2 Appendix 2E
4. US EPA Method 2, Section 10.3 and Alternate Method 11

Montrose Environmental Group, Ltd.

Thermocouple Verification - Probe Summary

Suite 210, 704 Mara Street, Point Edward, Ontario, N7V1X4
Tel (519) 336 4101

Dry Well Calibrator: FLUKE-9141 S/N: A8B895
Temperature Readerout: FLUKE-725 S/N: 2869136
Thermometer ID: Traceable 6530 S/N: 221211681
Thermometer ID: Digital Thermometer 240 - DT2

Probe Thermocouples						
Thermocouple I.D.	**% Difference - Absolute Temperature**				**Date Completed**	**Operator**
	32˚F	**212˚F**	**500˚F**	**1000˚F**		
Probe 5E	0.02	0.15	0.07	0.01	10-Jan-24	MH
Probe 7C	0.04	0.06	0.04	0.03	11-Jan-24	MH
Probe 7E	0.00	0.12	0.05	0.02	11-Jan-24	MH

Criteria: ≤1.5% of the absolute temperature of the primary standard or the thermocouple must be replaced.

References:

1. Montrose QAC-005 (Stack Thermocouples)
2. Alberta Stack Sampling Code. Method 2 Section 4.3
3. Ontario Stack Sampling Code, Method ON-2 Appendix 2E
4. US EPA Method 2, Section 10.3 and Alternate Method 11

Montrose Environmental Group, Ltd.
Control Unit DGM Temperature Readout Verification

Location: Pt. Edward
Date: 10-Jan-2024
Operator's Initials: GK
Readout Unit I.D.: #11
Simulator ID: FLUKE 725-054

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

Readout ID: 1-Stack

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	98	0.357
250	250	0.000
500	497	0.313
1000	1000	0.000
1500	1499	0.051
1950	1950	0.000
	Average:	0.115

Readout ID: 5-AUX

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	98	0.357
250	250	0.000
500	497	0.313
1000	1000	0.000
1500	1499	0.051
1950	1950	0.000
	Average:	0.115

Readout ID: 2-Probe

Simulator Setting °F	Readout °F	Difference %
0	1	0.217
50	49	0.196
100	98	0.357
250	250	0.000
500	498	0.208
	Average:	0.196

Readout ID: DGM (Inlet)

Simulator Setting °F	Readout °F	Difference %
0	1	0.217
50	49	0.196
100	98	0.357
150	149	0.164
200	200	0.000
	Average:	0.187

Readout ID: 3-Oven

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	98	0.357
250	250	0.000
500	497	0.313
	Average:	0.173

Readout ID: DGM (Outlet)

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	98	0.357
150	149	0.164
200	200	0.000
	Average:	0.143

Readout ID: 4-Impinger Outlet

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	98	0.357
150	148	0.328
	Average:	0.220

ALL READINGS MUST BE WITHIN 1.5% OF THE ABSOLUTE TEMPERATURE. IF THEY ARE NOT THE READOUT MUST BE REPLACED.

% Diff = │(((Simulator + 460) - (Readout + 460)) / (Simulator + 460)) * 100│

#11

Montrose Environmental Group, Ltd.

Control Unit DGM Temperature Readout Verification

Location: Pt. Edward
Date: 11-Jan-2024
Operator's Initials: MM
Readout Unit I.D.: #14
Simulator ID: FLUKE 725-054

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

Readout ID: 1-Stack

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	250	0.000
500	497	0.313
1000	1001	0.068
1500	1500	0.000
1950	1952	0.083
	Average:	0.105

Readout ID: 5-AUX

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	250	0.000
500	499	0.104
1000	1001	0.068
1500	1500	0.000
1950	1952	0.083
	Average:	0.079

Readout ID: 2-Probe

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	250	0.000
500	498	0.208
	Average:	0.117

Readout ID: DGM (Inlet)

Simulator Setting °F	Readout °F	Difference %
0	1	0.217
50	49	0.196
100	99	0.179
150	149	0.164
200	200	0.000
	Average:	0.151

Readout ID: 3-Oven

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	250	0.000
500	498	0.208
	Average:	0.117

Readout ID: DGM (Outlet)

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
150	149	0.164
200	200	0.000
	Average:	0.108

Readout ID: 4-Impinger Outlet

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
150	148	0.328
	Average:	0.176

ALL READINGS MUST BE WITHIN 1.5% OF THE ABSOLUTE TEMPERATURE. IF THEY ARE NOT THE READOUT MUST BE REPLACED.

% Diff = │(((Simulator + 460) - (Readout + 460)) / (Simulator + 460)) * 100│

Montrose Environmental Group, Ltd.

Control Unit DGM Temperature Readout Verification

Location: Pt. Edward
Date: 10-Jan-2024
Operator's Initials: GK
Readout Unit I.D.: #17
Simulator ID: FLUKE 725-054

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

Readout ID: 1-Stack

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	98	0.357
250	249	0.141
500	498	0.208
1000	1003	0.205
1500	1503	0.153
1950	1955	0.207
	Average:	0.184

Readout ID: 5-AUX

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	98	0.357
250	250	0.000
500	498	0.208
1000	1001	0.068
1500	1501	0.051
1950	1954	0.166
	Average:	0.131

Readout ID: 2-Probe

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	98	0.357
250	250	0.000
500	498	0.208
	Average:	0.152

Readout ID: DGM (Inlet)

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	98	0.357
150	149	0.164
200	200	0.000
	Average:	0.143

Readout ID: 3-Oven

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	98	0.357
250	251	0.141
500	499	0.104
	Average:	0.160

Readout ID: DGM (Outlet)

Simulator Setting °F	Readout °F	Difference %
0	1	0.217
50	49	0.196
100	99	0.179
150	149	0.164
200	200	0.000
	Average:	0.151

Readout ID: 4-Impinger Outlet

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	98	0.357
150	148	0.328
	Average:	0.220

ALL READINGS MUST BE WITHIN 1.5% OF THE ABSOLUTE TEMPERATURE. IF THEY ARE NOT THE READOUT MUST BE REPLACED.

% Diff = │(((Simulator + 460) - (Readout + 460)) / (Simulator + 460)) * 100│

Montrose Environmental Group, Ltd.

Control Unit DGM Temperature Readout Verification

Location: Pt. Edward
Date: 11-Jan-2024
Operator's Initials: MM
Readout Unit I.D.: #18
Simulator ID: FLUKE 725-054

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

Readout ID: 1-Stack

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	251	0.141
500	499	0.104
1000	1003	0.205
1500	1504	0.204
1950	1955	0.207
	Average:	0.155

Readout ID: 2-Probe

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	251	0.141
500	499	0.104
	Average:	0.124

Readout ID: 3-Oven

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	251	0.141
500	499	0.104
	Average:	0.124

Readout ID: 4-Impinger Outlet

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
150	149	0.164
	Average:	0.135

Readout ID: DGM

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
150	149	0.164
200	200	0.000
	Average:	0.108

Readout ID: 5-AUX

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
150	150	0.000
250	251	0.141
500	499	0.104
1000	1004	0.274
1500	1504	0.204
1950	1956	0.249
	Average:	0.137

Readout ID: 6-AUX

Simulator Setting °F	Readout °F	Difference %
0	1	0.217
50	49	0.196
100	99	0.179
150	150	0.000
250	251	0.141
500	499	0.104
1000	1004	0.274
1500	1504	0.204
1950	1956	0.249
	Average:	0.174

ALL READINGS MUST BE WITHIN 1.5% OF THE ABSOLUTE TEMPERATURE. IF THEY ARE NOT THE READOUT MUST BE REPLACED.

% Diff = │(((Simulator + 460) - (Readout + 460)) / (Simulator + 460)) * 100│

Montrose Environmental Group, Ltd.

Control Unit DGM Temperature Readout Verification

Location: Pt. Edward
Date: 11-Jan-2024
Operator's Initials: MM
Readout Unit I.D.: #19
Simulator ID: FLU-725-054

Entered Data
Non-Altering Data
Data Entry Cells
Out of Compliance

Readout ID: 1-Stack

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	250	0.000
500	498	0.208
1000	1003	0.205
1500	1504	0.204
1950	1955	0.207
	Average:	0.150

Readout ID: 2-Probe

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	251	0.141
500	499	0.104
	Average:	0.124

Readout ID: 3-Oven

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	251	0.141
500	499	0.104
	Average:	0.124

Readout ID: 4-Impinger Outlet

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
150	149	0.164
	Average:	0.135

Readout ID: DGM

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
150	149	0.164
200	200	0.000
	Average:	0.108

Readout ID: 5-AUX

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	251	0.141
500	499	0.104
1000	1004	0.274
1500	1504	0.204
1950	1957	0.290
	Average:	0.157

Readout ID: 6-AUX

Simulator Setting °F	Readout °F	Difference %
0	0	0.000
50	49	0.196
100	99	0.179
250	251	0.141
500	499	0.104
1000	1004	0.274
1500	1504	0.204
1950	1957	0.290
	Average:	0.157

ALL READINGS MUST BE WITHIN 1.5% OF THE ABSOLUTE TEMPERATURE. IF THEY ARE NOT THE READOUT MUST BE REPLACED.

% Diff = │(((Simulator + 460) - (Readout + 460)) / (Simulator + 460)) * 100│

#19

Montrose Environmental Group, Ltd. (CANADA)

Flue Gas Analyzer Calibration / Verification

Unit ID: Nova 4
Location: Point Edward, ON
Date: June 14, 2024
Calibrated by: MH

Oxygen Verification / Calibration

Calibration Gas Cylinder IDs and Concentrations

	Gas Cylinder ID	Concentration	
Zero Gas	133123	0	%
O_2 Span	FF51990	23.0	%
Mid-Range O_2 Gas	FF56641	12.0	%

Calibration / Verification

	Analyzer Reading (%)	% Difference From Standard
Zero Gas	0.0	
O_2 Span	23.0	0.0%
Mid-Range O_2 Gas	12.1	0.8%

Carbon Dioxide Verification / Calibration

Calibration Gas Cylinder IDs and Concentrations

	Gas Cylinder ID	Concentration	
Zero Gas	133123	0	%
CO_2 Span Gas	FF51990	20.0	%
Mid-Range CO_2 Gas	FF56641	10.0	%

Calibration / Verification

	Analyzer Reading (%)	% Difference From Standard
Zero Gas	0.2	
CO_2 Span Gas	20.0	0.0%
Mid-Range CO_2 Gas	10.2	2.0%

Montrose Environment Group Ltd.

BAROMETRIC VERIFICATION USING NIST TRACEABLE BAROMETER

Alberta Office
9954-67 Avenue, Edmonton, Alberta T6E 0P5
780-462-4099

Ontario Office
Suite 210, 704 Mara Street, Point Edward, Ontario N7V 1X4
519-336-4101

Barometer Verification Summary

ID	Verification Date	Expiry Date	Operator	Offset Added	Average		
					NIST Traceable Barometer Reading (inHg)	Field Barometer Reading (inHg)	Maximum Absolute Difference
Baro #01	1/16/2024	7/16/2024	MM	N/A	29.31	29.27	0.04
Baro #02	1/16/2024	7/16/2024	MM	N/A	29.31	29.29	0.02
Baro #03	1/16/2024	7/16/2024	MM	N/A	29.31	29.29	0.02
Baro #04	1/16/2024	7/16/2024	MM	N/A	29.31	29.31	0.00
Baro #06	1/16/2024	7/16/2024	MM	N/A	29.31	29.31	0.00

Absolute difference must be less than 0.10 to meet passing criteria

NIST Traceable Barometer

Cert. No.:	6530-13063381
Model:	68000-49
S/N:	221211681
Calibration expiry date:	2/2/2024

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Montrose Environmental Group, Ltd.
Digital Balance Field Verification

Location: OC GUELPH

Date: June 17/24

Balance ID: INTELL PD#1

Technician Name: Paul Baker

Technician Signature:

Calibration Weight Set Serial No.: Recovery #2

FIELD USE SPECIFICATIONS

	Capacity		Readability	
Fine Range Capacity *	0	g	0.1	g
Maximum Capacity	5000	g	0.1	g

** if applicable*

LINEARITY (Accumulative Method)

Verification

	Verification		Post Calibration (if required)	
Applied Weight	Reading	Deviation	Reading	Deviation
200 g	200.0 g	0 g	g	g
500 g	500.0 g	0 g	g	g
700 g	700.0 g	0 g	g	g
1000 g	1000.0 g	0 g	g	g
1200 g	1199.9 g	0.1 g	g	g
	Linearity Deviation	0.1 g	Linearity Deviation	g
	Specification Met (Y/N)	Y	Specification Met (Y/N)	

Linearity Deviation = absolute value of largest deviation, must be < |0.5| g

COMMENTS

CALIBRATED SCALE AFTER WARM UP

CALIBRATIONS ARE GOOD.

NOTE: The methods listed below all state the balance should have a 0.5 g readability
Method E, Section 5.3.2 (pg 24), Canada Reference Method EPS 1/RM/8, December 1993
Method ON-5, Section 3.2(f), (pg F-4), Ontario Source Testing Code, June 2010
Method 5, Section 2.3.4, (pg 5-4), Alberta Stack Sampling Code, 1995
Method 5, Section 6.3.4, (pg 174), U.S. EPA CFR 40 Part 60, July 2006

Appendix F

Field Data Sheets

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

Page 1 of 1

Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source West Furnace Stack (B24)

Pollutant Hex Cr
Method 0061
Run No. 1
Date June 13, 2024
Times 8:41 - 10:05

Initial Pitot L.C.: ± OK @ 3 "H₂O ✓
LkChk #1 (Initial) 0.003 cfm @ 15 "Hg
LkChk # (Final) 0.001 cfm @ 5 "Hg
Time on 8:41
Time off 9:21

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 9:25
Time off 10:05

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
SE	1	0.0	674.18	.15	0.91	555	78	78			50				3
		2.5	675.59	.15	0.91	563	78	78			50				3
	2	5.0	676.95	.15	0.91	561	78	78			50				3
		7.5	676.21	.14	0.85	567	78	78			50				3
	3	10.0	679.95	.14	0.95	562	79	79			50				3
		12.5	680.96	.15	0.95	566	79	79			50				3
	4	15.0	682.17	.15	0.95	565	79	79			50				3
		17.5	683.52	.15	0.91	563	79	79			50				3
	5	20.0	684.86	.15	0.91	561	79	79			50				3
		22.5	686.23	.15	0.91	567	79	79			50				3
	6	25.0	687.6	0.17	1.02	569	79	79			50				3
		27.5	689.06	0.17	1.0	571	79	79			50				3
	7	30.0	690.5	0.17	1.0	573	79	79			50				3
		32.5	691.94	0.2	1.2	567	79	79			50				3
	8	35.0	693.50	0.2	1.2	569	79	79			50				3
		37.5	695.07	0.19	1.1	568	79	79			50				3
SW	1	40.0	696.60	0.19	1.1	554	79	79			50				3
		42.5	698.17	0.19	1.1	570	80	80			50				3
	2	45.0	699.70	0.19	1.1	571	80	80			50				3
		47.5	701.3	0.19	1.1	575	80	80			50				3
	3	50.0	702.83	0.17	1.0	569	80	80			50				3
		52.5	704.74	0.17	1.0	563	80	80			50				4
	4	55.0	705.79	0.17	1.0	564	80	80			50				4
		57.5	707.15	0.14	.9	567	81	81			50				4
	5	60.0	708.55	0.15	.9	567	81	81			50				4
		62.5	709.88	0.15	.9	562	81	81			50				4
	6	65.0	711.24	0.2	1.2	558	81	81			50				4
		67.5	712.81	0.2	1.2	551	81	81			50				4
	7	70.0	714.36	0.2	1.2	564	82	82			50				4
		72.5	716.0	0.2	1.2	554	82	82			50				4
	8	75.0	717.60	0.2	1.2	560	82	82			50				4
		77.5	719.15	0.2	1.2	550	82	82			50				4
		80.0	720.74												

Source Dia./Dim. (in) 17.5
Port Length (in) 12
Assumed Moisture (%) 7

DGM ID 18
Y 0.9933
Ko 0.7245
ΔH@ 1.8329

Probe ID 7C
Nozzle ID A12
Dn 0.3377 (in)
Cp ~~0.915~~ 0.839

Baro. ID ~~29-01~~ MM 04
Mano. ID 18
Pb 29.01 "Hg
Pstatic -0.05 "H₂O

Gas Analyzer ID 4

O₂ %	20.3	20.0
CO₂ %	3.6	4.4
CO ppm		

Additional Notes

Operators MM
Computer ID N164

27.5

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

Page 1 of 1

Project No 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source West Furnace Stack (B24)

Pollutant Hex Cr
Method 0061
Run No. 2
Date June 18/2024
Times 11:17-12:43

Initial Pitot L.C.: ± OK @ 3 "H2O ✓
LkChk #1 (Initial) 0.001 cfm @ 10"Hg
LkChk # (Final) 0.001 cfm @ 5"Hg
Time on 11:17
Time off 11:57

Final Pitot L.C.: ± OK @ "H2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 12:03
Time off 12:43

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H2O	ΔH "H2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O2 %	Gases CO2 %	Gases CO ppm	Pump Vac "Hg
CW	1	0.0	721.2	0.19	1.20	560	88	88			51				2
		2.5	722.78	0.19	1.2	562	88	88			51				2
	2	5.0	724.31	0.17	1.0	564	88	88			51				2
		7.5	725.80	0.2	1.2	562	88	88			51				2
	3	10.0	727.5	1.2	1.2	558	88	88			51				2
		12.5	729.05	0.18	1.1	561	89	89			51				2
	4	15.0	730.43	0.18	1.1	563	89	89			51				2
		17.5	731.92	0.18	1.1	566	89	89			51				2
	5	20.0	733.45	0.18	1.1	560	89	89			51				2
		22.5	734.96	0.15	0.9	558	89	89			51				2
	6	25.0	736.3	0.15	0.9	563	89	89			51				2
		27.5	737.68	0.18	1.1	563	89	89			51				2
	7	30.0	739.12	0.18	1.1	557	89	89			51				2
		32.5	740.68	0.18	1.1	559	89	89			51				2
	8	35.0	742.2	0.18	1.1	562	89	89			51				2
		37.5	743.7	0.18	1.1	563	89	89			51				2
SE	1	40.0	745.23	0.15	0.9	551	89	89			51				2
		42.5	746.58	0.15	0.9	561	89	89			51				2
	2	45.0	747.95	0.15	0.9	556	89	89			51				2
		47.5	749.33	0.15	0.9	559	89	89			51				2
	3	50.0	750.70	0.15	0.9	556	89	89			51				2
		52.5	752.10	0.17	1.0	552	89	89			51				2
	4	55.0	753.56	0.17	1.0	558	89	89			51				2
		57.5	755.00	0.17	1.0	560	89	89			51				2
	5	60.0	756.48	0.17	1.0	553	89	89			51				2
		62.5	757.93	0.15	0.9	563	89	89			51				2
	6	65.0	759.32	0.14	0.93	567	89	89			51				2
		67.5	760.64	0.2	1.2	560	89	89			51				2
	7	70.0	762.29	0.2	1.2	565	89	89			51				2
		72.5	763.80	0.2	1.2	573	89	89			51				2
	8	75.0	765.40	0.2	1.2	574	89	89			51				2
		77.5	766.9	0.2	1.2	572	89	89			51				2
		80.0	768.58												

Source Dia./Dim. (in.) 17.5
Port Length (in.) 12
Assumed Moisture (%) ~~7~~ 8.89

DGM ID 18
Y 0.9933
Ko 0.7245
ΔH@ 1.8328

Probe ID 7C
Nozzle ID A12
Dn 0.3377 (in.)
Cp ~~0.845~~ 0.879

Baro. ID 04
Mano. ID 18
Pb 29.02 "Hg
Pstatic -0.05 "H2O

Gas Analyzer ID 4

O2 %	20.5	20.1
CO2 %	4.1	4.0
CO ppm		

Additional Notes

Operators MM
Computer ID N164

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

Page 1 of 1

Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source West Furnace Stack (B24)

Pollutant Hex Cr
Method 0061
Run No. 3
Date June 18, 2024
Times 15:06-16:38

Initial Pitot L.C.: ± OK @ 3 "H2O ✓
LkChk #1 (Initial) 0.001 cfm @ 10 "Hg
LkChk # (2) 0.001 cfm @ 5 "Hg
Time on 15:06
Time off 15:46

Final Pitot L.C.: ± OK @ "H2O
LkChk # (3) 0.001 cfm @ 5 "Hg
LkChk # ( ) cfm @ "Hg
Time on 15:58
Time off 16:38

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature		Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases			Pump Vac "Hg
							In °F	Out °F				O₂ %	CO₂ %	CO ppm	
SE	1	0.0	770.0	0.15	.93	541	97	97			51				2
		2.5	771.44	0.15	.91	562	97	97			51				2
	2	5.0	772.81	0.17	1.0	562	97	97			51				2
		7.5	774.3	0.17	1.0	563	97	97			51				2
	3	10.0	775.77	0.15	0.9	564	97	97			51				2
		12.5	777.16	0.15	0.9	558	97	97			51				2
	4	15.0	778.55	0.15	0.9	559	97	97			51				2
		17.5	779.9	0.15	0.9	552	97	97			51				2
	5	20.0	781.31	0.15	0.9	585	97	97			51				2
		22.5	782.69	0.15	0.9	562	97	97			51				2
	6	25.0	784.07	0.15	0.9	566	98	98			51				2
		27.5	785.46	0.2	1.2	573	98	98			51				2
	7	30.0	787.07	0.2	1.2	566	98	98			51				2
		32.5	788.61	0.2	1.2	570	98	98			51				2
	8	35.0	790.27	0.2	1.2	568	98	98			51				2
		37.5	791.89	0.23	1.4	569	98	98			51				2
SW	1	40.0	793.60	0.19	1.2	560	98	98			51				2
		42.5	795.23	0.19	1.2	572	98	98			51				2
	2	45.0	796.85	0.19	1.2	566	98	98			51				2
		47.5	798.33	0.19	1.2	560	97	97			51				2
	3	50.0	799.9	0.19	1.2	555	97	97			51				2
		52.5	801.46	0.19	1.2	552	97	97			51				2
	4	55.0	803.96	0.15	0.9	550	97	97			51				2
		57.5	804.48	0.15	0.9	551	97	97			51				2
	5	60.0	805.78	0.15	0.9	552	96	96			51				2
		62.5	807.31	0.15	0.9	554	96	96			51				2
	6	65.0	808.61	0.2	1.2	557	96	96			51				2
		67.5	810.22	0.2	1.2	553	96	96			51				2
	7	70.0	811.84	0.2	1.2	556	96	96			51				2
		72.5	813.46	0.2	1.2	557	96	96			51				2
	8	75.0	815.09	0.2	1.2	566	96	96			51				2
		77.5	816.71	0.19	1.1	563	95	95			51				2
		80.0	818.32												

Source Dia./Dim. (in.) 17.5
Port Length (in.) 12
Assumed Moisture (%) ~~7~~ 8 9

DGM ID 18
Y 0.9933
Ko 0.7245
ΔH@ 1.8378

Probe ID 7C
Nozzle ID A12 E14
Dn 0.3377 .3390
Cp ~~0.815~~ 0.839

Baro. ID 64
Mano. ID 18
Pb 29.00 "Hg
Pstatic -0.05 "H2O

Gas Analyzer ID 41

O_2 %	19.9	20.2
CO_2 %	4.0	4.3
CO ppm		

Additional Notes
- nozzle was broken during port change, E14 used SW port, A12 used SE port

Operators MM
Computer ID N164

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source West Furnace Stack (B24)

Pollutant Hex Cr
Method 0061
Run No. 5
Date June 19 /24
Times 10:30 - 11:56

Initial Pitot L.C.: ± OK @ 3 "H_2O ✓
LkChk #1 (Initial) 0.001 cfm @ 5 "Hg
LkChk # (Final) 0.001 cfm @ 5 "Hg
Time on 10:30
Time off 11:10

Final Pitot L.C.: ± OK @ "H_2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 11:16
Time off 11:56

Notes	Sample Point #	Sample Time min	DGM Volume ft^3	ΔP "H_2O	ΔH "H_2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O_2 %	Gases CO_2 %	Gases CO ppm	Pump Vac "Hg
SE	1	0.0	867.3	0.15	0.9	553	81	81			51				2
		2.5	868.7	0.15	0.9	561	81	81			51				2
	2	5.0	870.02	0.15	0.9	557	81	81			51				2
		7.5	871.39	0.15	0.9	558	81	81			51				2
	3	10.0	872.76	0.17	1.0	560	81	81			51				2
		12.5	874.21	0.17	1.0	562	82	82			51				2
	4	15.0	875.69	0.17	1.0	564	82	82			51				2
		17.5	877.16	0.17	1.0	563	82	82			51				2
	5	20.0	878.61	0.15	0.9	564	82	82			51				2
		22.5	879.99	0.15	0.9	568	82	82			51				2
	6	25.0	881.38	0.15	0.9	558	82	82			51				2
		27.5	882.76	0.19	1.1	555	82	82			51				2
	7	30.0	884.23	0.19	1.1	557	82	82			51				2
		32.5	885.77	0.22	1.3	552	82	82			51				2
	8	35.0	887.43	0.22	1.3	552	82	82			51				2
		37.5	889.08	0.22	1.3	560	82	82			51				2
SW	1	40.0	890.75	0.19	1.1	556	84	84			51				2
		42.5	892.28	0.19	1.1	555	84	84			51				2
	2	45.0	893.79	0.19	1.1	552	84	84			51				2
		47.5	895.35	0.19	1.1	561	84	84			51				2
	3	50.0	896.89	0.17	1.1	560	84	84			51				2
		52.5	898.39	0.17	1.0	559	84	84			51				2
	4	55.0	899.75	0.17	1.0	561	85	85			51				2
		57.5	901.21	0.17	1.0	562	85	85			51				2
	5	60.0	902.88	0.17	1.0	555	85	85			51				2
		62.5	904.18	0.17	1.0	549	85	85			51				2
	6	65.0	905.67	0.19	1.1	555	86	86			51				2
		67.5	907.24	0.19	1.1	551	86	86			51				2
	7	70.0	908.74	0.22	1.3	551	86	86			51				2
		72.5	910.32	0.22	1.3	549	86	86			51				2
	8	75.0	912.0	0.22	1.3	549	86	86			51				2
		77.5	913.76	0.22	1.3	552	86	86			51				2
		80.0	915.41												

Source Dia./Dim. (in.) 17.5
Port Length (in.) 12
Assumed Moisture (%) ~~7~~ 8.89

DGM ID 18
Y 0.9933
Ko 0.7245
ΔH@ 1.8328

Probe ID 7C
Nozzle ID F14
Dn 0.3390 (in.)
Cp ~~0.815~~ 0.839

Baro. ID 04
Mano. ID 18
Pb 29.11 "Hg
Pstatic -0.05 "H_2O

Gas Analyzer ID 4

O_2%	20.0	20.2
CO_2%	4.3	4.5
CO ppm		

Additional Notes

Operators MM
Computer ID N164

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source West Furnace Stack (B24)

Pollutant Hex Cr
Method 0061
Run No. 6
Date June 19/24
Times 13:29 – 14:59

Initial Pitot L.C.: ± OK @ 3 "H₂O ✓
LkChk #1 (Initial) 0.001 cfm @ 5 "Hg
LkChk # (Final) 0.001 cfm @ 5 "Hg
Time on 13:29
Time off 14:09

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 14:14
Time off 14:54

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
SW	1	0.0	915.8	0.15	0.9	550	90	90			53				2
		2.5	917.22	0.19	1.2	545	90	90			53				2
	2	5.0	918.89	0.19	1.2	545	90	90			53				2
		7.5	920.43	0.19	1.2	542	90	90			53				2
	3	10.0	921.99	0.19	1.2	548	90	90			53				2
		12.5	923.50	0.19	1.2	545	90	90			53				2
	4	15.0	925.06	0.15	0.9	546	90	90			53				2
		17.5	926.45	0.15	0.9	543	90	90			53				2
	5	20.0	927.82	0.15	0.9	543	91	91			53				2
		22.5	929.25	0.15	0.9	551	91	91			53				2
	6	25.0	930.58	0.2	1.2	549	91	91			53				2
		27.5	932.16	0.2	1.2	547	91	91			53				2
	7	30.0	933.73	0.2	1.2	549	91	91			53				2
		32.5	935.32	0.2	1.2	557	91	91			53				2
	8	35.0	936.93	0.2	1.2	548	91	91			53				2
		37.5	938.52	0.2	1.2	559	91	91			53				2
SE	1	40.0	940.09	0.18	1.1	550	91	91			53				2
		42.5	941.61	0.18	1.1	551	91	91			53				2
	2	45.0	943.11	0.17	1.0	555	91	91			53				2
		47.5	944.61	0.17	1.0	549	93	93			53				2
	3	50.0	946.11	0.17	1.0	553	93	93			53				2
		52.5	947.59	0.15	0.9	553	93	93			53				2
	4	55.0	948.99	0.15	0.9	554	93	93			53				2
		57.5	950.39	0.15	0.9	550	93	93			53				2
	5	60.0	951.73	0.15	0.9	554	93	93			53				2
		62.5	953.1	0.15	0.9	549	93	93			53				2
	6	65.0	954.47	0.15	0.9	555	93	93			53				2
		67.5	955.85	0.15	0.9	549	93	93			53				2
	7	70.0	957.23	0.15	0.9	553	93	93			53				2
		72.5	958.67	0.2	1.2	552	94	94			53				2
	8	75.0	960.19	0.2	1.2	555	94	94			53				2
		77.5	961.79	0.23	1.4	554	94	94			53				2
		80.0	963.53												

Source Dia./Dim. (in.) 17.5
Port Length (in.) 12
Assumed Moisture (%) ~~7~~ 8.89

DGM ID 18
Y 0.9933
Ko 0.7265
ΔH@ 1.8328

Probe ID 7C
Nozzle ID E14
Dn 0.3390 (in.)
Cp ~~0.815~~ 0.839

Baro. ID 04
Mano. ID 18
Pb 29.11 "Hg
Pstatic -0.05 "H₂O

Gas Analyzer ID 4
O₂ % 20.3 20.0
CO₂ % 3.8 4.3
CO ppm

Additional Notes

Operators MM
Computer ID NI64

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 MOB 2
Client Owens Corning
Facility Guelph Glass
Source West Furnace Stack (324)

Pollutant HexCr
Method 0061
Run No. 7
Date June 18/24
Times 15:50 - 17:20

Initial Pitot L.C.: ± OK @ ✓ "H₂O
LkChk #1 (Initial) 0.001 cfm @ 5 "Hg
LkChk # (Final) 0.001 cfm @ 5 "Hg
Time on 15:50
Time off 16:30

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 16:40
Time off 17:20

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	D/A Temp. °F	Pump Vac "Hg
SE 1		0	964.7	0.15	0.9	548	96	96			51		2
		2.5	966.1	0.15	0.9	550	96	96			51		2
2		5	967.57	0.15	0.9	557	96	96			51		2
		7.5	968.94	0.15	0.9	553	96	96			51		2
3		10	970.33	0.15	0.9	555	96	96			51		2
		12.5	971.65	0.15	0.9	552	96	96			51		2
4		15	973.050	0.17	~~0~~1.05	551	97	97			52		2
		17.5	974.500	0.16	1.00	551	97	97			52		2
5		20	975.945	0.15	0.92	551	97	97			52		2
		22.5	977.330	0.15	0.92	555	97	97			52		2
6		25	978.720	0.15	0.91	559	97	97			52		2
		27.5	980.195	0.20	~~0~~.1.20	556	97	97			53		2.5
7		30	981.690	0.21	1.30	558	97	97			53		2.5
		32.5	983.325	0.22	1.35	555	97	97			54		2.5
8		35	985.025	0.20	1.20	559	97	97			54		2.5
		37.5	986.630	0.22	1.35	551	97	97			55		2.5
SW 1		40	988.344	0.17	1.0	554	97	97			55		2.5
		42.5	989.84	0.17	1.0	555	97	97			55		2.5
2		45	991.37	0.19	1.1	560	97	97			55		2.5
		47.5	992.82	0.19	1.1	558	97	97			55		2.5
3		50	994.32	0.15	0.9	580	97	97			55		2.5
		52.5	995.70	0.15	0.9	560	97	97			55		2.5
4		55	997.2	0.15	0.9	561	97	97			55		2.5
		57.5	998.59	0.15	0.9	560	97	97			55		2.5
5		60	999.99	0.15	0.9	560	97	97			55		2.5
		62.5	1001.4	0.15	0.9	560	97	97			55		2.5
6		65	1002.76	0.15	0.9	570	97	97			55		2.5
		67.5	1004.15	0.15	0.9	569	97	97			55		2.5
7		70	1005.53	0.2	1.2	575	97	97			55		2.5
		72.5	1007.07	0.2	1.2	574	97	97			55		2.5
8		75	1008.68	0.2	1.2	571	97	97			55		2.5
		77.5	1010.25	0.2	1.2	568	97	97			55		2.5
		80	1011.85										

Source Dia./Dim. (in.) 17.5
Port Length (in.) 12
Assumed Moisture (%) 8.89

DGM ID 18
Y 0.9933
Ko 0.7245
ΔH@ 1.8328

Probe ID 7C
Nozzle ID E14
Dn 0.3390 (in.)
Cp ~~0.835~~ 0.839

Baro. ID 04
Mano. ID 18
Pb 29.09 "Hg
Pstatic -0.05 "H₂O

Gas Analyzer ID 4

O_2 %	20.1	20.0
CO_2 %	4.1	4.0
CO ppm	—	

Additional Notes

Operators MM/MH
Computer ID N164

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 1
Source: B24 W Furnace
Project No.: 032615
Date: Jun. 18, 2024
Recovered By: PB

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	**0.5 M KOH**	**0.5 M KOH**	**0.5 M KOH**	Empty	Silica Gel
Empty weight g	505.1	442.4	435.0	445.4	------
Initial weight g	655.4	518.2	510.4	------	982.7
Final weight g	547.2	623.6	563.1	463.2	1008.6
Gain g	-108.2	105.4	52.7	17.8	25.9
	150 mL	75 mL	75 mL		

Impinger gain: 67.7
Silica gain: 25.9
Total H_2O gain: 93.6 g ✓

Container	1	2	3
Sample Number	**032615-Cr7**	**032615-TCr13**	**032615-TCr14**
	Impingers #1-4 0.5 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	57.1	28.6	
Final weight g	973.2	236.0	
Total g	916.1	207.4	
Final pH	10.0	for total chrome only	for total chrome only

Purge On: 11:30
Purge Off: 12:00

Run: 2
Source: B24 W Furnace
Date: Jun. 18, 2024
Recovered By: PB

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	**0.5 M KOH**	**0.5 M KOH**	**0.5 M KOH**	Empty	Silica Gel
Empty weight g	502.4	436.6	435.6	439.5	------
Initial weight g	653.9	512.3	510.9	------	945.0
Final weight g	518.9	596.3	586.7	461.6	979.4
Gain g	-135.0	84.0	75.8	22.1	34.4
	150 mL	75 mL	75 mL		

Impinger gain: 46.9
Silica gain: 34.4
Total H_2O gain: 81.3 g ✓

Container	1	2	3
Sample Number	**032615-Cr8**	**032615-TCr15**	**032615-TCr16**
	Impingers #1-4 0.5 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	57.1	28.7	
Final weight g	907.6	210.2	
Total g	850.5	181.5	
Final pH	10.0	for total chrome only	for total chrome only

Purge On: 14:05
Purge Off: 14:35

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 3
Source: B24 W Furnace
Project No.: 032615
Date: Jun.18, 2024
Recovered By: P.B

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	**0.5 M KOH**	**0.5 M KOH**	**0.5 M KOH**	Empty	Silica Gel
Empty weight g	506.6	443.4	435.5	446.7	------
Initial weight g	659.0	519.2	511.2	------	974.4
Final weight g	534.2	591.2	601.8	486.4	998.3
Gain g	-124.8	72.0	90.6	39.7	23.9
	150 mL	75 mL	75 mL		

Impinger gain: 77.5
Silica gain: 23.9
Total H_2O gain: 101.4g ✓

Container	1	2	3
Sample Number	**032615-Cr9**	**032615-TCr17**	**032615-TCr18**
	Impingers #1-4 0.5 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	57.4	28.0	
Final weight g	929.5	205.3	
Total g	872.1	177.3	
Final pH	10.0	for total chrome only	for total chrome only

Purge On: 17:40
Purge Off: 18:10

Run: 4
Source: B24 W Furnace
Date: Jun.19, 2024
Recovered By: PB

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	**0.5 M KOH**	**0.5 M KOH**	**0.5 M KOH**	Empty	Silica Gel
Empty weight g	503.0	436.9	436.9	440.4	------
Initial weight g	654.7	511.9	812.6	------	955.3
Final weight g	514.1	566.3	537.4	447.8	976.4
Gain g	-140.6	~~44.4~~ 54.4	24.8	7.4	21.1
	150 mL	75 mL	75 mL		

Impinger gain: -64.0
Silica gain: 21.1
Total H_2O gain: ~~-42.9~~ -32.9 ✓

Container	1	2	3
Sample Number	**032615-Cr10**	**032615-TCr19**	**032615-TCr20**
	Impingers #1-4 0.5 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	56.8	28.1	
Final weight g	855.1	219.7	
Total g	798.3	191.6	
Final pH	10.0	for total chrome only	for total chrome only

Purge On: 10:45
Purge Off: 11:15

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 5
Source: B24 W Furnace
Project No.: 032615
Date: Jun. 19, 2024
Recovered By: PB

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	**0.5 M KOH**	**0.5 M KOH**	**0.5 M KOH**	Empty	Silica Gel
Empty weight g	507.0	442.8	435.6	446.1	------
Initial weight g	658.1	519.3	511.8	------	941.1
Final weight g	622.5	583.3	544.4	458.3	968.6
Gain g	-35.6	64.0	32.6	12.2	27.5
	150 mL	75 mL	75 mL		

Impinger gain: 73.2
Silica gain: 27.5
Total H_2O gain: 100.7g ✓

Container	1	2	3
Sample Number	**032615-Cr11**	**032615-TCr21**	**032615-TCr22**
	Impingers #1-4 0.5 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	57.2	28.4	
Final weight g	857.2	223.4	
Total g	830.0	195.0	
Final pH	10.0	for total chrome only	for total chrome only

Purge On: 12:55
Purge Off: 13:25

Run: 6
Source: B24 W Furnace
Date: Jun. 19, 2024
Recovered By: PB

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	**0.5 M KOH**	**0.5 M KOH**	**0.5 M KOH**	Empty	Silica Gel
Empty weight g	504.0	438.0	437.2	441.2	------
Initial weight g	655.7	513.8	514.5	------	919.9
Final weight g	661.8	572.4	535.4	448.9	937.2
Gain g	6.1	58.6	20.9	7.7	17.3
	150 mL	75 mL	75 mL		

Impinger gain: 93.3
Silica gain: 17.3
Total H_2O gain: 110.6g ✓

Container	1	2	3
Sample Number	**032615-Cr12**	**032615-TCr23**	**032615-TCr24**
	Impingers #1-4 0.5 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	56.8	28.3	
Final weight g	929.1	195.9	
Total g	872.3	167.6	
Final pH	9.0	for total chrome only	for total chrome only

Purge On: 15:50
Purge Off: 16:20

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source East Furnace Stack (B25)

Pollutant Hex Cr
Method 0061
Run No. 1
Date June 18/24
Times 8:40 -10:05

Initial Pitot L.C.: ± OK @ 4 "H_2O
LkChk #1 (Initial) 0.001 cfm @ 16 "Hg
LkChk # (Final) 0.001 cfm @ 16 "Hg
Time on ~~8:40~~ 8.41
Time off 9:21

Final Pitot L.C.: ± OK @ "H_2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 9:25
Time off 10:05

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H_2O	ΔH "H_2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O_2 %	Gases CO_2 %	Gases CO ppm	Pump Vac "Hg
~~SE~~ SW	1	0.0	5.25	0.14	0.92	548	81	80			77				2.0
		2.5	6.68	0.14	0.91	548	81	80			56				2.0
	2	5.0	8.09	0.14	0.91	547	82	80			~~76~~ 54				2.0
		7.5	9.42	0.15	0.99	542	82	81			50				2.0
	3	10.0	10.79	0.14	0.91	551	82	81			49				2.0
		12.5	12.23	0.12	0.79	546	82	81			48				2.0
	4	15.0	13.58	0.13	0.85	549	82	81			49				2.0
		17.5	14.86	0.12	0.79	547	83	81			49				2.0
	5	20.0	16.11	0.12	0.79	546	83	81			50				2.0
		22.5	17.36	0.13	0.86	542	83	81			50				2.0
	6	25.0	18.63	0.12	0.78	551	83	81			50				2.0
		27.5	19.85	0.19	1.24	554	83	81			51				2.0
	7	30.0	21.35	0.20	1.30	554	84	81			56				2.0
		32.5	22.93	0.20	1.30	555	84	81			52				2.0
	8	35.0	24.61	0.21	1.40	549	84	81			53				2.0
		37.5	26.24	0.21	1.40	553	85	81			54				2.0
SE	1	40.0	27.87	0.17	1.10	542	82	82			50				2.0
		42.5	29.35	0.17	1.10	555	84	82			49				2.0
	2	45.0	30.83	0.18	1.20	550	85	82			48				2.0
		47.5	32.38	0.16	1.00	560	85	83			48				2.0
	3	50.0	33.81	0.16	1.00	557	85	83			49				2.0
		52.5	35.25	0.16	1.00	554	86	83			51				2.0
	4	55.0	36.73	0.15	0.98	550	86	83			52				2.0
		57.5	38.17	0.13	0.85	557	86	83			53				3.0
	5	60.0	39.52	0.13	0.85	551	86	83			53				3.0
		62.5	40.88	0.14	0.92	550	86	83			54				3.0
	6	65.0	42.21	0.16	1.10	539	87	84			55				3.0
		67.5	43.61	0.16	1.10	552	87	83			56				3.0
	7	70.0	45.07	0.19	1.30	540	87	84			56				3.0
		72.5	46.59	0.22	1.50	519	87	84			57				3.0
	8	75.0	48.29	0.21	1.40	541	87	84			57				3.0
		77.5	49.94	0.21	1.40	533	87	84			58				3.0
		80.0	51.54												

Source Dia./Dim. (in.) 17.5
Port Length (in.) 12
Assumed Moisture (%) 7

DGM ID 14
Y 1.0047
Ko 0.7212
ΔH@ 1.8175

Probe ID 7E
Nozzle ID D11
Dn 0.3388 (in.)
Cp 0.834

Baro. ID BARO-04
Mano. ID 14
Pb ~~0.834~~ 29.02 "Hg
Pstatic 0.02 "H_2O

Gas Analyzer ID	NOVA 4	
O_2 %	20.3	20.0
CO_2 %	3.6	4.4
CO ppm		

Additional Notes

Operators CM
Computer ID NIG2

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source East Furnace Stack (B25)

Pollutant Hex Cr
Method 0061
Run No. 2
Date June 18/24
Times 11:17 - 12:43

Initial Pitot L.C.: ± OK @ 0.04 "H₂O
LkChk #1 (Initial) 0.001 cfm @ 5 "Hg
LkChk # (Final) 0.001 cfm @ 5 "Hg
Time on 11:17
Time off 11:57

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 12:03
Time off 12:43

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
JE	1	0.0	51.90	0.16	1.10	546	90	90			56				2.5
		2.5	53.41	0.16	1.10	548	91	90			52				2.5
	2	5.0	54.93	0.16	1.10	552	91	90			50				2.5
		7.5	56.43	0.18	1.20	547	92	90			48				2.5
	3	10.0	58.06	0.18	1.20	543	92	90			46				2.5
		12.5	59.59	0.17	1.10	573	92	90			47				2.5
	4	15.0	61.09	0.15	1.00	550	92	90			47				2.5
		17.5	62.56	0.14	0.93	550	93	90			46				2.5
	5	20.0	64.03	0.14	0.93	545	93	90			45				2.5
		22.5	65.47	0.14	0.93	541	93	90			45				2.5
	6	25.0	66.87	0.13	0.83	554	93	90			46				2.5
		27.5	68.15	0.19	~~0~~1.20	551	93	91			47				2.5
	7	30.0	69.78	0.20	1.30	546	93	91			48				2.5
		32.5	71.40	0.19	1.20	548	93	91			48				2.5
	8	35.0	73.04	0.18	1.20	554	93	91			49				2.5
		37.5	74.61	0.20	1.30	545	93	91			50				2.5
SV	1	40.0	76.22	0.12	0.78	537	91	91			50				2.5
		42.5	77.49	0.12	0.77	541	92	91			51				2.5
	2	45.0	78.75	0.12	0.78	536	93	91			52				2.5
		47.5	80.04	0.13	0.85	533	93	91			53				2.5
	3	50.0	81.35	0.13	0.85	533	93	91			54				2.5
		52.5	82.69	0.13	0.85	529	93	91			55				2.5
	4	55.0	84.01	0.13	0.85	533	93	91			55				2.5
		57.5	85.35	0.13	0.85	532	93	91			56				2.5
	5	60.0	86.69	0.16	1.00	540	93	91			57				2.5
		62.5	88.19	0.16	1.00	551	94	91			58				2.5
	6	65.0	89.64	0.15	0.96	552	94	91			54				2.5
		67.5	91.09	0.20	1.30	547	94	91			52				2.5
	7	70.0	92.67	0.20	1.30	551	95	92			50				2.5
		72.5	94.32	0.20	1.30	560	95	92			48				2.5
	8	75.0	95.92	0.20	1.30	556	95	92			49				2.5
		77.5	97.58	0.20	1.30	562	95	92			50				2.5
		80.0	99.23												

Source Dia./Dim. (in.) 17.5
Port Length (in.) 12
Assumed Moisture (%) ~~7~~ 9.19

DGM ID 14
Y 1.0047
Ko 0.7212
ΔH@ 1.8175

Probe ID 7E
Nozzle ID 011
Dn 0.3388 (in.)
Cp 0.834

Baro. ID BARO-04
Mano. ID 14
Pb 29.02 "Hg
Pstatic 0.02 "H₂O

Gas Analyzer ID NOVA 4
O₂ % 20.5 20.1
CO₂ % 4.1 4.0
CO ppm

Additional Notes

Operators CM
Computer ID 1162

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source East Furnace Stack (B25)

Pollutant Hex Cr
Method 0061
Run No. 3
Date June 18 / 24
Times 15:06 - 16:38

Initial Pitot L.C.: ± OK @ 0.01 "H2O 4
LkChk #1 (Initial) 0.001 cfm @ 5 "Hg
LkChk # (final) 0.001 cfm @ 5 "Hg
Time on 15:06
Time off 15:46

Final Pitot L.C.: ± OK @ "H2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 15:58
Time off 16:38

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
SW	1	0.0	99.76	0.14	0.90	552	98	97			46				2.5
		2.5	101.15	0.15	0.97	550	99	98			45				2.5
	2	5.0	102.56	0.15	0.97	552	99	98			42				2.5
		7.5	104.04	0.15	0.96	557	99	98			42				2.5
	3	10.0	105.46	0.15	0.97	555	100	98			43				2.5
		12.5	106.93	0.15	0.97	555	100	98			43				2.5
	4	15.0	108.37	0.15	0.97	552	101	98			44				2.5
		17.5	109.84	0.15	0.98	547	101	99			45				2.5
	5	20.0	111.31	0.15	0.96	562	101	99			46				2.5
		22.5	112.74	0.17	1.10	555	101	99			47				2.5
	6	25.0	114.31	0.20	1.30	561	101	99			49				2.5
		27.5	115.97	0.19	1.20	565	101	99			51				2.5
	7	30.0	117.52	0.20	1.30	566	101	99			52				2.5
		32.5	119.13	0.20	1.30	558	101	99			54				2.5
	8	35.0	120.83	0.20	1.30	559	161	99			56				2.5
		37.5	122.51	0.21	1.40	556	101	99			55				2.5
SE	1	40.0	124.24	0.16	1.00	547	99	99			49				2.5
		42.5	125.82	0.15	1.00	550	99	99			45				2.5
	2	45.0	127.32	0.15	0.96	560	99	99			44				2.5
		47.5	128.81	0.17	1.10	551	99	99			44				2.5
	3	50.0	130.28	0.17	1.10	548	99	98			46				2.5
		52.5	131.77	0.17	1.10	547	99	98			48				2.5
	4	55.0	133.30	0.13	0.85	543	99	98			50				2.5
		57.5	134.70	0.13	0.84	547	98	98			51				2.5
	5	60.0	136.12	0.15	0.98	544	98	98			52				2.5
		62.5	137.56	0.15	0.97	547	98	98			53				2.5
	6	65.0	139.00	0.19	1.20	551	98	98			54				2.5
		67.5	140.64	0.19	1.20	551	98	98			55				2.5
	7	70.0	142.20	0.20	1.30	544	98	97			54				2.5
		72.5	143.89	0.20	1.30	551	98	97			56				2.5
	8	75.0	145.53	0.18	1.20	562	98	97			56				2.5
		77.5	147.11	0.19	1.20	559	98	97			58				2.5
		80.0	148.720												

Source Dia./Dim. (in.) 17.5
Port Length (in.) 12
Assumed Moisture (%) → 9.1

DGM ID 14
Y 1.0047
Ko 0.7212
ΔH@ 1.8175

Probe ID 7E
Nozzle ID D11
Dn 0.3388 (in.)
Cp 0.804

Baro. ID BARO-04
Mano. ID 14
Pb 29.(8) "Hg
Pstatic 0.02 "H2O

Gas Analyzer ID NOVA 4
O₂ % 19.8 20.2
CO₂ % 4.0 4.3
CO ppm

Additional Notes

Operators CM
Computer ID NIC2

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source East Furnace Stack (B25)

Pollutant Hex Cr
Method 0061
Run No. 5
Date June 19/24
Times 10:30-11:56

Initial Pitot L.C.: ± OK @ 4 "H2O
LkChk #1 (Initial) 0.001 cfm @ 8 "Hg
LkChk # (Final) 0.001 cfm @ 8 "Hg
Time on 10:36
Time off ~~10:~~ 11:40

Final Pitot L.C.: ± OK @ "H2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 11:16
Time off 11:56

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
SE	1	0.0	94.80	0.14	0.89	546	84	83			55				2.0
		2.5	96.18	0.15	0.95	549	86	86			47				2.0
	2	5.0	97.57	0.14	0.89	547	85	83			48				2.0
		7.5	98.90	0.14	0.88	549	86	84			49				2.0
	3	10.0	100.24	0.14	0.88	553	86	84			49				2.0
		12.5	101.56	0.14	0.88	556	86	84			51				2.0
	4	15.0	102.87	0.14	0.88	556	87	84			52				2.0
		17.5	104.20	0.13	0.82	554	87	84			54				2.0
	5	20.0	105.47	0.12	0.75	555	87	84			55				2.0
		22.5	106.73	0.12	0.76	552	87	85			56				2.0
	6	25.0	107.98	0.13	0.83	545	87	85			57				2.0
		27.5	109.27	0.19	1.20	548	87	85			44				2.5
	7	30.0	110.84	0.20	1.30	546	88	85			44				2.5
		32.5	112.46	0.20	1.30	546	88	85			45				2.5
	8	35.0	114.08	0.20	1.30	543	88	86			47				1.5
		37.5	115.73	0.20	1.30	552	88	86			48				2.5
SW	1	40.0	117.37	~~0.20~~	~~1.30~~	~~553~~	~~89~~ *	86			44				2.5
		42.5	118.76	0.17	1.10	545	88	86			45				2.5
	2	45.0	120.22	0.18	1.20	538	89	87			47				2.5
		47.5	121.79	0.17	1.10	552	89	87			49				2.5
	3	50.0	123.31	0.17	1.10	551	89	87			51				2.5
		52.5	124.85	0.15	0.95	553	89	87			52				2.5
	4	55.0	126.23	0.16	1.00	549	89	87			53				2.5
		57.5	127.70	0.13	0.82	556	90	87			55				2.5
	5	60.0	128.99	0.16	1.00	550	90	87			56				2.5
		62.5	130.41	0.16	1.00	546	90	87			56				2.5
	6	65.0	131.85	0.16	1.00	549	90	88			57				2.5
		67.5	133.28	0.20	1.30	541	90	88			48				2.5
	7	70.0	134.89	0.20	1.30	540	90	88			47				2.5
		72.5	136.48	0.22	1.40	538	90	88			46				2.5
	8	75.0	138.22	0.22	1.40	539	90	88			47				2.5
		77.5	140.05	0.21	1.40	539	90	88			48				2.5
		80.0	141.66												

*0.16 1.00 551 87 86

Source Dia./Dim. (in.) 17.5
Port Length (in.) 12
Assumed Moisture (%) ~~7~~ 9%

DGM ID 14
Y 1.0047
Ko 0.7212
ΔH@ 1.8175

Probe ID 7E
Nozzle ID D11
Dn 0.3388 (in.)
Cp 0.834

Baro. ID BARO-04
Mano. ID 14
Pb 29.11 "Hg
Pstatic 0.02 "H2O

Gas Analyzer ID NOVA 4
O₂ % 20.0 20.3
CO₂ % 4.3 4.5
CO ppm

Additional Notes

Operators CM
Computer ID AN162

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source East Furnace Stack (B25)

Pollutant Hex Cr
Method 0061
Run No. 6
Date June 19/24
Times 13:29 - 14:54

Initial Pitot L.C.: ± OK @ 4 "H2O
LkChk #1 (Initial) 0.001 cfm @ 8 "Hg
LkChk # (Final) 0.001 cfm @ 8 "Hg
Time on 13:29
Time off 14:09

Final Pitot L.C.: ± OK @ "H2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 14:14
Time off 14:54

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H2O	ΔH "H2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O2 %	Gases CO2 %	Gases CO ppm	Pump Vac "Hg
SW	1	0.0	42.30	0.17	1.10	529	91	91			56				2.5
		2.5	43.84	0.17	1.10	532	92	91			44				2.5
	2	5.0	45.38	0.17	1.10	530	92	91			44				2.5
		7.5	46.92	0.18	1.20	529	93	92			45				2.5
	3	10.0	48.52	0.17	1.10	533	93	92			45				2.5
		12.5	50.07	0.17	1.10	532	93	92			46				2.5
	4	15.0	51.59	0.15	0.97	537	94	92			47				2.5
		17.5	53.04	0.14	0.91	533	94	92			48				2.5
	5	20.0	54.48	0.14	0.90	544	94	92			49				2.5
		22.5	55.87	0.15	0.97	541	94	92			50				2.5
	6	25.0	57.28	0.20	~~0~~ 1.30	535	94	92			52				2.5
		27.5	58.97	0.20	1.30	537	94	93			52				2.5
	7	30.0	60.64	0.20	1.30	540	94	93			54				2.5
		32.5	62.32	0.20	1.30	544	95	93			55				2.5
	8	35.0	63.98	0.20	1.30	551	95	93			57				2.5
		37.5	65.63	0.20	1.30	556	95	93			58				2.5
SE	1	40.0	67.28	0.13	0.84	539	94	93			43				2.5
		42.5	68.63	0.13	0.84	547	95	93			44				2.5
	2	45.0	69.97	0.13	0.84	~~540~~	95	94			45				2.5
		47.5	71.32	0.14	0.91	538	95	94			47				2.5
	3	50.0	72.73	0.14	0.91	536	95	94			48				2.5
		52.5	74.14	0.14	0.91	540	96	94			49				2.5
	4	55.0	75.51	0.14	0.90	545	96	94			50				2.5
		57.5	76.92	0.12	0.77	556	96	94			52				2.5
	5	60.0	78.23	0.13	0.84	551	96	94			53				2.5
		62.5	79.57	0.13	0.84	550	96	95			54				2.5
	6	65.0	80.87	0.13	0.83	553	96	95			55				2.5
		67.5	82.19	0.15	0.97	549	96	95			56				2.5
	7	70.0	83.59	0.14	0.96	549	97	95			56				2.5
		72.5	85.01	0.19	1.20	547	97	95			57				2.5
	8	75.0	86.57	0.19	1.20	549	97	95			57				2.5
		77.5	88.19	0.19	1.20	550	97	95			58				2.5
		80.0	89.84												

Source Dia./Dim. (in.) 17.5
Port Length (in.) 12
Assumed Moisture (%) ~~7~~ 9.8

DGM ID 14
Y 1.0047
Ko 0.7212
ΔH@ 1.8175

Probe ID 7E
Nozzle ID D11
Dn 0.3388 (in.)
Cp 0.834

Baro. ID BARO-04
Mano. ID 14
Pb 29.11 "Hg
Pstatic 0.02 "H2O

Gas Analyzer ID NOVA 4

O2 %	20.2	20.0
CO2 %	3.8	4.3
CO ppm		

Additional Notes

Operators CM
Computer ID NK2

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 M032
Client Owens Corning
Facility Guelph Glass
Source East Furnace Stack (325)

Pollutant Hex Cr
Method 0061
Run No. 7
Date June 19/24
Times 15:50 - 17:20

Initial Pitot L.C.: ± OK @ 4 "H_2O
LkChk #1 (Initial) 0.001 cfm @ 8 "Hg
LkChk # (Final) 0.001 cfm @ 5 "Hg
Time on 15:50
Time off 16:30

Final Pitot L.C.: ± OK @ "H_2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 16:40
Time off 17:20

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H_2O	ΔH "H_2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Temp. °F	Pump Vac "Hg
SE	1	0	90.30	0.12	0.77	550	97	97			58		2.0
		2.5	91.62	0.12	0.78	544	98	97			45		2.0
	2	5	92.96	0.12	0.77	554	98	97			45		2.0
		7.5	94.28	0.12	0.78	543	99	98			45		2.0
	3	10	95.54	0.12	0.78	548	99	97			46		2.0
		12.5	96.84	0.13	0.85	541	99	98			47		2.0
	4	15	98.19	0.13	0.85	542	99	98			48		2.0
		17.5	99.54	0.13	0.84	547	99	98			50		2.0
	5	20	100.89	0.13	0.85	545	99	98			51		2.0
		22.5	102.24	0.14	0.91	549	99	98			51		2.0
	6	25	103.63	0.17	1.10	549	99	98			52		2.0
		27.5	105.09	0.17	1.10	555	99	98			53		2.0
	7	30	106.57	0.17	1.10	547	99	98			54		2.0
		32.5	108.12	0.20	1.30	547	99	98			55		2.0
	8	35	109.79	0.19	1.20	555	99	98			56		2.0
		37.5	111.42	0.19	1.20	543	99	98			57		2.0
SW	1	40	113.03	0.14	0.90	554	98	98			58		2.5
		42.5	114.46	0.15	0.96	555	98	98			58		2.5
	2	45	115.94	0.15	0.97	547	98	98			44		2.5
		47.5	117.40	0.14	0.90	560	99	98			44		2.5
	3	50	118.82	0.13	0.84	555	99	98			46		2.5
		52.5	120.21	0.13	0.84	549	99	98			47		2.5
	4	55	121.55	0.13	0.84	556	99	98			49		2.5
		57.5	122.89	0.12	0.77	563	99	98			50		2.5
	5	60	124.24	0.14	0.88	575	99	98			52		2.5
		62.5	125.64	0.14	0.89	571	99	98			53		2.5
	6	65	126.97	0.13	0.82	579	99	98			54		2.5
		67.5	128.26	0.13	0.82	579	98	98			47		2.5
	7	70	129.60	0.13	0.81	584	98	98			48		2.5
		72.5	130.95	0.19	1.20	588	98	98			49		2.5
	8	75	132.54	0.21	1.30	574	98	98			51		2.5
		77.5	134.17	0.21	1.30	574	100	98			52		2.5
		80	135.80										

Source Dia./Dim. (in.) 17.5
Port Length (in.) 12
Assumed Moisture (%) 9.2

DGM ID 14
Y 1.0047
Ko 0.7212
ΔH@ 1.8175

Probe ID 7E
Nozzle ID D11
Dn 0.3388 (in.)
Cp 0.834

Baro. ID BARO-04
Mano. ID 14
Pb 29.09 "Hg
Pstatic 0.02 "H_2O

Gas Analyzer ID NOVA 4
O_2 % 20.1 20.0
CO_2 % 4.1 4.0
CO ppm

Additional Notes

Operators CM
Computer ID N162

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 1
Source: B25 E Furnace
Project No.: 032615
Date: Jun 18 2024
Recovered By: PB

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	0.5M KOH	0.5M KOH	0.5M KOH	Empty	Silica Gel
Empty weight g	503.5	421.6	433.7	435.0	------
Initial weight g	658.4	496.7	509.0	------	963.2
Final weight g	582.3	582.5	562.4	447.8	984.3
Gain g	-76.1	83.8	53.4	12.8	21.1
	150 mL	75 mL	75 mL		

Impinger gain: 73.9
Silica gain: 21.1
Total H_2O gain: 97.0g ✓

Container	1	2	3
Sample Number	032615-Cr1	032615-TCr1	032615-TCr2
	Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	57.2	28.2	
Final weight g	962.2	250.1	
Total g	905.0	221.9	
Final pH	10.0	for total chrome only	for total chrome only

Purge On: 11:30
Purge Off: 12:00

Run: 2
Source: B25 E. Furnace
Date: June 18/24
Recovered By: P.B.

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	0.5M KOH	0.5M KOH	0.5M KOH	Empty	Silica Gel
Empty weight g	525.0	437.0	437.5	438.5	------
Initial weight g	676.9	513.7	513.4	------	946.5
Final weight g	536.5	583.9	564.6	464.7	983.4
Gain g	-140.4	70.2	51.2	26.2	36.9
	150 mL	75 mL	75 mL		

Impinger gain: 7.2
Silica gain: 36.9
Total H_2O gain: 44.1 ✓

Container	1	2	3
Sample Number	032615-Cr2	032615-TCr3	032615-TCr4
	Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	56.7	28.6	
Final weight g	958.3	226.0	
Total g	901.6	197.4	
Final pH	10.0	for total chrome only	for total chrome only

Purge On: 14:05
Purge Off: 14:35

BLANKS

Date Blanks Obtained: June 18/24

	300 mL	100 mL	100 mL	300 mL
Container Number	4	5	6	4
Field Blank	0.1 M KOH	d.d. H2O	0.1 N HNO_3	0.5M KOH
Blank Sample Number	032615-Cr28	032615-Cr29	032615-TCr-35	032615-Cr30
Initial weight g	57.4	28.2	28.2	56.7
Final weight g	358.6	128.4	128.8	357.7
Total g	301.2	100.2	100.6	301.0

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 3
Source: B25 E Furnace
Project No.: 032615
Date: Jun. 18, 2024
Recovered By: P.B.

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		**0.5 M KOH**	**0.5 M KOH**	**0.5 M KOH**	Empty	Silica Gel
Empty weight	g	508.7	422.2	434.5	436.0	------
Initial weight	g	655.7	498.3	510.2	------	955.9
Final weight	g	577.3	585.4	553.2	449.6	976.8
Gain	g	-78.4	87.1	43.0	13.6	20.9
		150 mL	75 mL	75 mL		

Impinger gain: 68.3
Silica gain: 20.9
Total H_2O gain: 86.2. ✓

Container		1	2	3
Sample Number		**032615-Cr3**	**032615-TCr5**	**032615-TCr6**
		Impingers #1-4 0.5 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	56.9	27.7	
Final weight	g	936.8	180.1	
Total	g	879.9	152.4	
Final pH		10.0	for total chrome only	for total chrome only

Purge On: 17:40
Purge Off: 18:10

Run: 4
Source: B25 E Furnace
Date: Jun 19, 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		**0.5 M KOH**	**0.5 M KOH**	**0.5 M KOH**	Empty	Silica Gel
Empty weight	g	526.9	437.4	438.3	439.7	------
Initial weight	g	679.8	513.6	514.3	------	948.0
Final weight	g	546.8	597.5	563.8	482.2	968.8
Gain	g	-133.0	83.9	49.5	12.8	20.8
		150 mL	75 mL	75 mL		

Impinger gain: 12.9
Silica gain: 20.8
Total H_2O gain: 33.7 ✓

Container		1	2	3
Sample Number		**032615-Cr4**	**032615-TCr7**	**032615-TCr8**
		Impingers #1-4 0.5 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.2	27.9	
Final weight	g	897.6	260.7	
Total	g	840.4	232.8	
Final pH		10.0	for total chrome only	for total chrome only

Purge On: 10:45
Purge Off: 11:15

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 5
Source: B25 E Furnace
Project No.: 032615
Date: Jun.19, 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		**0.5 M KOH**	**0.5 M KOH**	**0.5 M KOH**	Empty	Silica Gel
Empty weight	g	505.0	422.3	434.4	435.3	------
Initial weight	g	655.6	498.3	509.7	------	956.1
Final weight	g	620.2	571.2	546.4	447.2	978.8
Gain	g	-35.4	72.9	36.7	11.9	22.7
		150 mL	75 mL	75 mL		

Impinger gain: 86.1
Silica gain: 22.7
Total H_2O gain: 108.8 ✓

Container		1	2	3
Sample Number		**032615-Cr5**	**032615-TCr9**	**032615-TCr10**
		Impingers #1-4 0.5 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.3	28.6	
Final weight	g	857.2	185.7	
Total	g	799.9	157.1	
Final pH		10.0	for total chrome only	for total chrome only

Purge On: 13:05
Purge Off: 13:35

Run: 6
Source: B25 E Furnace
Date: Jun.19, 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		**0.5 M KOH**	**0.5 M KOH**	**0.5 M KOH**	Empty	Silica Gel
Empty weight	g	528.0	438.7	438.4	439.4	------
Initial weight	g	679.0	514.2	516.8	------	959.7
Final weight	g	659.2	598.8	552.6	443.6	973.4
Gain	g	-19.8	84.6	35.8	4.2	13.7
		150 mL	75 mL	75 mL		

Impinger gain: 104.8
Silica gain: 13.7
Total H_2O gain: 118.5 ✓

Container		1	2	3
Sample Number		**032615-Cr6**	**032615-TCr11**	**032615-TCr12**
		Impingers #1-4 0.5 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.0	28.5	
Final weight	g	964.4	185.2	
Total	g	907.4	156.7	
Final pH		10.0	for total chrome only	for total chrome only

Purge On: 15:50
Purge Off: 16:20

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 7
Source: B25 E. Furn.
Project No.: 032615
Date: June 19/21
Recovered By: PB

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight g	518.8	443.6	442.4	444.8	------
Initial weight g	670.7	519.1	517.8	------	964.6
Final weight g	680.5	596.4	535.6	447.8	977.2
Gain g	9.8	76.3	17.8	3.0	12.6
	150 mL	75 mL	75 mL		

Impinger gain: 106.9 Silica gain: 12.6 Total H_2O gain: 119.5 ✓

Container	1	2	3
Sample Number	032615-Cr32	032615-TCr57	032615-TCr59
	Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	57.1	28.2	
Final weight g	902.0	192.3	
Total g	844.9	164.1	
Final pH	10.0	for total chrome only	for total chrome only

Purge On: 18:30
Purge Off: 19:00

Run: 7
Source: B24 W. Furn.
Date: June 19/21
Recovered By: PD

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight g	506.5	443.7	436.2	447.2	9------
Initial weight g	657.2	518.6	513.8	------	954.2
Final weight g	666.5	590.2	533.7	453.6	970.7
Gain g	9.3	71.6	19.9	6.4	16.5
	150 mL	75 mL	75 mL		

Impinger gain: 107.2 Silica gain: 16.5 Total H_2O gain: 123.7 ✓

Container	1	2	3
Sample Number	032615-Cr31	032615 TCr56	032615-TCr58
	Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	57.2	28.1	
Final weight g	913.3	205.4	
Total g	856.1	177.3	
Final pH	10.0	for total chrome only	for total chrome only

Purge On: 18:30
Purge Off: 19:00

BLANKS **Date Blanks Obtained:**

	300 mL	100 mL	100 mL
Container Number	4	5	6
Field Blank	0.1 M KOH	d.d. H2O	0.1 N HNO_3
Blank Sample Number			
Initial weight g			
Final weight g			
Total g			

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source Forehearth (B38)

Pollutant Hex Cr
Method 0061
Run No. 1
Date June 18, 2024
Times 8:33-9:57

Initial Pitot L.C.: ± [✓ OK] @ 4 "H₂O
LkChk #1 (Initial) 0.002 cfm @ 15 "Hg
LkChk # (final) 0.001 cfm @ 5 "Hg
Time on 8:33
Time off 9:13

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 9:17
Time off 9:57

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
West	1	0.0	62.693	0.21	~~2.16~~ 2.30	245	76	76			56				0.5
		2.5	64.835	0.22	2.40	249	77	77			55	21.3	1.2		0.5
	2	5.0	67.050	0.19	2.10	249	77	77			53				0.5
		7.5	69.210	0.19	2.05	251	77	77			53				0.5
	3	10.0	71.230	0.19	2.05	253	77	77			55				0.5
		12.5	73.300	0.19	2.05	252	78	78			56				0.0
	4	15.0	75.345	0.19	2.16	250	78	78			58				0.0
		17.5	77.425	0.19	2.10	249	78	78			59				0.0
	5	20.0	79.510	0.18	1.95	251	78	78			61				0.0
		22.5	81.498	0.18	2.00	246	78	78			62				0.0
	6	25.0	83.510	0.18	2.00	246	78	78			64				0.0
		27.5	85.535	0.18	2.00	248	78	78			65				0.0
	7	30.0	87.605	0.17	1.90	246	79	79			66				0.0
		32.5	89.525	0.18	2.00	252	79	79			67				0.0
	8	35.0	91.560	0.17	~~2.0~~ 1.90	247	79	79			67				0.0
		37.5	93.590	0.18	2.00	248	79	79			68				0.0
South	1	40.0	95.625	0.21	2.35	235	79	79			68				~~0.0~~ 0.5
		42.5	97.810	0.20	2.20	237	79	79			68				0.5
	2	45.0	99.940	0.20	2.30	231	79	79			67				0.0
		47.5	102.090	0.20	2.30	234	79	79			64	21.2	1.2		0.0
	3	50.0	104.255	0.20	2.30	237	79	79			62				0.0
		52.5	106.480	0.20	2.25	239	80	80			61				0.0
	4	55.0	108.580	0.19	2.10	243	80	80			61				0.0
		57.5	110.650	0.18	2.00	244	80	80			61				0.0
	5	60.0	112.695	0.17	1.90	245	81	81			61				0.0
		62.5	114.665	0.17	1.90	255	81	81			61				0.0
	6	65.0	116.640	0.18	2.00	260	81	81			62				0.0
		67.5	118.660	0.18	2.00	262	81	81			61				0.0
	7	70.0	120.720	0.17	1.85	251	81	81			62				0.0
		72.5	122.740	0.16	1.80	241	81	81			63				0.0
	8	75.0	124.590	0.16	1.80	241	81	81			63				0.0
		77.5	126.490	0.16	1.80	244	81	81			64				0.0
		80.0	128.383												

Source Dia./Dim. (in.) 29.5
Port Length (in.) 21
Assumed Moisture (%) 3

DGM ID 19
Y 0.9877
Ko 0.7208
ΔH@ 1.8588

Probe ID 8E
Nozzle ID E13 glass
Dn 0.3473 (in.)
Cp 0.832

Baro. ID Kam-04
Mano. ID DGM 19
Pb 28.98 "Hg
Pstatic -0.20 "H₂O

Gas Analyzer ID	Nova 4	
O_2 %	21.3	21.2
CO_2 %	1.2	1.2
CO ppm	—	—

Additional Notes

Operators MH
Computer ID N284

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source Forehearth (B38)

Pollutant Hex Cr
Method 0061
Run No. 2
Date June 18, 2024
Times 11:08 - 12:34

Initial Pitot L.C.: ± [✓ OK] @ 7 "H₂O
LkChk #1 (Initial) 0.001 cfm @ 10 "Hg
LkChk # (final) 0.001 cfm @ 5 "Hg
Time on 11:08
Time off 11:48

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 11:54
Time off 12:34

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
South	1	0.0	129.430	0.19	2.10	237	86	86			65				0.5
		2.5	131.480	0.19	2.10	242	86	86			66				0.5
	2	5.0	133.585	0.19	2.10	236	87	87			68				0.0
		7.5	135.675	0.19	2.10	238	87	87			65				0.0
	3	10.0	137.800	0.18	2.00	240	87	87			64				0.0
		12.5	139.860	0.18	2.00	236	87	87			65				0.0
	4	15.0	141.950	0.18	2.00	245	87	87			65				0.0
		17.5	143.960	0.17	1.85	249	87	87			65	21.6	1.2	—	0.0
	5	20.0	145.910	0.18	2.00	250	87	87			65				0.0
		22.5	147.920	0.18	2.00	248	87	87			64				0.0
	6	25.0	149.765	0.16	1.80	247	87	87			65				0.0
		27.5	151.890	0.17	1.80	261	87	87			65				0.0
	7	30.0	153.835	0.16	1.75	260	MH ~~87~~ 88	88			66				0.0
		32.5	155.745	0.15	1.70	233	88	88			66				0.0
	8	35.0	157.625	0.15	1.70	234	88	88			65				0.0
		37.5	159.510	0.16	1.80	238	88	88			65				0.0
West	1	40.0	161.447	0.21	2.30	257	88	88			65				0.6
		42.5	163.640	0.20	2.20	255	88	88			66				0.0
	2	45.0	165.720	0.21	2.30	254	88	88			66				~~0.0~~ 0.5
		47.5	167.930	0.21	2.25	262	88	88			65				0.5
	3	50.0	170.880	0.20	2.20	258	88	88			66				0.5
		52.5	172.235	0.19	2.05	259	88	88			66	21.4	1.3	—	0.0
	4	55.0	174.300	0.19	2.10	251	89	89			66				0.0
*176.335		57.5	*~~176.435~~ MH	0.19	2.05	253	88	88			67				0.0
	5	60.0	178.435	0.19	2.05	255	88	88			67				0.0
		62.5	180.500	0.19	2.10	256	89	89			67				0.0
	6	65.0	182.620	0.19	2.10	253	88	88			67				0.0
		67.5	184.690	0.18	~~2~~ 1.95	260	89	89			67				0.0
	7	70.0	186.725	0.19	2.05	256	89	89			67				0.0
		72.5	188.800	0.19	2.10	256	90	90			67				0.0
	8	75.0	190.880	0.18	2.00	252	89	89			67				0.0
		77.5	192.900	0.17	1.90	253	90	90			67				0.0
		80.0	194.935												

Source Dia./Dim. (in.) 29.5
Port Length (in.) 21
Assumed Moisture (%) ~~3~~ 4.5

DGM ID 19
Y 0.9877
Ko 0.7208
ΔH@ 1.8588

Probe ID 5E
Nozzle ID E13 glass
Dn 0.3475 (in.)
Cp 0.832

Baro. ID Baro-04
Mano. ID DGM #19
Pb 29.62 "Hg
Pstatic -0.19 "H₂O

Gas Analyzer ID Nova 4

O₂ %	21.6	21.4
CO₂ %	1.2	1.3
CO ppm	—	—

Additional Notes

Operators MH/TC
Computer ID N234

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source Forehearth (B38)

Pollutant Hex Cr
Method 0061
Run No. 3
Date June 18, 2024
Times 15:02 – 16:~~45~~ 25

Initial Pitot L.C.: ± [✓ OK] @ 4 "H₂O
LkChk #1 (Initial) 0.001 cfm @ 10 "Hg
LkChk # (final) 0.001 cfm @ 5 "Hg
Time on 15:02
Time off 15:42

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 15:45
Time off 16:~~46~~ ~~45~~ 25

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
West	1	0.0	196.836	0.20	2.15	265	94	94			65				0.0
		2.5	198.970	0.20	2.15	262	95	95			65				0.0
	2	5.0	201.100	0.20	2.15	270	95	95			65				0.0
		7.5	203.310	0.19	2.05	265	95	95			67				0.0
	3	10.0	205.300	0.19	2.10	267	95	95			66				0.0
		12.5	207.365	0.19	2.10	267	95	95			64				0.0
	4	15.0	209.488	0.18	1.90	267	95	95			65				0.0
		17.5	211.440	0.19	2.10	264	96	96			65				0.0
	5	20.0	213.535	0.17	1.90	265	96	96			65	21.1	1.3	~~1.5~~ MH	0.0
		22.5	215.515	0.18	2.00	256	96	96			65				0.0
	6	25.0	217.880	0.18	2.00	257	96	96			65				0.0
		27.5	219.635	0.17	1.90	259	98	98			65				0.0
	7	30.0	221.570	0.16	1.80	265	97	97			65				0.0
		32.5	223.600	0.15	1.70	256	97	97			66				0.0
	8	35.0	225.440	0.16	1.80	286	97	97			66				0.0
		37.5	227.365	0.16	1.80	259	97	97			67				0.0
South	1	40.0	229.320	0.17	1.95	253	97	97			67				0.0
		42.5	231.240	0.18	2.00	249	97	97			66				0.0
	2	45.0	233.310	0.19	2.10	255	97	97			66				0.0
		47.5	235.420	0.18	2.00	253	97	97			64				0.0
	3	50.0	237.510	0.15	1.70	258	97	97			64				0.0
		52.5	239.380	0.16	1.80	257	96	96			65				0.0
	4	55.0	241.240	0.17	1.95	252	96	96			66				0.0
		57.5	243.240	0.16	1.80	256	96	96			67				0.0
	5	60.0	245.330	0.15	1.70	262	96	96			67	21.3	1.4	—	0.0
		62.5	247.215	0.14	1.55	278	96	96			67				0.0
	6	65.0	249.010	0.16	1.80	269	95	95			67				0.0
		67.5	250.910	0.17	1.90	268	95	95			67				0.0
	7	70.0	252.850	0.16	1.80	270	95	95			68				0.0
		72.5	254.800	0.15	1.65	277	98	95			68				0.0
	8	75.0	256.660	0.14	1.50	273	95	95			68				0.0
#0.13		77.5	258.470	~~0.14~~	1.45	269	95	95			68				0.0
		80.0	260.240												

Source Dia./Dim. (in.) 29.5
Port Length (in.) 21
Assumed Moisture (%) ~~2~~ 4.5

DGM ID 19
Y 0.9877
Ko 0.7208
ΔH@ 1.8588

Probe ID 5E
Nozzle ID E13 glass
Dn 0.3473 (in.)
Cp 0.832

Baro. ID Baro-07
Mano. ID 09419
Pb 29.00 "Hg
Pstatic -0.18 "H₂O

Gas Analyzer ID Nova 4

O₂ %	21.1	21.3
CO₂ %	1.3	1.4
CO ppm	—	—

Additional Notes

Operators MH / TC
Computer ID N234

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source Fcrehearth (B38)

Pollutant Hex Cr
Method 0061
Run No. 4
Date June 19, 2024
Times 8:07 - 9:31

Initial Pitot L.C.: ± OK @ 4 "H2O
LkChk #1 (Initial) 0.001 cfm @ 10 "Hg
LkChk # (final) 0.001 cfm @ 5 "Hg
Time on 8:07
Time off 8:47

Final Pitot L.C.: ± OK @ "H2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 8:51
Time off 9:31

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H2O	ΔH "H2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O_2 %	Gases CO_2 %	Gases CO ppm	Pump Vac "Hg
South	1	0.0	263.375	0.21	2.30	230	76	76			68				0.5
		2.5	265.520	0.22	2.40	228	76	76			68				0.5
	2	5.0	267.725	0.21	2.40	231	76	76			65				0.5
		7.5	269.890	0.21	2.40	232	76	76			61	21.2	1.0	—	0.5
	3	10.0	272.080	0.21	2.35	236	76	76			59				0.5
		12.5	274.310	0.21	2.35	234	76	76			59				0.5
	4	15.0	276.490	0.21	2.30	237	76	76			59				0.5
		17.5	278.540	0.21	2.35	240	76	76			59				0.5
	5	20.0	280.740	0.19	2.10	245	77	77			59				0.0
		22.5	282.755	0.18	2.00	251	77	77			59				0.0
	6	25.0	284.760	0.19	2.10	257	77	77			58				0.0
		27.5	286.800	0.19	2.10	257	77	77			58				0.0
	7	30.0	288.840	0.18	2.05	244	77	77			57				0.0
		32.5	290.865	0.18	2.00	249	77	77			57				0.0
	8	35.0	292.900	0.18	2.00	253	77	77			57				0.0
		37.5	294.850	0.18	2.00	255	78	78			58				0.0
West	1	40.0	296.860	0.23	2.50	246	78	78			62				~~0.0~~ 0.5
		42.5	299.080	0.24	2.60	248	78	78			62				~~0.0~~ 0.5
	2	45.0	301.390	0.23	2.50	250	78	78			59				0.5
		47.5	303.620	0.23	2.60	249	78	78			59				0.5
	3	50.0	306.010	0.23	2.55	254	78	78			59				0.5
		52.5	308.120	0.23	2.55	246	78	78			60				0.5
	4	55.0	310.410	0.21	2.35	246	78	78			60				0.5
		57.5	312.650	0.21	2.35	249	78	78			61				0.5
	5	60.0	314.725	0.21	2.35	250	78	78			62				0.5
		62.5	316.910	0.21	2.30	249	78	78			62				0.5
	6	65.0	319.070	0.20	2.25	246	78	78			63	21.2	1.3	—	0.0
		67.5	321.200	0.20	2.20	251	78	78			63				0.0
	7	70.0	323.390	0.19	2.10	252	79	79			63				0.0
		72.5	325.370	0.18	2.05	244	79	79			63				0.0
	8	75.0	327.395	0.19	2.10	247	79	79			63				0.0
		77.5	329.460	0.19	2.15	245	79	79			64				0.0
		80.0	331.547												

Source Dia./Dim. (in.) 29.5
Port Length (in.) 21
Assumed Moisture (%) ~~3~~ 4.5

DGM ID 19
Y 0.9877
Ko 0.7208
ΔH@ 1.8588

Probe ID 5E
Nozzle ID E13 glass
Dn 0.3473 (in.)
Cp 0.832

Baro. ID Baro-64
Mano. ID DGM #19
Pb 29.10 "Hg
Pstatic -0.26 "H2O

Gas Analyzer ID Nova 4

O_2 %	21.2	21.2
CO_2 %	1.0	1.3
CO ppm	—	—

Additional Notes

Operators MH
Computer ID N234

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source Forehearth (B38)

Pollutant Hex Cr
Method 0061
Run No. 5
Date June 19, 2024
Times 10:23 – 11:47

Initial Pitot L.C.: ± OK @ 4 "H₂O
LkChk #1 (Initial) 0.001 cfm @ 10 "Hg
LkChk # (Final) 0.001 cfm @ 5 "Hg
Time on 10:23
Time off ~~10:~~ 11:03

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 11:07
Time off 11:47

Notes	Sample Point #	Sample Time min	DGM Volume ft^3	ΔP "H_2O	ΔH "H_2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O_2 %	Gases CO_2 %	Gases CO ppm	Pump Vac "Hg
West	1	0.0	333.935	0.22	2.40	249	80	80			65				0.5
		2.5	336.135	0.21	2.30	251	80	80			65				0.5
	2	5.0	338.325	0.21	2.30	251	80	80			60				0.5
		7.5	340.470	0.21	2.35	250	80	80			60				0.5
	3	10.0	342.650	0.21	2.30	254	81	81			55				0.5
		12.5	344.835	0.21	2.30	250	81	81			55				0.5
	4	15.0	346.985	0.20	2.25	254	81	81			57				0.0
		17.5	349.125	6.20	2.25	253	81	81			58				0.0
	5	20.0	351.260	0.19	2.10	250	81	81			58				0.0
		22.5	353.320	0.18	2.00	249	81	81			58	21.2	1.3	–	0.0
	6	25.0	355.340	0.18	2.00	247	81	81			58				0.0
		27.5	357.360	0.18	2.00	253	82	82			58				0.0
	7	30.0	359.425	0.17	2.00	204	83	83			60				0.0
		32.5	361.405	0.16	1.90	224	83	83			60				0.0
	8	35.0	363.370	0.17	2.00	225	83	83			62				0.0
		37.5	365.385	0.17	2.00	222	83	83			62				0.0
South	1	40.0	367.400	0.21	~~2.00~~	238	83	83			64				0.0
*2.35		42.5	369.880	0.21	2.40	240	83	83			64				0.0
	2	45.0	371.780	0.21	2.40	235	83	83			62				0.5
		47.5	373.940	0.21	2.40	241	84	84			61				0.5
	3	50.0	376.140	0.19	2.15	241	84	84			62				0.0
		52.5	378.235	0.18	2.05	246	84	84			63				0.0
	4	55.0	380.300	0.19	2.10	244	84	84			64				0.0
		57.5	382.350	0.19	2.15	244	84	84			64				0.0
	5	60.0	384.520	0.19	2.15	243	84	84			65				0.0
		62.5	386.590	0.17	1.90	257	85	85			65	21.4	1.4	–	0.0
	6	65.0	388.560	0.16	1.80	264	85	85			66				0.0
		67.5	390.485	0.16	1.80	260	85	85			66				0.0
	7	70.0	392.380	0.16	1.80	260	85	85			66				0.0
		72.5	394.300	0.16	1.75	268	85	85			67				0.0
	8	75.0	396.203	0.16	1.75	259	85	85			67				0.0
		77.5	398.095	0.15	1.65	267	85	85			67				0.0
		80.0	399.977												

Source Dia./Dim. (in.) 29.5
Port Length (in.) 21
Assumed Moisture (%) ~~8~~ 4.5

DGM ID 19
Y 0.9877
Ko 0.7208
ΔH@ 1.8588

Probe ID 5E
Nozzle ID E13 glass
Dn 0.3473 (in.)
Cp 0.832

Baro. ID Baro-04
Mano. ID DGM #19
Pb 29.11 "Hg
Pstatic -0.21 "H₂O

Gas Analyzer ID Nova 4

O_2 %	21.2	21.4
CO_2 %	1.3	1.4
CO ppm	–	–

Additional Notes

Operators MH/TC
Computer ID N234

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No 032615 Mob 2
Client Owens Corning
Facility Guelph Glass
Source Forehearth (B38)

Pollutant Hex Cr
Method 0061
Run No. 6
Date June 19, 2024
Times 13:25 – 14:48

Initial Pitot L.C.: ± [✓ OK] @ 5 "H₂O
LkChk #1 (Initial) 0.001 cfm @ 10 "Hg
LkChk # (final) 0.001 cfm @ 5 "Hg
Time on 13:25
Time off 14:05

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on 14:08
Time off 14:48

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
South	1	0.0	403.718	0.17	1.90	257	88	88			65				0.0
		2.5	405.710	0.18	2.00	256	88	88			65				0.0
	2	5.0	407.735	0.17	1.90	255	88	88			65				0.0
		7.5	409.725	0.18	2.00	253	88	88			67				0.0
	3	10.0	411.740	0.16	1.85	256	88	88			65				0.0
		12.5	413.690	0.18	2.00	249	89	89			65	21.3	1.1	—	0.0
	4	15.0	415.710	0.16	1.80	261	89	89			64				0.0
		17.5	417.680	0.18	2.05	252	89	89			64				0.0
	5	20.0	419.720	0.17	1.95	254	89	89			62				0.0
		22.5	421.720	0.15	1.70	268	89	89			64				0.0
	6	25.0	423.585	0.15	1.70	266	90	90			64				0.0
		27.5	425.450	0.15	1.65	269	90	90			65				0.0
	7	30.0	427.270	0.15	1.70	267	90	90			65				0.0
		32.5	429.180	0.14	1.60	267	90	90			65				0.0
	8	35.0	430.980	0.15	1.70	268	90	90			65				0.0
		37.5	432.815	0.16	1.80	271	90	90			65				0.0
West	1	40.0	434.725	0.19	2.15	258	90	90			66				0.0
		42.5	436.805	0.20	2.20	263	91	91			67				0.0
	2	45.0	439.010	0.19	2.10	268	91	91			65				0.0
		47.5	441.060	0.18	2.05	262	91	91			59				0.0
	3	50.0	443.085	0.18	2.05	261	91	91			57				0.0
		52.5	445.140	0.19	2.15	262	91	91			57				0.0
	4	55.0	447.230	0.17	1.90	267	91	91			58	21.1	1.3	–	0.0
		57.5	449.310	0.18	2.00	261	92	92			58				0.0
	5	60.0	451.210	0.18	2.05	260	92	92			57				0.0
		62.5	453.350	0.15	1.70	260	92	92			57				0.0
	6	65.0	455.260	0.17	1.95	252	92	92			57				0.0
		67.5	457.210	0.15	1.80	260	92	92			57				0.0
	7	70.0	458.915	0.17	1.95	257	92	92			56				0.0
		72.5	460.900	0.17	1.95	260	92	92			56				0.0
	8	75.0	462.915	0.17	1.90	260	92	92			56				0.0
		77.5	464.950	0.16	1.90	255	93	93			56				0.0
		80.0	466.880												

Source Dia./Dim. (in.) 29.5
Port Length (in.) 21
Assumed Moisture (%) ~~3~~ 4.5

DGM ID 19
Y 0.9877
Ko 0.7208
ΔH@ 1.8588

Probe ID 5E
Nozzle ID E13 glass
Dn 0.3473 (in.)
Cp 0.832

Baro. ID Baro-04
Mano. ID DGM #19
Pb 29.11 "Hg
Pstatic −0.21 "H₂O

Gas Analyzer ID Nova 4

O₂ %	21.3	21.1
CO₂ %	1.1	1.3
CO ppm	—	—

Additional Notes

Operators MH
Computer ID N234

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 1
Project No.: 032615
Source: B38 Forehearth
Date: Jun. 18, 2024
Recovered By: PB.

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	516.6	441.6	441.4	443.2	------
Initial weight	g	668.0	517.4	517.9	------	973.9
Final weight	g	651.4	553.8	534.2	453.1	994.5
Gain	g	-16.6	36.4	16.3	9.9	20.6
		150 mL	75 mL	75 mL		

Impinger gain: 46.0
Silica gain: 20.6
Total H_2O gain: 66.6 g ✓

Container		1	2	3
Sample Number		**032615-Cr13**	**032615-TCr25**	**032615-TCr26**
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.5	28.5	
Final weight	g	992.5	298.8	
Total	g	935.0	270.3	
Final pH		9.5	for total chrome only	for total chrome only

Purge On: 11:00
Purge Off: 11:30

Run: 2
Source: B38 Forehearth
Date: Jun. 18, 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	532.0	424.7	424.0	438.7	------
Initial weight	g	683.4	499.8	499.5	------	954.1
Final weight	g	663.9	546.3	515.0	450.2	969.8
Gain	g	-19.5	46.5	15.5	11.5	15.7
		150 mL	75 mL	75 mL		

Impinger gain: 54.0
Silica gain: 15.7
Total H_2O gain: 69.7 g ✓

Container		1	2	3
Sample Number		**032615-Cr14**	**032615-TCr27**	**032615-TCr28**
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	56.8	28.1	
Final weight	g	913.8	199.3	
Total	g	857.0	171.2	
Final pH		9.5	for total chrome only	for total chrome only

Purge On: 14:05
Purge Off: 14:35

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 3
Source: B38 Forehearth
Project No.: 032615
Date: Jun.18, 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	517.6	442.6	443.4	444.5	------
Initial weight	g	670.4	520.8	519.5	------	981.8
Final weight	g	659.7	558.2	530.7	451.0	1002.6
Gain	g	-10.7	37.4	11.2	6.5	20.8
		150 mL	75 mL	75 mL		

Impinger gain: 44.4
Silica gain: 20.8
Total H_2O gain: 65.2 ✓

Container		1	2	3
Sample Number		**032615-Cr15**	**032615-TCr29**	**032615-TCr30**
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.0	28.7	
Final weight	g	887.4	202.9	
Total	g	830.4	174.2	
Final pH		9.0	for total chrome only	for total chrome only

Purge On: 17:20
Purge Off: 17:50

Run: 4
Source: B38 Forehearth
Date: Jun.19, 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	533.6	425.2	424.5	439.0	------
Initial weight	g	684.7	500.8	500.6	------	970.5
Final weight	g	672.4	551.9	515.0	444.6	988.2
Gain	g	-12.3	51.1	14.4	5.6	17.7
		150 mL	75 mL	75 mL		

Impinger gain: 58.8
Silica gain: 17.7
Total H_2O gain: 76.5 ✓

Container		1	2	3
Sample Number		**032615-Cr16**	**032615-TCr31**	**032615-TCr32**
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.2	28.0	
Final weight	g	898.5	183.6	
Total	g	841.3	155.6	
Final pH		9.0	for total chrome only	for total chrome only

Purge On: 10:09
Purge Off: 10:39

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 5
Source: B38 Forehearth
Project No.: 032615
Date: Jun. 19, 2024
Recovered By: PrB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	518.2	442.9	442.3	444.3	------
Initial weight	g	668.8	518.6	519.3	------	946.0
Final weight	g	649.5	554.2	531.1	449.7	986.7
Gain	g	-19.3	35.6	11.8	54	40.7
		150 mL	75 mL	75 mL		

Impinger gain: 33.5
Silica gain: 40.7
Total H2O gain: ~~54.2~~ 74.2 ✓ MB

Purge On: 12:30
Purge Off: 13:00

Container		1	2	3
Sample Number		**032615-Cr17**	**032615-TCr33**	**032615-TCr34**
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.3	28.6	
Final weight	g	836.5	181.0	
Total	g	779.2	152.4	
Final pH		9.0	for total chrome only	for total chrome only

Run: 6
Source: B38 Forehearth
Date: Jun. 19, 2024
Recovered By: PB.

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	535.2	425.5	424.8	439.4	------
Initial weight	g	691.2	503.4	499.9	------	950.5
Final weight	g	663.8	534.6	509.8	445.3	967.4
Gain	g	-27.4	31.2	9.9	5.9	16.9
		150 mL	75 mL	75 mL		

Impinger gain: 19.6
Silica gain: 16.9
Total H2O gain: 36.5 ✓

Purge On: 16:25
Purge Off: 16:55

Container		1	2	3
Sample Number		**032615-Cr18**	**032615-TCr35**	**032615-TCr36**
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.9	28.2	
Final weight	g	874.4	204.1	
Total	g	816.5	175.9	
Final pH		9.0	for total chrome only	for total chrome only

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

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STACK SAMPLING FIELD DATA SHEET

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Project No. 032615
Client Owens Corning
Facility Guelph Glass
Source **ROOF VENT ID:** B33

Pollutant Hex Cr
Method 0061
Run No. 1
Date June 15 2022
Times 7:42 - 14:43

Initial Pitot L.C.: ± OK @ "H₂O
LkChk #1 (Initial) 0.001 cfm @ 5 "Hg
LkChk # (f.l) 0.001 cfm @ 5 "Hg
Time on 7:42
Time off 14:43

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on
Time off

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
	1	0	925.72		1.90		88	82			60				3.0
		30	948.78		1.90		93	84			65				3.0
	1hr	110	1011.57		1.90		100	91			59				3.0
	50	215	1093.42		1.90		104	96			63				3.0
		421	1253.304		1.90		108	102			68				

Source Dia./Dim. (in.)
Port Length (in.)
Assumed Moisture (%)

DGM ID 17
Y 0.9985
Ko 0.7,07
ΔH@ 1.9034

Probe ID
Nozzle ID
Dn (in.)
Cp

Baro. ID 04
Mano. ID
Pb 28.98 "Hg
Pstatic "H₂O

Gas Analyzer ID
O₂ % 20.9
CO₂ % 0
CO ppm

Additional Notes

Operators
Computer ID

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615
Client Owens Corning
Facility Guelph Glass
Source **ROOF VENT ID:** 833

Pollutant Hex Cr
Method 0061
Run No. 2
Date June 19, 2024
Times 7:30 - 14:31

Initial Pitot L.C.: ± OK @ "H_2O
LkChk #1 (Initial) 0.001 cfm @ 10 "Hg
LkChk # (final) 0.001 cfm @ 5 "Hg
Time on 7:30
Time off 1431

Final Pitot L.C.: ± OK @ "H_2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on
Time off

Notes	Sample Point #	Sample Time min	DGM Volume ft^3	ΔP "H_2O	ΔH "H_2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O_2 %	Gases CO_2 %	Gases CO ppm	Pump Vac "Hg
	1	0	255.795		1.9		82	81			68				1.5
		45	288.645		1.9		94	85			55				2.0
		140	363.825		1.9		100	91			64				2.5
		296	486.525		1.9		105	98			63				2.5
		342	522.495		1.9		107	99			68				2.5
		421	584.93		1.9		110	104			72				2.5

Source Dia./Dim. (in.)
Port Length (in.)
Assumed Moisture (%)

DGM ID 17
Y 0.9985
Ko 0.7107
$\Delta H_@$ 1.9034

Probe ID ~~29.08~~
Nozzle ID
Dn (in.)
Cp

Baro. ID 04
Mano. ID
Pb 29.08 "Hg
Pstatic "H_2O

Gas Analyzer ID
O_2 % 20.9
CO_2 % 0
CO ppm

Additional Notes

Operators
Computer ID

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615
Client Owens Corning
Facility Guelph Glass
Source **ROOF VENT ID:** B33

Pollutant Hex Cr
Method 0061
Run No. 3
Date June 21 2024
Times 7:52 - 14:52

Initial Pitot L.C.: ± OK @ "H_2O
LkChk #1 (Initial) 0.000 cfm @ 5 "Hg
LkChk # (Final) 0.000 cfm @ 5 "Hg
Time on 7:52
Time off 14:52

Final Pitot L.C.: ± OK @ "H_2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on
Time off

Notes	Sample Point #	Sample Time min	DGM Volume ft^3	ΔP "H_2O	ΔH "H_2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O_2 %	Gases CO_2 %	Gases CO ppm	Pump Vac "Hg
	1	0	585.95		1.90		70	68			64				2.5
		60	632.79		1.90		90	80			64				3.0
		122	687.77		1.90		96	87			64				3.0
		230	766.40		1.90		102	94			64				3.0
		350	860.175		1.90		107	99			68				3.0
		420	915.111		1.90		108	101			64				3.0

Source Dia./Dim. (in.)
Port Length (in.)
Assumed Moisture (%)

DGM ID 17
Y 0.9985
Ko 0.7107
$\Delta H_@$ 1.7034

Probe ID
Nozzle ID
Dn (in.)
Cp

Baro. ID 04
Mano. ID
Pb 29.15 "Hg
Pstatic "H_2O

Gas Analyzer ID
O_2 % 20.9
CO_2 % 0
CO ppm

Additional Notes

Operators
Computer ID

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 1
Source: B33 Roof Vent
Project No.: 032615
Date: Jun. 18, 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	526.2	433.4	441.0	434.1	------
Initial weight	g	677.9	508.7	516.0	------	955.4
Final weight	g	602.5	569.3	577.8	466.6	1028.4
Gain	g	-75.4	60.6	61.8	32.5	73.0
		150 mL	75 mL	75 mL		

Impinger gain: 79.5
Silica gain: 73.0
Total H_2O gain: 152.5 ✓

Container		1	2	3
Sample Number		**032615-Cr22**	**032615-TCr43**	**032615-TCr44**
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.3	22.9	
Final weight	g	942.4	192.6	
Total	g	885.1	169.7	
Final pH		10.5	for total chrome only	for total chrome only

Purge On: 17:09
Purge Off: 17:39

Run: 2
Source: B33 Roof Vent
Date: Jun. 19, 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	495.5	426.3	436.3	436.1	------
Initial weight	g	646.0	501.6	512.2	------	968.8
Final weight	g	579.1	560.8	532.1	460.5	1048.9
Gain	g	-66.9	59.2	19.9	24.4	80.1
		150 mL	75 mL	75 mL		

Impinger gain: 36.6
Silica gain: 80.1
Total H_2O gain: 116.7 ✓

Container		1	2	3
Sample Number		**032615-Cr23**	**032615-TCr45**	**032615-TCr46**
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	56.5	28.4	
Final weight	g	859.1	197.2	
Total	g	802.6	168.8	
Final pH		9.5	for total chrome only	for total chrome only

Purge On: 15:30
Purge Off: 16:00

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 3
Source: B33 Roof Vent
Project No.: 032615
Date: Jun. 20, 2024
Recovered By: PB

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight g	530.0	434.5	442.1	435.0	------
Initial weight g	680.5	510.6	517.8	------	949.6
Final weight g	632.1	570.3	571.0	449.5	1020.2
Gain g	-48.4	59.7	53.2	14.5	70.6
	150 mL	75 mL	75 mL		

Impinger gain: 79.0
Silica gain: 70.6
Total H_2O gain: 149.6 ✓

Container	1	2	3
Sample Number	**032615-Cr24**	**032615-TCr47**	**032615-TCr48**
	Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	56.6	27.8	
Final weight g	955.9	203.9	
Total g	903.3	176.1	
Final pH	9.5	for total chrome only	for total chrome only

Purge On: 15:45
Purge Off: 16:15

Run:
Source:
Date:
Recovered By:

	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents	0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight g					------
Initial weight g				------	
Final weight g					
Gain g					
	150 mL	75 mL	75 mL		

Impinger gain:
Silica gain:
Total H_2O gain:

Container	1	2	3
Sample Number			
	Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g			
Final weight g			
Total g			
Final pH		for total chrome only	for total chrome only

Purge On:
Purge Off:

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

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STACK SAMPLING FIELD DATA SHEET

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Project No. 032615
Client Owens Corning
Facility Guelph Glass
Source **ROOF VENT ID:** B34

Pollutant Hex Cr
Method 0061
Run No. 1
Date Jun 18 2024
Times 7:38 - 14:38

Initial Pitot L.C.: ± ~~OK @~~ "H_2O
LkChk #1 (Initial) 0.000 cfm @ 5 "Hg
LkChk # (final) 0.003 cfm @ 5 "Hg
Time on 7:38
Time off 14:38

Final Pitot L.C.: ± OK @ "H_2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on
Time off

Notes	Sample Point #	Sample Time min	DGM Volume ft^3	ΔP "H_2O	ΔH "H_2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O_2 %	Gases CO_2 %	Gases CO ppm	Pump Vac "Hg
	1	0	455.39		1.80		90	88			60				0.5
		30	478.54		1.80		97	92			59				2.5
	16	115	545.72		1.80		103	98			63				2.5
	55	200	613.98		1.80		109	105			68				2.0
		420	782.59		1.80		109	105			68				2.0

Source Dia./Dim. (in.)
Port Length (in.)
Assumed Moisture (%)

DGM ID 11
Y 1.0353
Ko 0.7584
ΔH@ 1.7157

Probe ID
Nozzle ID
Dn (in.)
Cp

Baro. ID 04
Mano. ID
Pb 28.98 "Hg
Pstatic "H_2O

Gas Analyzer ID
O_2 % 20.9
CO_2 % 0
CO ppm

Additional Notes

Operators
Computer ID

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615
Client Owens Corning
Facility Guelph Glass
Source **ROOF VENT ID:** 134

Pollutant Hex Cr
Method 0061
Run No. 2
Date Jun 19/2024
Times 7:27 - 14:27

Initial Pitot L.C.: ± OK @ "H_2O
LkChk #1 (Initial) 0.001 cfm @ 10 "Hg
LkChk # (final) 0.001 cfm @ 5 "Hg
Time on 7:27
Time off 14:27

Final Pitot L.C.: ± OK @ "H_2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on
Time off

Notes	Sample Point #	Sample Time min	DGM Volume ft^3	ΔP "H_2O	ΔH "H_2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O_2 %	Gases CO_2 %	Gases CO ppm	Pump Vac "Hg
		0	782.9		1.7		84	83			60				2
		45	81655		1.7		90	87			62				4
		140	885.65		1.7		96	91			69				4
		296	1007.96		1.7		101	97			65				4
		342	1043.5		1.7		121	98			71				4
		470	1103.546		1.7		124	100			70				4

Source Dia./Dim. (in.)
Port Length (in.)
Assumed Moisture (%)

DGM ID 11
Y 1.0353
Ko 0.7584
ΔH@ 1.7157

Probe ID —
Nozzle ID —
Dn — (in.)
Cp —

Baro. ID 04
Mano. ID
Pb 29.08 "Hg
Pstatic "H_2O

Gas Analyzer ID
O_2 % 20.9
CO_2 % 0
CO ppm

Additional Notes

Operators MM
Computer ID

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STACK SAMPLING FIELD DATA SHEET

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Project No. 032615
Client Owens Corning
Facility Guelph Glass
Source ROOF VENT ID: B34

Pollutant Hex Cr
Method 0061
Run No. 3
Date June 20 2024
Times 7:35-14:35

Initial Pitot L.C.: ± OK @ "H_2O
LkChk #1 (Initial) 0.001 cfm @ 10 "Hg
LkChk # ( ) .001 cfm @ 10 "Hg
Time on 7:35
Time off 14:35

Final Pitot L.C.: ± OK @ "H_2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on
Time off

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H_2O	ΔH "H_2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O_2 %	Gases CO_2 %	Gases CO ppm	Pump Vac "Hg
	1	0	104.40		1.70		68	68			63				2.5
		70	155.99		1.70		80	85			63				2.5
		134	204.51		1.70		93	89			64				
		242	286.60		1.70		96	92			66				3.0
	362	[illegible]	370.93		1.70		102	98			59				3.0
		420	419.344		1.70		104	100			64				3.0

Source Dia./Dim. (in.)
Port Length (in.)
Assumed Moisture (%)

DGM ID 17
Y 1.0353
Ko 0.7584
$\Delta H_@$ 1.7152

Probe ID /
Nozzle ID
Dn (in.)
Cp

Baro. ID 04
Mano. ID
Pb 29.15 "Hg
Pstatic "H_2O

Gas Analyzer ID
O_2 % 20.9
CO_2 % 0
CO ppm

Additional Notes

Operators
Computer ID

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 1
Source: B34 Roof Vent
Project No.: 032615
Date: Jun. 18, 2024
Recovered By: PB.

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	509.4	438.8	434.7	434.1	------
Initial weight	g	659.6	515.3	510.6	------	983.9
Final weight	g	552.1	518.2	561.4	486.7	1130.4
Gain	g	-107.5	2.9	50.8	52.6	146.5
		150 mL	75 mL	75 mL		

Impinger gain: -1.2
Silica gain: 146.5
Total H_2O gain: 145.3 ✓

Container	1	2	3
Sample Number	**032615-Cr25**	**032615-TCr49**	**032615-TCr50**
	Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	56.8	27.8	
Final weight g	922.4	196.8	
Total g	865.6	169.0	
Final pH	10.5	for total chrome only	for total chrome only

Purge On: 17:09
Purge Off: 17:39

Run: 2
Source: B34 Roof Vent
Date: Jun. 19, 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	526.2	437.5	437.9	439.4	------
Initial weight	g	677.0	513.0	514.1	472.8	940.8
Final weight	g	616.3	550.4	558.5	~~[illegible]~~ PB	~~1130.4~~ PB 1021.0
Gain	g	-60.7	37.4	44.4	33.4	80.2
		150 mL	75 mL	75 mL		

Impinger gain: 54.5
Silica gain: 80.2
Total H_2O gain: 134.7 ✓

Container	1	2	3
Sample Number	**032615-Cr26**	**032615-TCr51**	**032615-TCr52**
	Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight g	57.3	28.7	
Final weight g	819.6	186.9	
Total g	762.3	158.2	
Final pH	9.0	for total chrome only	for total chrome only

Purge On: 16:10
Purge Off: 16:40

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 3
Source: B34 Roof Vent
Project No.: 032615
Date: Jun. 20 , 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	511.3	439.5	436.2	435.3	------
Initial weight	g	663.4	515.6	512.6	------	953.2
Final weight	g	573.4	539.2	566.8	469.2	1072.8
Gain	g	-89.8	23.6	54.2	33.9	119.6
		150 mL	75 mL	75 mL		

Impinger gain: 21.9
Silica gain: 119.6
Total H_2O gain: 141.5g ✓

Container		1	2	3
Sample Number		032615-Cr27	032615-TCr53	032615-TCr54
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.3	28.1	
Final weight	g	877.2	186.7	
Total	g	819.9	158.6	
Final pH		9.0	for total chrome only	for total chrome only

Purge On: 15:45
Purge Off: 16:15

Run:
Source:
Date:
Recovered By:

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g					------
Initial weight	g				------	
Final weight	g					
Gain	g					
		150 mL	75 mL	75 mL		

Impinger gain:
Silica gain:
Total H_2O gain:

Container		1	2	3
Sample Number				
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g			
Final weight	g			
Total	g			
Final pH			for total chrome only	for total chrome only

Purge On:
Purge Off:

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615
Client Owens Corning
Facility Guelph Glass
Source **ROOF VENT ID:** C29

Pollutant Hex Cr
Method 0061
Run No. 1
Date Dec 15 2019
Times 7:28 - 14:28

Initial Pitot L.C.: ± ~~OK @ "H₂O~~
LkChk #1 (Initial) 0.003 cfm @ 5 "Hg
LkChk # (Final) 0.003 cfm @ 5 "Hg
Time on 7:28
Time off 14:28

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on
Time off

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
	1	0	188.815	—	1.90	—	87	86	—		64	—	—	—	3.0
		30	191.29		1.90		94	87			65				3.0
		120	266.38		1.90		98	91			64				3.0
	[illegible]	250	355.035		1.90		101	95			67				3.3
		420	484.04		1.90		109	102			68				

Source Dia./Dim. (in.) /
Port Length (in.) /
Assumed Moisture (%) /

DGM ID 20
Y 0.9897
Ko 0.7005
ΔH@ 1.9194

Probe ID /
Nozzle ID /
Dn / (in.)
Cp /

no probe or nozzle

Baro. ID 04
Mano. ID 20
Pb 28.98 "Hg
Pstatic — "H₂O

Gas Analyzer ID —
O₂ % 20.9
CO₂ % 0
CO ppm

Additional Notes

Operators
Computer ID —

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615
Client Owens Corning
Facility Guelph Glass
Source **ROOF VENT ID:** C9

Pollutant Hex Cr
Method 0061
Run No. 2
Date June 19 2024
Times 7:29 -14:29

Initial Pitot L.C.: ± OK @ "H2O
LkChk #1 (Initial) 0.000 cfm @ 5 "Hg
LkChk # (final) 0.000 cfm @ 4 "Hg
Time on 7:29
Time off 14:29

Final Pitot L.C.: ± OK @ "H2O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on
Time off

Notes	Sample Point #	Sample Time min	DGM Volume ft³	ΔP "H₂O	ΔH "H₂O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp. °F	Imp. Out Temp. °F	Gases O₂ %	Gases CO₂ %	Gases CO ppm	Pump Vac "Hg
	1	0	484.205		1.90		87	81			61				4.0
		40	513.925		1.90		94	88			62				4.5
		138	558.20		1.90		100	93			68				4.5
		320	773.915		1.90		109	102			68				4.5
		420	798.739		1.90		112	105			70				4.5

Source Dia./Dim. (in.)
Port Length (in.)
Assumed Moisture (%)

DGM ID 20
Y 0.9897
Ko 0.7005
ΔH@ 1.9,98

Probe ID
Nozzle ID
Dn (in.)
Cp

Baro. ID 04
Mano. ID
Pb 29.08 "Hg
Pstatic "H2O

Gas Analyzer ID
O2 % 20.9
CO2 % 0
CO ppm

Additional Notes

Operators
Computer ID

Montrose Environmental Group Ltd.

STACK SAMPLING FIELD DATA SHEET

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Project No. 032615
Client Owens Corning
Facility Guelph Glass
Source **ROOF VENT ID:** C28

Pollutant Hex Cr
Method 0061
Run No. 3
Date Jun 25 2024
Times 7:58 - 15:02

Initial Pitot L.C.: ± OK @ "H₂O
LkChk #1 (Initial) 0.000 cfm @ 5 "Hg
LkChk # (final) 0.000 cfm @ 5 "Hg
Time on 7:58
Time off 15:02

Final Pitot L.C.: ± OK @ "H₂O
LkChk # ( ) cfm @ "Hg
LkChk # ( ) cfm @ "Hg
Time on
Time off

Notes	Sample Point #	Sample Time min	DGM Volume ft^3	ΔP "H_2O	ΔH "H_2O	Stack Temp. °F	Meter Temperature In °F	Meter Temperature Out °F	Probe Temp. °F	Oven Temp °F	Imp. Out Temp. °F	Gases O_2 %	Gases CO_2 %	Gases CO ppm	Pump Vac "Hg
	1	0	802.425		1.90		78	78			54				3.0
	60	[illegible]	845.53		1.90		92	84			57				3.0
		220	963.65		1.90		101	94			58				3.0
		347	1057.043		1.90		103	97			57				3.0
		424	1113.30		1.90		106	100			65				3.0

Source Dia./Dim. (in.) /
Port Length (in.) /
Assumed Moisture (%)

DGM ID 27
Y 0.9897
Ko 07005
ΔH@ 1.9198

Probe ID /
Nozzle ID
Dn (in.)
Cp

Baro. ID 04
Mano. ID —
Pb 29.15 "Hg
Pstatic — "H₂O

Gas Analyzer ID
O_2 % 20.9
CO_2 % 0
CO ppm

Additional Notes

Operators
Computer ID

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 1
Source: C79 Roof Vent
Project No.: 032615
Date: Jun. 18, 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	506.3	416.2	427.0	439.1	------
Initial weight	g	656.8	493.8	504.2	------	909.8
Final weight	g	627.9	559.8	505.3	476.7	975.5
Gain	g	-28.9	66.0	1.1	37.6	65.7
		150 mL	75 mL	75 mL		

Impinger gain: 75.8
Silica gain: 65.7
Total H_2O gain: 141.5 ✓

Container		1	2	3
Sample Number		**032615-Cr19**	**032615-TCr37**	**032615-TCr38**
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.5	28.0	
Final weight	g	997.0	189.6	
Total	g	939.5	161.6	
	Final pH	10.5	for total chrome only	for total chrome only

Purge On: 17:09
Purge Off: 17:59

Run: 2
Source: C79 Roof Vent
Date: Jun. 19, 2024
Recovered By: PB

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	525.5	437.2	438.6	439.3	------
Initial weight	g	676.9	516.3	516.6	------	988.1
Final weight	g	612.1	553.7	567.7	469.3	1057.8
Gain	g	-64.8	37.4	51.1	30.0	69.7
		150 mL	75 mL	75 mL		

Impinger gain: 53.7
Silica gain: 69.7
Total H_2O gain: 123.4 ✓

Container		1	2	3
Sample Number		**032615-Cr20**	**032615-TCr39**	**032615-TCr40**
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	56.8	28.1	
Final weight	g	898.9	204.0	
Total	g	842.1	175.9	
	Final pH	9.0	for total chrome only	for total chrome only

Purge On: 16:50
Purge Off: 16:20

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Method 0061 (Hexavalent Chromium) - Recovery Sheet

Run: 3
Project No.: 032615
Source: C79 Roof Vent
Date: Jun. 20, 2024
Recovered By: P.D

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g	508.7	417.0	427.7	440.9	------
Initial weight	g	659.0	492.3	503.4	------	967.6
Final weight	g	631.9	538.0	537.0	461.1	1033.4
Gain	g	-27.1	45.7	33.6	20.2	65.8
		150 mL	75 mL	75 mL		

Impinger gain: 72.4
Silica gain: 65.8
Total H_2O gain: 138.2g ✓

Container		1	2	3
Sample Number		**032615-Cr21**	**032615-TCr41**	**032615-TCr42**
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g	57.5	28.9	113.5
Final weight	g	906.5	184.8	
Total	g	849.0	155.9	
	Final pH	9.0	for total chrome only	for total chrome only

Purge On: 1555
Purge Off: 1625

Run:
Source:
Date:
Recovered By:

		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5
Contents		0.1 M KOH	0.1 M KOH	0.1 M KOH	Empty	Silica Gel
Empty weight	g					------
Initial weight	g				------	
Final weight	g					
Gain	g					
		150 mL	75 mL	75 mL		

Impinger gain:
Silica gain:
Total H_2O gain:

Container		1	2	3
Sample Number				
		Impingers #1-4 0.1 M KOH + H2O	Train Rinse 0.1 N HNO_3	Filter Jar
Initial weight	g			
Final weight	g			
Total	g			
	Final pH		for total chrome only	for total chrome only

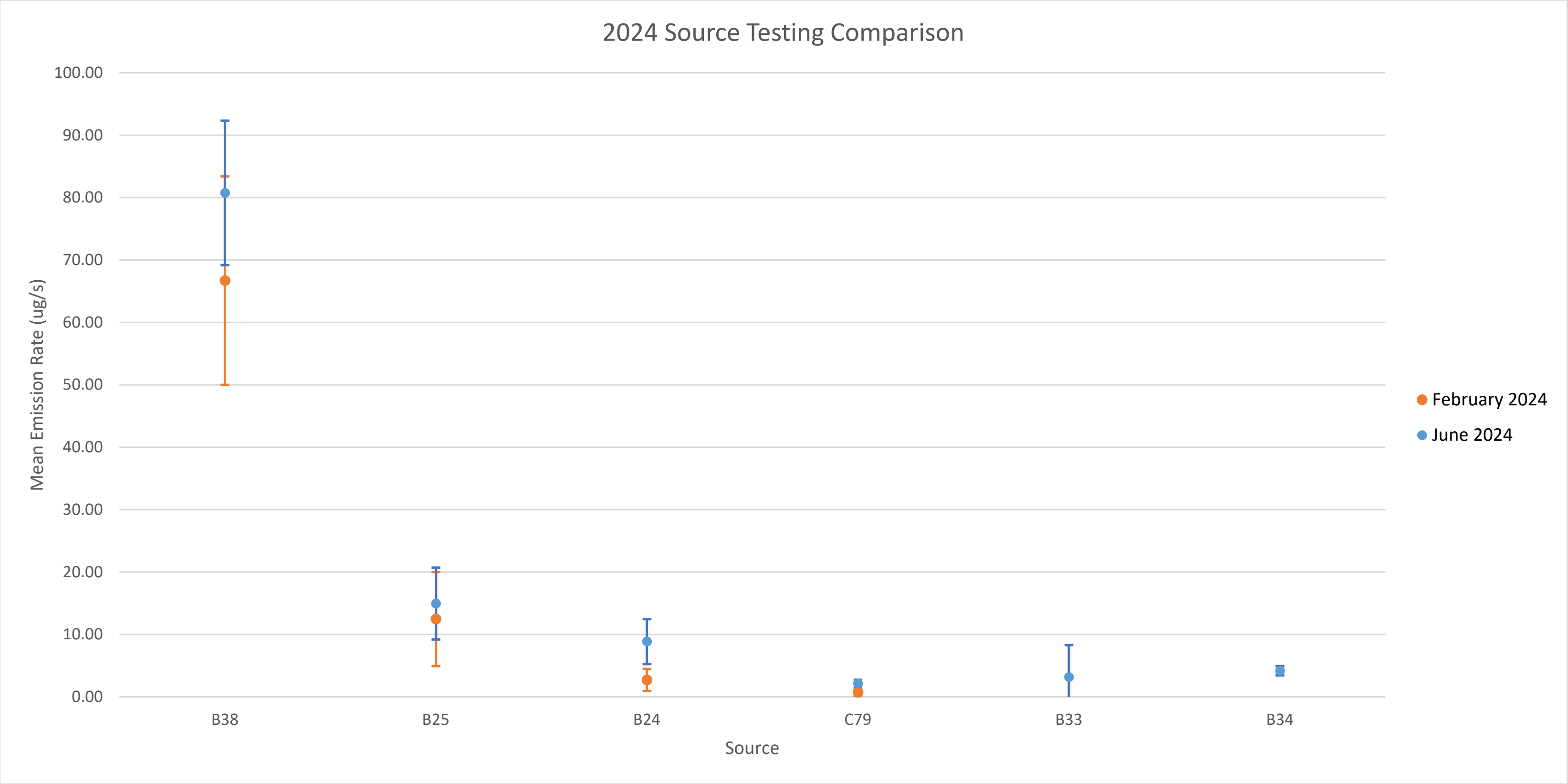
Purge On:
Purge Off:

- maintain all liquid samples and blanks above a pH of 8.5
- refrigerate samples
- purge train @ 10 L/min for 30 minutes

Appendix G

Process and Production Data (Provided Separately)

End of Document



February 2024 source testing data is available but has not been used for this report.

Engineering Report

Owens Corning – Guelph Composites Roof Exhaust Fans Airflow Testing

December 20, 2019

Prepared For:

Owens Corning
Guelph, ON
Mr. Jordan Sloan
Customer Reference P.O. No.: 4512493781

Prepared By:

FLOWCARE Engineering Inc.
Cambridge, Ontario, Canada
Steven G. Kaufman, P.Eng
Pankaj P. Rasal, M.Eng
FLOWCARE Reference Job # A156619

File a1566R1r0 – Owens Corning Roof Exhauster Flow Test.docx

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4. Conclusions 5
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1. Background

The Owens Corning Guelph Plant has installed VFDs to control their roof exhaust fans and has contracted FLOWCARE Engineering Inc. to determine the airflow rate from the fans. This is required for an environmental compliance evaluation which is being undertaken by the plant. Four roof exhausters are affected, two which have silencers and two without silencers

The roof exhauster fans are VFD controlled and have 8 speed settings at even frequency increments between 35.5 Hz and 60 Hz (i.e. every 3.5 Hz increment). The fans also have a butterfly damper that opens when the fan is running.

One roof exhauster of each configuration was tested on December 17, 2019 to determine exhaust airflow at several fan speed settings.

2. Test Plan

The two exhaust fans were each tested at all eight (8) speed settings. The following field measurement data was collected for the site tests.

- Fan inlet static pressure – Absolute pressure readings were taken inside the plant in the general vicinity of the inlet to the exhauster and outside the plant beside the roof exhauster.
- Wet and dry bulb temperature - Temperature of the exhaust flow was measured at the outlet test plane.
- Flow – The air flow velocity at the outlet of the exhauster was measured with a TSI VelociCalc anemometer. The distribution of velocity measurement traverse points over the cross section of the outlet was in accordance with standard measurement procedures specified in AMCA 203-90(R2007) and as illustrated in Figure 1. The volume flow rate was calculated using the average of the measured velocity, multiplied by the cross-sectional area of the 62 in. diameter exhauster outlet.

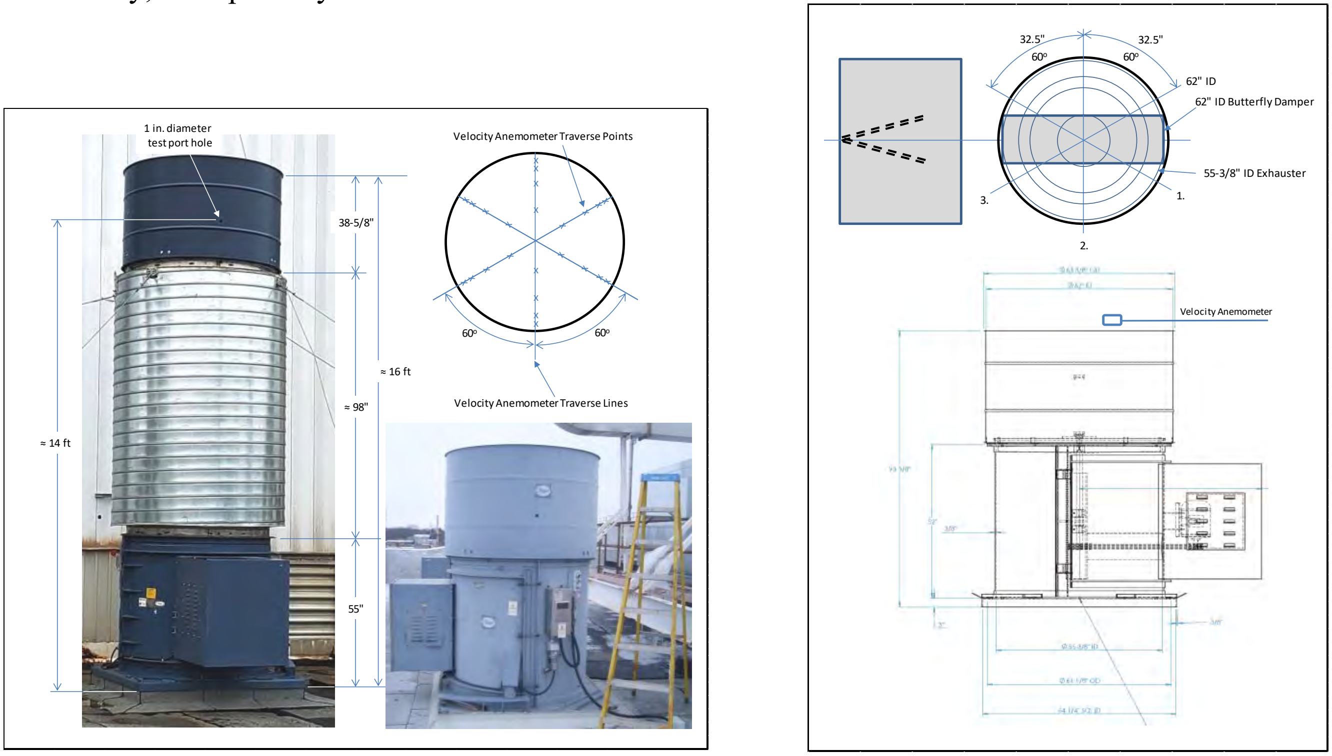

Figure 1: Illustration of the Two Roof Exhausters Tested

3. Test Results

The field test data is provided in Appendix I

3.1. Comparison of Flow for Exhauster with and without Silencer

A summary of field-tested results of both exhausters is provided in Table 1.

Table 1: Measured Flow Rates of Both Exhausters

VFD Frequency	Measured Flow rate (Without Silencer)	Measured Flow rate (With Silencer)	Ratio of measured flow rates
(Hz)	CFM	CFM	(without silencer)/(with silencer)
60	48,419	48421	1.00
56.5	45,290	45614	0.99
53	42,111	42167	1.00
49.5	39,832	38994	1.02
46	36,617	36133	1.01
42.5	33,371	32315	1.03
39	32,911	33995	0.97
35.5	27,497	29821	0.92

The volume flow rates for the exhausters with and without the silencer are approximately equally.

Note - It is reasonable to assume a 10 to 15 percent uncertainty in the flow measurement as it is very difficult to achieve high accuracy field measurements for an open inlet / open outlet roof exhauster fan arrangement. Factors influencing the flow measurement uncertainty include:

i) The velocity profile at the outlet of the exhauster is not uniform.
ii) The velocity and direction of wind immediately above the outlet of the fan may affect the flow.
iii) The butterfly damper blades may not be fully open at low flows, thereby disrupting the velocity profile.

It is also noted that the measured volume flow rate includes some induced flow entering through an approximately ½ in. radial gap between the fan barrel diameter and the butterfly damper barrel diameter. Refer to Figure 2. Therefore, the volume flow exhausted from the plant is marginally less than the values listed in Table 1.

Figure 2: Illustration of Radial Gap between Fan Barrel Diameter and Butterfly Damper Barrel Diameter

3.2. Comparison of Measured and Theoretical Flow

Theoretical values of the flow rates at exhauster speeds of less than 100% speed (i.e. VFD at 60 Hz) have been calculated based on the fan affinity law that the volume flow rate at full speed will vary at slower speeds by the ratio of the fan speeds. Fan speed is proportional to the VFD output frequency and the ratio of fan speeds will be equal to the ratio of the VFD frequencies.

The field measured and theoretical flow rates from 100% speed (VFD at 60 Hz) down to 56% speed (VFD at 35.5 Hz) are listed in Tables 3 and 4 and plotted in Figures 3 and 4.

Table 3: Measured and Theoretical Flow Rates versus Speed Setting for Exhauster without Silencer

CFM West forehead exhaust fan (Without Silencers)		
VFD Frequency (Hz)	Measured Flow rate CFM	Theoretical Flow Rate CFM
60	48,419	48,419
56.5	45,290	45,594
53	42,111	42,770
49.5	39,832	39,945
46	36,617	37,121
42.5	33,371	34,297
39	32,911	31,472
35.5	27,497	28,648

Table 4: Measured and Theoretical Flow Rates versus Speed Setting for Exhauster with Silencer

Furnace hall roof exhaust fan (With Silencer)		
VFD Frequency (Hz)	Measured Flow rate CFM	Theoretical Flow Rate CFM
60	48421	48421
56.5	45614	45597
53	42167	42772
49.5	38994	39948
46	36133	37123
42.5	32315	34298
39	33995	31474
35.5	29821	28649

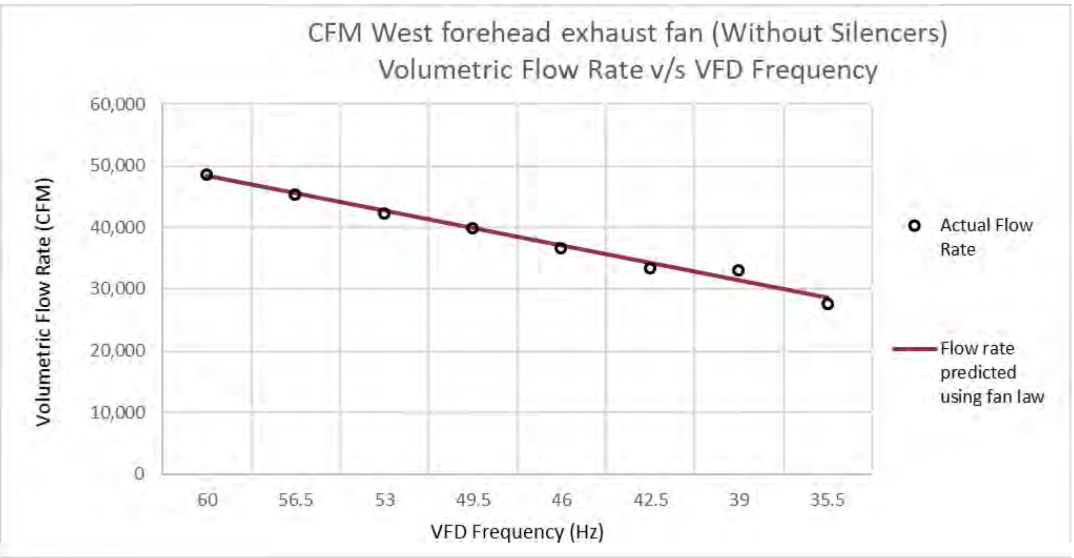

Figure 3: Volumetric Flow Rate (CFM) Plotted against the VFD Frequency (Hz)

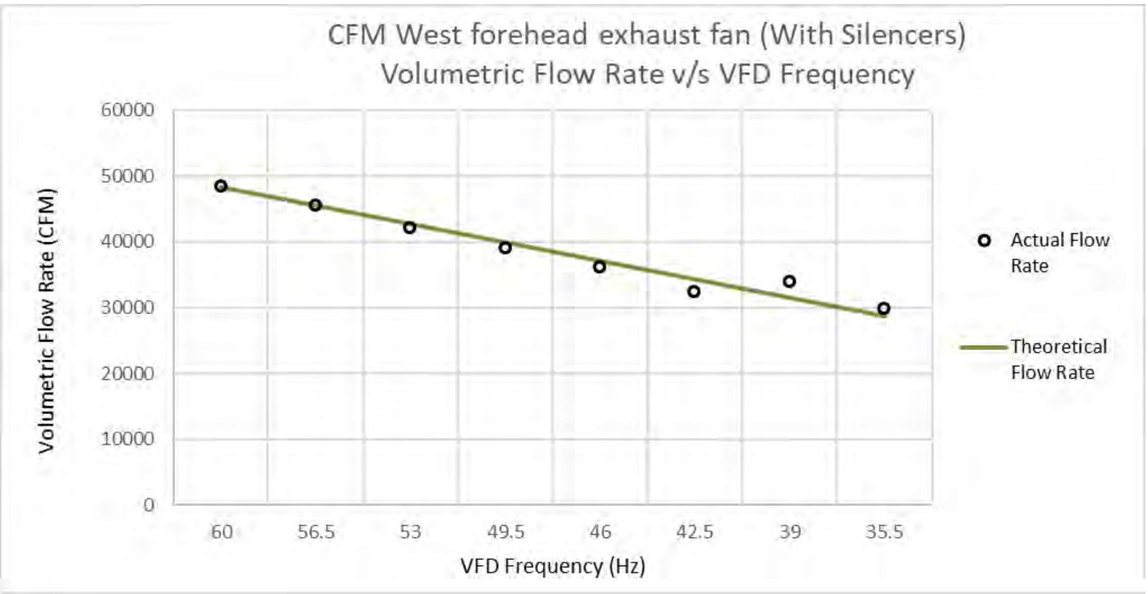

Figure 4: Volumetric Flow Rate (CFM) Plotted against the VFD Frequency (Hz)

The flow rates for both the fans agree with expected values from the fan laws except at low VFD frequencies of 39 Hz and 35.5 Hz. It is reasonable to assume that this discrepancy is due to the effect of butterfly damper blades that partially close at low fan speeds.

4. Conclusions

i) The volume flow rates for the exhauster with and without the silencer are approximately the same.
ii) The measured volume flow rates at different fan speeds demonstrates that the exhausters follow the fan affinity laws.

5. Appendix I

FLOWCARE ENGINEERING INC.	**Engineering Work Sheet**	**Job No.** a156619		
	Project: Owens Corning - Guelph Composites	**File Ref.** a1566-EWS-1-r0		
		Rev.	**By**	**Date**
		0	SGK	Dec. 16, 2019
	Re: Roof Exhaust Fans Airflow Testing			
	Without Silencer			

Fan No. 1

Test Date Dec. 17, 2019

Time	9:45am			
Fan Speed	60 Hz			
Pbar - Outside	389.64			
Pbar - Inside	389.6			
Dry Bulb Temp.	33			
Wet Bulb Temp.	15			

Velocity	1	2	3
1	2,213	2,511	2,156
2	2,992	3,270	1,760
3	2,896	3,126	819
4	2,240	1,998	1,073
5	2,427	1,806	1,155
6	2,762	3,222	798
7	3,301	3,381	1,678
8	2,803	2,618	2,421

Time	10:45am			
Fan Speed	56.5 Hz			
Pbar - Outside	389.7			
Pbar - Inside	389.67			
Dry Bulb Temp.	36			
Wet Bulb Temp.	16			

Velocity	1	2	3
1	2,114	2,441	2,144
2	2,873	3,098	1,867
3	2,694	2,942	678
4	2,220	1,897	983
5	2,034	1,662	1,041
6	2,596	2,924	444
7	3,112	3,206	1,432
8	2,706	2,421	2,315

Time	11:07am			
Fan Speed	53 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	1,924	2,140	1,942
2	2,705	2,943	1,522
3	2,624	2,740	466
4	2,034	1,788	891
5	2,236	1,584	995
6	2,452	2,788	431
7	2,931	2,982	1,415
8	2,604	2,397	1,672

Time	11:30am			
Fan Speed	49.5 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	1,905	2,114	1,858
2	1,609	2,693	2,517
3	759	2,568	2,374
4	856	1,641	1,906
5	1,112	1,553	1,752
6	230	2,580	2,253
7	1,094	2,809	2,744
8	2,013	2,282	2,375

FLOWCARE
ENGINEERING INC.

Engineering Work Sheet	**Job No.** a156619		
Project: Owens Corning - Guelph Composites	**File Ref.** a1566-EWS-1-r0		
	Rev.	**By**	**Date**
	0	SGK	Dec. 16, 2019
Re: Roof Exhaust Fans Airflow Testing Without Silencer			

Fan No. 1

Test Date Dec. 17, 2019

Time	12.:30pm			
Fan Speed	46 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	1,708	1,934	1,068
2	2,349	2,540	1,654
3	2,262	2,387	626
4	1,857	1,497	751
5	1,591	1,376	941
6	2,146	2,399	468
7	2,520	2,601	1,228
8	2,127	1,991	1,895

Time	12:19pm			
Fan Speed	42.5 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	1,628	1,704	1,582
2	1,417	2,293	2,224
3	814	2,182	2,279
4	748	1,412	194
5	920	1,230	582
6	520	2,179	2,294
7	1,104	2,385	2,514
8	1,651	1,957	2,387

Time	12:36pm			
Fan Speed	39 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	2,143	2,081	1,969
2	2,333	2,314	1,776
3	1,337	2,046	936
4	284	326	660
5	673	647	626
6	1,812	2,033	914
7	2,297	2,361	1,349
8	2,487	2,277	1,993

Time	12:51pm			
Fan Speed	35.5 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	2,179	2,165	2,120
2	1,543	2,196	1,656
3	572	1,878	551
4	324	326	535
5	204	324	682
6	647	1,486	597
7	1,273	2,163	1,107
8	2,147	2,382	2,419

FLOWCARE ENGINEERING INC.	**Engineering Work Sheet**	**Job No.** a156619		
	Project: Owens Corning - Guelph Composites	**File Ref.** a1566-EWS-1-r0		
		Rev.	**By**	**Date**
		0	SGK	Dec. 16, 2019
	Re: Roof Exhaust Fans Airflow Testing With Silencer			

Fan No. 2

Test Date Dec. 17, 2019

Time	2:36pm			
Fan Speed	60 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	1,158	2,110	671
2	1,923	3,041	2,582
3	2,638	3,149	3,004
4	2,209	1,994	1,675
5	2,450	1,691	2,274
6	3,018	3,087	3,055
7	2,845	3,114	3,457
8	1,356	1,503	1,425

Time	3:06pm			
Fan Speed	56.5 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.	39			
Wet Bulb Temp.	16			

Velocity	1	2	3
1	990	1,370	918
2	1,705	2,780	2,520
3	2,529	2,665	2,992
4	2,340	1,697	1,912
5	2,119	1,621	2,299
6	2,844	3,000	3,034
7	2,768	2,911	3,143
8	1,327	1,493	1,238

Time	3:24pm			
Fan Speed	53 Hz			
Pbar - Outside	388.79			
Pbar - Inside	388.82			
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	970	1,304	940
2	1,694	2,821	2,282
3	2,225	2,367	2,850
4	1,934	1,669	1,822
5	2,006	1,565	2,145
6	2,644	2,734	2,953
7	2,422	2,644	2,549
8	1,410	1,306	1,014

Time	3:48pm			
Fan Speed	49.5 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	827	1,666	954
2	1,507	2,482	2,166
3	2,148	2,578	2,602
4	1,074	1,496	1,395
5	1,717	1,367	1,798
6	2,551	2,596	2,790
7	2,517	2,493	2,682
8	1,221	1,273	737

FLOWCARE
ENGINEERING INC.

Engineering Work Sheet	**Job No.** a156619		
Project: Owens Corning - Guelph Composites	**File Ref.** a1566-EWS-1-r0		
	Rev.	**By**	**Date**
	0	SGK	Dec. 16, 2019
Re: Roof Exhaust Fans Airflow Testing With Silencer			

Fan No. 2

Test Date Dec. 17, 2019

Time	4:13pm			
Fan Speed	46 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	1,708	1,934	1,068
2	2,349	2,540	1,654
3	2,262	2,387	626
4	1,857	1,497	751
5	1,591	1,376	941
6	2,146	2,399	468
7	2,520	2,601	1,228
8	2,127	1,991	1,895

Time	4:26pm			
Fan Speed	42.5 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	1,628	1,704	1,582
2	1,417	2,293	2,224
3	814	2,182	2,279
4	748	1,412	194
5	920	1,230	582
6	520	2,179	2,294
7	1,104	2,385	2,514
8	1,651	1,957	2,387

Time	4:43			
Fan Speed	39 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	2,143	2,081	1,969
2	2,333	2,314	1,776
3	1,337	2,046	936
4	284	326	660
5	673	647	626
6	1,812	2,033	914
7	2,297	2,361	1,349
8	2,487	2,277	1,993

Time	5:04pm			
Fan Speed	35.5 Hz			
Pbar - Outside				
Pbar - Inside				
Dry Bulb Temp.				
Wet Bulb Temp.				

Velocity	1	2	3
1	2,179	2,165	2,120
2	1,543	2,196	1,656
3	572	1,878	551
4	324	326	535
5	204	324	682
6	647	1,486	597
7	1,273	2,163	1,107
8	2,147	2,382	2,419

Attachment 3
Technology Benchmarking Report

TECHNOLOGY BENCHMARKING REPORT

HEXAVALENT CHROMIUM

GUELPH PLANT

Prepared for: **OWENS CORNING COMPOSITE MATERIALS CANADA LP**

Prepared by: **MONTROSE ENVIRONMENTAL SOLUTIONS CANADA INC.**

Version 1.0
March 2025
Point Edward, Ontario

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TECHNOLOGY BENCHMARKING REPORT
HEXAVALENT CHROMIUM
GUELPH PLANT

Prepared for Owens Corning Composite Materials Canada LP, March 2025

LICENSED PROFESSIONAL ENGINEER
P. E. McINNIS
03-28-2025
PROVINCE OF ONTARIO

Danielle Agar

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Environmental Specialist

DISCLAIMER

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VERSION CONTROL

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V0.1	25-Mar-2025	Draft	41296-526 Benchmark R 2025-03-25 draft V0.1.docx	Issued to client for review
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EXECUTIVE SUMMARY

This Technology Benchmarking Report (TBR) has been prepared to support the Owens Corning Guelph Glass site-specific annual standard renewal request for hexavalent chromium under Section 32 of Ontario Regulation 419/05: Air Pollution – Local Air Quality (O. Reg. 419/05; Government of Ontario 2025). This report (TBR) is a required element of the renewal application for the site-specific standard and has been prepared in accordance with the Ministry of the Environment, Conservation and Parks (MECP) publications *Guide to Requesting a Site-Specific Standard* (GRSSS; MOECC 2017a) and the *Guideline for the Implementation of Air Standards in Ontario* (GIASO; MOECC 2017b).

The Owens Corning facility is located at 247 York Road in Guelph, Ontario. The facility produces textile glass yarn and fiberglass for reinforcements for commercial and industrial markets worldwide. This facility is the sole producer of fiberglass for reinforcements in Ontario and Canada and has been operating in Guelph since 1951. Due to the nature of the process, the facility operates continuously 24 hours per day, 365 days per year. Detailed process descriptions and documentation of emission estimates are located in the Emission Summary and Dispersion Modelling (ESDM) Report.

This is a companion document to the ESDM report where modelling indicates that the facility would not meet the hexavalent chromium standard and that a site-specific standard is necessary. This report provides an assessment of the available technologies to reduce point of impingement (POI) concentrations of hexavalent chromium using the top-down approach prescribed by Appendix A of the MECP GRSSS guidance document.

This Technical Benchmarking Report:

- identifies all available technologies to reduce the POI concentration of hexavalent chromium
- assesses the commercial availability of each of the technologies identified and screens out those options which are not commercially available
- assesses the technical feasibility of each of the identified technologies and screens out options that are not feasible
- ranks the technically feasible pollution mitigation options, and combinations of options (pollution control strategies), based on reductions in POI concentrations

Twenty-two (22) individual technologies in the following categories were assessed:

- Material Substitutions (4 options)
- Process Changes (7 options)
- Add-On Controls (11 options)

An additional category of “Other” was added for re-engineering of exhaust points to overcome site-specific dispersion challenges. While this is not a required option for consideration, it is another method for the facility to reduce the predicted POI concentrations in the surrounding community.

The technically feasible individual technologies and combinations of options were modelled and ranked based on their potential to reduce the predicted POI concentrations. The following table summarizes the assessment of these pollution control strategies.

Combination Description	Overall Percent POI Concentration Reduction	Ranking
Furnace: Furnace volumetric flow rate increase Forehearth: Horizontal burner firing in the CFM forehearth Stack height increase (to 32mag) Volumetric flow rate increase Substitute with Low Sublimation Chromium Refractory in CFM forehearth	49%	1
Furnace: Furnace volumetric flow rate increase Forehearth: Stack height increase (to 32mag) Volumetric flow rate increase Substitute with Low Sublimation Chromium Refractory in CFM forehearth	48.5%	2
Forehearth: Horizontal burner firing in the CFM forehearth Stack height increase (to 32mag) Volumetric flow rate increase Substitute with Low Sublimation Chromium Refractory in CFM forehearth	45%	3
Forehearth: Stack height increase (to 32mag) Volumetric flow rate increase Substitute with Low Sublimation Chromium Refractory in CFM forehearth	45%	4
Furnace: Furnace volumetric flow rate increase Forehearth: Horizontal burner firing in the CFM forehearth Stack height increase (to 32mag) Substitute with Low Sublimation Chromium Refractory in CFM forehearth	42%	5

The above combinations show the control options selected for the top five pollution control combinations. Additional details related to all of these control options are located in the TBR.

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1 INTRODUCTION

1.1 Background

In 2011, O. Reg. 419/05 (Government of Ontario 2025) was amended to introduce new air standards for a number of compounds including hexavalent chromium along with a 5 year phase in period for these standards. On July 1, 2016, a new hexavalent chromium air standard of 0.00014 micrograms per cubic meter (µg/m^3) on an annual average basis came into effect. This air standard represents a 99% reduction from the previous (pre-2016) standard for hexavalent chromium.

O. Reg. 419/05 contains provisions to request a site-specific standard for a contaminant listed in Schedule 3 if a facility is unable to demonstrate compliance with the air standard. In 2016, the Owens Corning Guelph facility was granted a site-specific standard which will expire in 2026. The facility is requesting the renewal of a site-specific standard for hexavalent chromium. The Technology Benchmarking Report (TBR) is a required element of a renewal application for a site-specific standard.

1.2 Purpose

The purpose of this TBR is to identify and evaluate all possible pollution control options for hexavalent chromium using a top-down analysis approach. The feasibility of all pollution control options has been assessed and all feasible options ranked to determine the most effective option for the facility. This process identifies all technologies and determines a default preferred pollution control strategy. This document will be used to determine the most appropriate pollution control option combination for the facility.

This document is prepared in accordance with the MECP publications *Guide to Requesting a Site-Specific Standard* (GRSSS; MOECC 2017a), the *Guideline for the Implementation of Air Standards in Ontario* (GIASO; MOECC 2017b) and *Air Dispersion Modeling Guideline for Ontario* (MOECC 2016).

The objectives of this TBR are to:

- Develop a list of all pollution control methods available in the following categories:
    - Material Substitution
    - Process Change
    - Add-on Controls
- Assess the technical feasibility of each method available and their combinations
- Rank the pollution control strategies based upon the greatest reduction to the maximum point of impingement (POI) concentration

2 IDENTIFICATION AND DESCRIPTION OF SOURCES

2.1 Facility Description

The Owens Corning Composite Materials Canada LP - Guelph Glass Plant (Owens Corning) is located at 247 York Road in Guelph, Ontario. The facility produces textile glass yarn and fiberglass for reinforcements for commercial and industrial markets worldwide. This facility is the sole producer of Continuous Filament Mat in Canada.

Owens Corning in Guelph has been in operation since 1951 and is recognized as the world's leading producer of high quality Continuous Filament Mat (CFM) using a special type of E glass known as Advantex® with a very low environmental footprint. The facility also uses Advantex® to produce a wet chopped strand (WUCS) product for resale.

The NAICS code for the Owens Corning Guelph facility is 327214, Glass Manufacturing. All sources at this location are stationary. The adjacent lands have mixed zoning, including industrial, commercial, residential, and parkland. This facility operates 24 hours a day, 7 days a week, 52 weeks a year. The facility has production capacity of approximately 16,000 tonnes of molten glass per year.

Glass fibers are produced by melting raw materials in gas-fired furnaces and transporting the molten glass through forehearth channels to "bushings" where it is mechanically pulled to form the fibers. Subsequently, the fibers are used to make glass yarns, mat, and reinforcements. The raw materials used to manufacture these high-tech glass fibers consist of dry solids, in powder and granular form, including clay, sand, limestone, and dolomite.

The furnace and forehearth structures that contain and transport molten glass are lined with various types of refractory brick. Chromium-containing refractory is universally used by the fiberglass industry as the material to construct the molten glass channel siderails. Chromium-containing refractory is used due to its superior corrosion resistance which significantly reduces waste and provides acceptable operational efficiency. This refractory is a source of di- and tri-valent chromium which is partially converted to the hexavalent form in furnace and forehearths prior to emission. The sources of hexavalent chromium emissions from the facility are:

- Furnace & Forehearth Stacks (Source IDs: B24, B25, and B38)
- Furnace Hall General Ventilation Exhausts (Source IDs: B33, B34, C79, and C80)

2.1.1 Furnace and Forehearth Emissions

Glass melting occurs in a natural gas-fired furnace, also referred to as a melter. The melter uses an oxygen/natural gas-fired combustion system. The batch of mixed raw material is fed into the rear of the furnace and melts to form a molten homogeneous glass.

Molten glass flows from the melter via channels into the forehearths leading to the fiber forming areas. The channels and forehearths are also referred to as the front end. Like the melter, the front end is heated with natural gas and uses an oxygen/gas-fired combustion system to maintain the glass in a molten state. The front end at this facility is fully enclosed, limiting fugitive emissions and allowing for a controlled combustion atmosphere.

The process sources of hexavalent chromium emissions are indicated below:

- Single furnace with dual stacks (Source IDs: B24 and B25)
- Forehearth stack (Source ID: B38)

The calculation methodology for the furnace and forehearth stack emissions can be found in found in Section 6 of the ESDMR.

2.1.2 General Ventilation

Currently there are a total of four general exhausts (Source IDs: B33, B34, C79, and C80) above the furnace, forehearths, and channels. These general exhausts remove the radiant heat emitted into the building from furnace and forehearth operations. These ventilation fans do not influence the generation of hexavalent chromium emissions; however, they are emission points for fugitive losses from the processes.

The calculation methodology for hexavalent chromium emissions from the general ventilation exhausts can be found in Section 6 of the ESDMR.

3 CURRENT FACILITY EMISSIONS AND MODELLED CONCENTRATIONS

All data sets contain natural variability including the data collected during the June 2024 testing which was the basis for the emission estimates in the ESDMR. To account for variability in measured emission rates, a one-tailed t-test was used to estimate the uncertainty on the mean of the measured emission rates in accordance with the *Alberta Air Monitoring Directive* (AMD) Chapter 5 (GoA 2016) and generally accepted practices. This provides an estimate for the range in which the mean of future measurements would be expected, assuming that variations in hexavalent chromium emission rates are normally distributed. The current site-specific standard of 0.0024 µg/m^3 approved by the MECP in 2016 was developed using a similar approach for incorporating measurement uncertainty, setting a precedent for this methodology. The incorporation of uncertainty provides a level of conservatism which is appropriate when setting standards where future source testing will be the mechanism for determining compliance.

Additional details for the uncertainty calculations and the dispersion modelling are located in the ESDM report.

The following information related to source contributions and exceedance frequency is provided as suggested in Appendix A of the GRSSS (MOECC 2017a) .

Table 1 outlines the source contributions to the maximum POI concentration, as well as the source contribution at three specific sensitive receptors, which are dwellings. These receptors were selected by first determining all sensitive receptors in the surrounding area and then selecting the most impacted receptors. The maximum POI occurs along the southeast property line. The modelling files for the current operating scenario can be found in the ESDMR appendices.

TABLE 1 Relative Source Contributions to POI Concentration

			Contribution to Point of Impingement Concentrations			
Source (Group)	Emission Rate (g/s)	Percent of Total Emissions (%)	At Point of Maximum Concentration (ng/m^3)	At Receptor 1 (ng/m^3)	At Receptor 2 (ng/m^3)	At Receptor 3 (ng/m^3)
All	1.37E-04	100%	1.33	0.49	0.47	0.46
Furnace[1]	3.11E-05	23%	0.06	0.07	0.07	0.07
Forehearth	8.98E-05	66%	0.64	0.33	0.32	0.30
General Ventilation[2]	1.61E-05	12%	0.63	0.09	0.08	0.08
Date and Time of Maximum (year)[3]			2017	2018	2018	2018

[1] Source group of furnace exhausts (Source IDs: B24 and B25)

[2] Source group of general exhausts (Source IDs B33, B34, C79 & C80)

[3] The Schedule 3 standard for hexavalent chromium is an annual standard therefore a year is provided rather than the date and time

The majority of hexavalent chromium emissions and POI contribution are from the forehearth stack (B38) which exhausts both the CFM and WUCS forehearth channels. The furnace exhaust stacks (B24 and B25) are the second largest contributor to emissions, but the smallest influence on the maximum POI concentration due to better dispersion than the general ventilation sources. Emissions from the general ventilation exhausters in the furnace hall essentially consist of any trace amounts of process emissions that do not get directly exhausted through the process stacks. There are currently four general ventilators operating, constituting approximately 12% of the total facility emissions for hexavalent chromium. However, due to challenges with detection limits for such low concentrations and variable exhaust, it is likely the contributions of these sources are being overestimated. The general ventilation sources have very low hexavalent chromium concentrations but still contribute to site emissions due to large volumetric flowrates.

Appendix A contains a summary table showing the maximum location, year and concentration for each individual source. Note that the location of the overall maximum POI may not necessarily be the same as the location of each individual source maximum.

The frequency, average, and median of the POI concentrations provides additional context and assists with understanding the potential impact on the nearby receptors. The following table outlines this data for the maximum POI location and the three most impacted sensitive receptors. Since hexavalent chromium has an annual standard, the frequency refers to the percentage of the 5 years of modelling that are above the standard.

TABLE 2 Frequency, Average, and Median Annual Concentrations

All Sources	Units	Maximum Receptor	Receptor 1	Receptor 2	Receptor 3
Frequency above Schedule 3 Annual Standard [1]	(%)	100%	100%	100%	100%
Average Concentration over 5 years	(ng/m^3)	1.277	0.431	0.418	0.407
Median Concentration over 5 years	(ng/m^3)	1.279	0.430	0.413	0.409

[1] % of time exceedance occurs at the receptor. Since hexavalent chromium has an annual standard, the frequency refers to the % of modelled years above the standard.

There are no exceedances of the 24-hour URT at any locations and all 24 hour modelled concentrations are less than 9% of the URT.

The modelling files used in this determination can be found in appendices of the ESDMR.

4 JURISDICTIONAL REVIEW

A jurisdictional review was completed as part of developing a list of possible methods to reduce the POI concentration of hexavalent chromium. The following sections outline the research activities conducted and a summary of the results.

4.1 Information Resources

Montrose used the following information resources as part of the jurisdictional review:

- Clean Air World
- European Commission Best Available Techniques (BAT) Reference Document for the Manufacture of Glass

- RACT/BACT/LAER Clearing House (RBLC database)
- National Emission Standards for Hazardous Air Pollutants (NESHAP & MACT)
- New Source Performance Standards (NSPS)
- Other Government Agencies (California Air Resources Board, Texas Commission on Environmental Quality)
- Sector Analysis (North American Insulation Manufacturers Association [NAIMA], Glass Manufacturing Industry Council [GMIC])
- Ontario Ministry of the Environment, Conservation and Parks (MECP)
- Environment and Climate Change Canada (ECCC)
- Canadian Council of Ministers of the Environment (CCME)
- Permits for USA Glass Composites Facilities
- WebFIRE data for Fiberglass Manufacturing

The following sections outline the relevant findings from each of these reviews. Where applicable and relevant options were identified, further details are included in Appendix B.

4.1.1 Clean Air World

Clean Air World, The National Association of Clean Air Agencies (formerly STAPPA and ALAPCO) maintains a website to help learn about air pollution as well as find the latest news and information on important air topics. This resource was reviewed for readily available information. This search did not result in any findings related to hexavalent chromium.

4.1.2 European Commission (Glass Manufacturing)

The European Commission (EC) has established guidance for manufacturing of glass fibre for production capacities above 20 tonnes/day and the Joint Research Center published a report of BAT Reference Document for the Manufacture of Glass, including for the continuous filament glass fibre sector. This BAT reference document includes all types of glass manufacturing, many of which do not apply to this facility. The continuous filament glass fibre sector comprised only 2.5% of the total European Union glass manufacturing production at the time of issue. This document was reviewed for particulate (PM) and metals reduction best available technologies.

The EC BAT report discusses several techniques for preventing the formation of emissions, many of which the Guelph facility has already implemented:

- use of electric e-boost
- sealing to preventing air ingress to the combustion space as part of air/fuel ratio control
- burner positioning
- raw material modifications

The technical feasibility and status of these techniques are discussed the following sections.

Specific to the continuous filament glass fibre sector, BAT is to reduce dust emissions from the waste gases of the melting furnace by using one or a combination of the following techniques:

- formulate the glass without boron; boron is the main constituent of particulate matter from the melting furnace
- filtration system: EP or bag filter (maximum benefit achieved for application on new plants)
- wet scrubbing system (application to existing plants may be limited by technical constraints)

The Guelph facility would be considered as meeting the BAT based on the absence of boron in the glass formulation.

Specific to the continuous filament glass fibre sector, BAT for metals reduction from the furnace is by using one or a combination of the following techniques:

- selection of raw materials for the batch formulation with a low content of metals
- applying a dry or semi-dry scrubbing in combination with a filtration system
- applying wet scrubbing (may have technical restraints)

The Guelph facility would be considered as meeting the BAT based on the low metals content in the glass formulation. Scrubbers and filtration systems were included in the technology feasibility assessment.

The report summarizes the dust emission levels expected from continuous filament glass fibre (CFGF) manufacturing facilities (with boron free formulations) to be in the range of <0.14 to 0.35 kg/tonne of glass produced. The PM from the Guelph furnace is estimated to be 0.07 kg/tonne of glass produced, below the lower end of the expected emission range. Additionally, the EC report indicates dust emissions from CFGF facilities with secondary abatement (end of pipe controls) to be 0.02 – 0.24 kg/tonne of glass produced. The PM emissions from the Guelph furnace are already within the range of those expected with end of pipe controls, questioning the need for additional reductions specifically related to particulate.

Similarly, the Guelph emissions are several orders of magnitude less than the EC emission levels expected for a subset of metals including chromium. Additional data are provided in Appendix B.

The Environment Agency for England and Wales, with the Scottish Environment Protection Agency (SEPA) and the Northern Ireland Environment and Heritage Service (EHS) produced a guidance document, titled *Integrated Pollution Prevention and Control (IPPC) Guidance for the Glass Manufacturing Sector (A1 Processes)* (Environment Agency, SEPA, and EHS 2001). The guidance document is based on the BAT Reference document produced by the European Commission. Additional data on control options and techniques are provided in Appendix B.

4.1.3 RACT/BACT/LAER Clearinghouse (RBLC)

The RACT/BACT/LAER Clearinghouse is a database of information the US EPA uses to retain information for modified and new facilities and associated air emissions. The acronym definitions are as follows:

RACT: Reasonably available control technology
BACT: Best available control technology
LAER: Lowest achievable emission rate

In order to identify control technologies for hexavalent chromium, the clearinghouse search was conducted by CAS RN 7440-47-3 for chromium and chromium compounds including di-, tri-, and hexavalent chromium. This provided data for all industries where emission control technologies were identified for chromium compounds.

The RBLC search results were primarily from industries which are dramatically different from the composite glass industry such as steel, resource recovery, power generation, electroplating, and waste incineration. In many of these industries, the inclusion of chromium as a controlled compound may be attributed to the presence of chromium in the raw materials or as a by-product of fuel combustion in boilers. The control methods identified included dry filtration (baghouse, fabric filter, etc.), electrostatic precipitator (ESP), scrubbers, cyclones, and in one case a HEPA filter. The control equipment list was reviewed and assessed for applicability and where appropriate included in the options considered for the Guelph facility. Several other control methods were listed including good operating practices, restricting fuel types, process changes and permit limits. Additional details of the RBLC data review are included in Appendix B.

4.1.4 NESHAP – Glass Manufacturing

The NESHAP for the Glass Manufacturing industry area sources (NAICS 327212) outlines requirements for continuous glass melting furnaces when an urban HAP (arsenic, cadmium, chromium, lead, manganese) is used as a raw material in the furnace. The Owens Corning Guelph Glass facility does not use any of these materials as raw inputs to the glass, which would exclude this facility from the requirements under this NESHAP if it were located in the USA.

However, for the purpose of completeness of this review and assessment, these NESHAP emission limits were reviewed and summarized below from the Final Rule Emission Limits (Table 1 to Subpart SSSSSS of Part 63-Emission Limits; U.S. EPA 2007):

For each new or existing glass melting furnace that produces glass at an annual rate of at least 45 Mg/year AND is charged with compounds of arsenic, cadmium, chromium, manganese, lead, or nickel as raw materials, you must meet one of the following emission limits:

- The 3-hour block average production-based PM mass emission rate must not exceed 0.1 g/kg of glass produced
- The 3-hour block average production-based metal HAP mass emission rate must not exceed 0.01 g/kg of glass produced

As chromium is considered a HAP in the USA, this would translate to a total chromium emission limit of 0.01 g chromium per kg of glass produced. The total chromium emission rate from the Owens Corning Guelph furnace is less than 2% of the limit stated above.

4.1.5 NESHAP and MACT – Fiberglass Manufacturing

The NESHAP for the Wool Fiberglass Manufacturing industry (NAICS 327993) was also reviewed. The Owens Corning Guelph facility produces textile glass, not fiberglass; therefore, if this facility were located in the USA these NESHAP requirements would not apply.

However, for the purpose of completeness of this assessment and due to the potential for furnace similarities, these NESHAP limits from 40 CFR part 63 subpart NNN are summarized below:

- Existing and new gas-fired furnaces (at area sources) – chromium compounds: 0.00025 lb/ton glass pulled (emission limit for wool fiberglass manufacturing major sources)
- Existing and new gas-fired furnaces (at major sources) – chromium compounds: 0.00025 lb/ton glass pulled and Particulate = 0.33 lb/ton of glass pulled

The total chromium emission rate from the Owens Corning Guelph furnace is similar to the limit stated for the fiberglass manufacturing industry in the USA. The particulate emission rate from the furnace is less than half of the limit stated above for the fiberglass industry in the USA.

Area sources are facilities that emit less than 10 tons/year of a single HAP or less than 25 tons/year for all HAPs combined. Major sources are facilities that emit more than the area source category. The Guelph Glass facility would be best reflected in the area source category in terms of emission potential. Area sources are subject to generally available control technologies (GACT) and major sources are subject to maximum achievable control technologies (MACT).

The final rule for area sources identified two GACTs for the industry to consider:

- Replacement of cullet with other raw minerals
- More frequent rebuilds of the furnace

The Guelph facility does not use cullet as a raw material. A substantial dataset exists for furnace hexavalent chromium at the Guelph facility which does not identify any correlation between furnace age and emission levels. Neither of these GACTs is applicable to this facility.

The development of the rulemaking recognized that furnace design plays a significant role in the emission of chromium compounds and that furnace design modifications can be a method to reduce emissions.

Control techniques identified in NESHAP and in the NESHAP Risk and Technology Review for the Mineral Wool and Wood Fiberglass Industries (40 CFR Part 63) have been included in the options for feasibility assessment. Additional data are provided in Appendix B.

4.1.6 NESHAP – Chemical Manufacturing Area Sources: Chromium Compounds

The chromium compounds chemical manufacturing area sources NESHAP applies to chromium compounds manufacturing facilities that are considered an area source of HAP emissions. The NESHAP is not directly applicable to the Guelph facility; however, control equipment mentioned in the summary version of the NESHAP has been included in a review of technologies from other industries. Additional details are provided in Appendix B (U.S. EPA 2024).

4.1.7 New Source Performance Standards – NSPS

The USEPA NSPS for Glass Manufacturing (40CFR Part 60 subpart CC (60.290 – 60.296) was reviewed. At the time of issue, it set particulate emission standards for glass melting furnaces based on the type of glass produced and fuel used. The PM limit that would apply to the furnace at the Guelph plant would be 0.25 grams per kilogram of glass produced. Particulate from the Guelph furnace is 0.07 grams per kilogram of glass produced. Additional details are provided in Appendix B.

4.1.8 Other Government Agencies

4.1.8.1 California Air Resources Board (CARB)

The California Health and Safety Code defines toxic air contaminants (TACs) as "an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health." (CARB 2025). The California Air Resources Board (CARB) has identified 189 federal HAPs as TACs. Hexavalent chromium is included in the list of TACs and has a Threshold Determination of “none identified”. This indicates that the board determined there is “not sufficient available scientific evidence to support the identification of a threshold exposure level” (CARB 2025).

In May 2023, CARB updated its “rules on airborne toxics” in order to phase out the use of hexavalent chromium by facilities in the chrome plating and chromic anodizing industries (CARB 2023). These changes would start with the use of hexavalent chromium for decorative purposes as safer alternatives are available. CARB has provided two options to facilities with different timelines and incentive programs for each option. Functional chrome plating facilities will be required to implement certain requirements by 2026 to reduce fugitive emissions. CARB will conduct technology reviews in 2032 and 2036 in order to assess alternative technologies for the functional chrome plating industry, with the phase-out planned for 2039.

The state of California does not appear to have identified any other industries for the reduction of hexavalent chromium compounds.

4.1.8.2 Texas Commission on Environmental Quality (TCEQ)

The TCEQ *Development Support Document – Hexavalent Chromium (Particulate Compounds)* was reviewed for information relevant to this application. The document provides background on major uses and sources of hexavalent chromium, acute and chronic evaluation, chemical and physical properties of hexavalent chromium, and key studies. The document also includes the Air Permitting Effects Screening Levels (ESLs) which came into effect in 2014:

- Short Term ESL (24h) for Air Permit Reviews = 0.39 µg/m^3
- Long Term ESL for Air Permit Reviews = 0.0043 µg/m^3

A comparison of the ESLs against the equivalent modelled concentrations from the Guelph facility has been included in Appendix B.

Long term hexavalent chromium average ambient concentrations (total suspended particulate or PM10) were provided in the document. These concentrations were measured at various locations in Texas and range from approximately 5.9E-06 to 1.7E-04 µg/m^3(TCEQ 2025).

A TCEQ *Interoffice Memorandum on Chromium* (to the Remediation Division Staff) was also reviewed. This document includes recommended methodologies for assessing chromium releases to groundwater, surface water, and soil. The memorandum does not include any discussion related to air or air pollution control technologies; however, the document provides a description of anthropogenic sources of chromium which does not include glass manufacturing (TCEQ 2002).

4.1.9 Sector Analysis

Various resources from trade associations were reviewed; further details are provided in this section.

4.1.9.1 North American Insulation Manufacturers Association (NAIMA)

The NAIMA provides "service to manufacturers of fiberglass, rock wool, and slag wool insulation (sometimes collectively known as mineral fiber) used for thermal, sound, fire, or filtration purposes." NAIMA also promotes "the welfare and development of the mineral fiber insulation industry" (NAIMA 2025).

Montrose reviewed supplemental comments provided by NAIMA related to chromium emissions data provided to the EPA for the Mineral Wool Production and Wool Fiberglass Manufacturing NESHAP (NAIMA 2012). Key items from the NAIMA submission include:

- Concern regarding perceived chrome issue is based on a single outlier of a dataset
- Alternatively the EPA should consider chrome limits based on furnace type
- The location and extent of chrome-based refractory use in the furnace varies based on furnace type
- The temperature of the surface of the chrome alumina refractories is the most influential variable in for hexavalent chromium emissions

The NAIMA supplemental comments did not identify any additional technologies for review in this assessment.

4.1.9.2 Glass Manufacturing Industry Council (GMIC)

The GMIC is a group that supports glass producers, suppliers, and researchers "through government and trade advocacy, the promotion of glass usage, the coordination of technical initiatives, education and training, workforce development, and the facilitation of new ways to meet sustainability demands." (GMIC 2025) The GMIC regularly publishes a Glass Manufacturing Industry Report. The "Regulations" section of the 2021 GMIC: Glass Manufacturing Industry Report was (GMIC 2021) reviewed. A summary of US and European Union Regulations were included with no specific reference to hexavalent chromium; however, chromium compounds are included in a list of HAPs. This document did not contain any new information or technologies not identified in other resources reviewed.

4.1.10 Metal Finishers and Chromium Electroplating

The Ontario MECP Metal Finishers Industry Standard applies to facilities with the NAICS code 332810: Coating, Engraving, Heat Treating and Allied Activities. Although this industry standard does not apply to glass manufacturing, it includes references to specific control technologies for hexavalent chromium. The control technologies identified in the Industry Standard were reviewed for applicability to the Owens Corning Guelph facility process sources. However, the technologies identified in the Industry Standard are for metal finishing tanks and specify that sources must meet at least one of the following requirements:

- Discharges of chromium compounds (hexavalent) from the tank are captured by a local exhaust ventilation system and conveyed to an air pollution device.

- A fume suppressant is used in the tank.

- The tank is covered by a tank cover that meets certain criteria specified in the document.

Specific air pollution control devices mentioned in the document include a packed bed scrubber with or without a HEPA filter, a composite mesh pad scrubber with or without a HEPA filter attached. These control technologies were included in the feasibility assessment as part of the technology transfer considerations. The control technologies listed above are consistent with other documents reviewed as part of the technology transfer assessment. The US EPA *A Guidebook on How to Comply with the Chromium Electroplating and Anodizing NESHAP (1995)* (U.S. EPA 1995) identified a fiber-bed mist eliminator as well. However, at the time the document was prepared, there was inadequate test data available to demonstrate control efficiency. The TCEQ document *Chromium Plating Facilities – April 1995* (TCEQ 1995) identified BACT consistent with the Ontario MECP Metal Finishers Industry Standard and the US EPA *Guidebook* document (MECP 2023).

4.1.11 Environment and Climate Change Canada (ECCC)

Environment and Climate Change Canada (ECCC) has several resources available with information on chromium compounds. Montrose reviewed the following documents as part of the jurisdictional review:

1. *Discussion Document: Proposed Amendments to the Chromium Electroplating, Chromium Anodizing and Reverse Etching Regulations* (ECCC 2022)
2. *Canadian Environmental Protection Act, 1999 Federal Environmental Quality Guidelines - Hexavalent Chromium* (ECCC 2018)
3. *Canadian Environmental Protection Act, Priority Substances List Assessment Report – Chromium and its Compounds* (Environment Canada and Health Canada 1994)
4. *Risk Evaluation Determining Whether Environmental Emergency Planning is Required Under the Environmental Emergency Regulations set under the Canadian Environmental Protection Act, 1999 (CEPA 1999)* (Environment Canada 2011)
5. *Environmental Emergency Regulations, 2019* (Government of Canada 2025)
6. *Performance measurement for toxic substances* (Goverment of Canada 2025)

Many of the documents listed above refer to other industries that are associated with hexavalent chromium emissions such as chromium electroplating, chromium anodizing, reverse etching, electricity generation, forging and stamping, and other manufacturing facilities. The *Discussion Document* referenced above is associated with *The Chromium Electroplating, Chromium Anodizing and Reverse Etching Regulations* which came into force July 2009. The Regulations require the control of air releases of hexavalent chromium compounds from tanks used in specified activities. The *Discussion Document* provides details on proposed amendments to the Regulations. The document does not have direct applicability to the Owens Corning Guelph facility as glass manufacturing is not referenced. In addition, the control technologies mentioned are for tank sources.

The *1999 Federal Environmental Quality Guidelines - Hexavalent Chromium* provide benchmarks for the quality of the ambient environment based on toxicological effects or hazards of substances. The use of the Federal Environmental Quality Guidelines (FEQG) is voluntary unless prescribed in permits or in other regulatory tools. This document is a fact sheet for the Federal Water Quality Guideline (FWQG) for “the protection of aquatic life from adverse effects of hexavalent chromium.” The document identifies that the primary users of chromium are the metallurgical, refractory, and chemical industries and that point source atmospheric emissions of hexavalent chromium in Canada have been declining since 2005. Control technologies are not listed in the document.

The *Priority Substances List Assessment Report – Chromium and its Compounds* contains a review of the presence (and concentration) of chromium compounds in the water, air and food in Canada and the level of risk. A list of anthropogenic sources of chromium in the atmosphere is included in the document with mirror and glass production amounting to 5% of total emissions. The document does not contain information on regulatory limits or specific control strategies.

The risk evaluation document is associated with the Environmental Emergency Regulations. The document contains a risk evaluation for chromic acid and chromium trioxide (hexavalent chromium compounds). Based on a review of environmental, human, and physical hazards, these compounds were recommended for addition to the Environmental Emergency Regulations. Chromic acid and chromium trioxide are present in the most recent version of the Environmental Emergency Regulations, 2019. Both substances have a concentration threshold of 10% (mass/mass) and a minimum quantity of 0.22 tonnes.

4.1.12 Canadian Council of Ministers of the Environment (CCME)

The CCME is an "intergovernmental forum for collective action on environmental issues of national and international concern."(CCME 2025). The CCME website includes various resources for educational and reference purposes. This resource was reviewed for readily available information. This search did not result in any findings related to glass manufacturing or hexavalent chromium control strategies for air emissions.

4.1.13 Permit Reviews

Montrose conducted a review of available operating permits for the Glass Manufacturing industry in the USA. The Guelph Composites facility has a Canadian NAICS code of 327214 for Glass Manufacturing. The equivalent USA NAICS code for the facility is 327212 for Other Pressed and Blown Glass and Glassware Manufacturing which was used to identify applicable facilities for permit review.

A total of 12 permits were identified and reviewed. Three of these facilities have operations that do not use a furnace and were therefore excluded from the assessment. Of the nine remaining permits, only three of these facilities had control devices for furnace emissions. The permit for a facility in Ohio lists a wet scrubber for the melters in accordance with the Ohio Administrative Code (OAC) for controlling particulate matter. The permit for a facility in North Carolina has a dry scrubber on one of four furnaces specifically for the control of particulate and fluorides. A facility in Georgia has a permit listing a furnace control system consisting of a dry scrubber and baghouse for the purpose of complying with 40 CFR part 60 CC which is specific to particulate control. None of the permits reviewed indicate that these furnace control devices were specific to controlling chromium compound emissions, but are most likely required to reduce particulate and in some cases other Hazardous Air Pollutant (HAP) emissions. Chromium is one of 188 compounds in the HAP list. The control methods identified in the permit review have been included in the list of potential pollution control options for this facility.

A more detailed summary of the permit review is located in Appendix B.

4.1.14 WebFIRE Data

During ongoing consultation with the MECP on the development of this application package, it was suggested to include a review of the data available from the WebFIRE database for the fiberglass manufacturing sector (SCC codes beginning with 305012). This database contains source testing data submitted to the U.S. EPA from facilities that qualify as “Major Sources” in some industries. U.S. EPA “Major Sources” are in the higher emitter (HAPs more than 25 tonnes/year) compared to “area sources” which emit less than that HAPs limit. Therefore, it stands to reason that more of the major emitters would have control devices based on the method of categorization.

The Guelph Composites facility is part of the Glass Manufacturing industrial sector, not the Fiberglass Manufacturing industry and would fall within the “area source” category. The U.S. EPA does not require the submission of source testing data on a regular basis from the Glass Manufacturing sector, meaning there is no directly comparable data in WebFIRE for the glass manufacturing industry.

The available data represents total chromium outlet concentrations from furnace stacks equipped with control devices such as baghouses or electrostatic precipitators. These data are performance outlet tests and without pre-control device data, there is insufficient information available to determine how effective these devices are at removing chromium and specifically hexavalent chromium.

As part of the action plan for the site-specific standard, Owens Corning will further assess this data in the context of furnace design and differences in these sectors.

5 POLLUTION CONTROL OPTIONS

5.1 Initial Identification of Pollution Control Options

The pollution control options identified for this facility have been grouped by source or by source group for similar sources in the following three required categories:

- *Materials Substitution* - Materials substitution consists of any pollution control options that result in a decrease of the POI concentration by substituting one material used in the process with another, along with any associated technology that is required with the substitution.
- *Process Changes* - Pollution control options resulting in a decrease of the POI concentrations due to process changes fall into this category. A process change is any change to the production processes, work practices, asset design, and pollution prevention activities.
- *Add-on Controls* - Add-on controls are any pollution control devices that reduce air emissions after they have been produced.

These three categories are prescribed by the MECP GRSSS guidance document. An additional optional category of “Other” has been added for the re-engineering of the exhaust points to overcome site-specific dispersion challenges. This is not a required option for consideration; however, it is another method for the facility to reduce their impact on the surrounding community. The following table outlines all pollution control options that were identified for this facility, prior to the assessment of feasibility.

TABLE 3 Initial Identification of Pollution Control Options

Category	Individual Option Description
Add-on Control	Dry Electrostatic Precipitator (DEP)
	Wet Electrostatic Precipitator (WEP)
	Dust collector/baghouse (DC)
	Low Pressure Cyclone
	HEPA Filter
	Low Pressure Venturi Scrubber
	High Pressure Venturi Scrubber
	Liquid Bed Scrubber
	Spray Chamber Scrubber or Cyclone Spray Chamber
	Packed Bed Filter
	Tri-Mer Chrome Scrubber
Material Substitution	Replacing chromic oxide containing refractory with Zircon or other non-chrome containing refractory
	Substituting with Low Sublimation Chromium Refractory
	Modifying batch ingredients
	Using Fused zirconia siderails (XiLEC) for forehearth and channels
Process Change	Using radiant electric heat
	Using Substoichiometric combustion ratio
	Adding e-boost
	Converting furnace to air/gas combustion vs. oxygen/gas combustion
	Converting front end to air/gas combustion vs. oxygen/gas combustion
	Minimizing front end freeboard
	Incorporating horizontal burner firing in the forehearth (design change)
	Using more accurate combustion control skids with constructing front end superstructures (two technologies must be combined to be effective)
Other	Re-engineering the exhaust points to overcome site-specific dispersion challenges

A brief description of each option is located in the table below.

TABLE 4 Description of Pollution Control Options

Dry Electrostatic Precipitator (DEP)
Removes particles from a gas stream by using electrical energy to charge particles either positively or negatively. The charged particles are then attracted to collector plates carrying the opposite charge. In a DEP the collector plates are knocked or rapped by various mechanical means to dislodge the particulates, which slide down into a hopper where they are collected.
Wet Electrostatic Precipitator (WEP)
Removes particles from a gas stream by using electrical energy to charge particles either positively or negatively. The charged particles are then attracted to collector plates carrying the opposite charge. In a WEP, a pre-quench (water spray) is typically used to cool and saturate gases prior to entering the electrical field. As particulate matter accumulates on the collector plates, they are cleaned by a continuous or intermittent film or spray of water.
Dust collector/baghouse (DC)
Typically composed of a blower, dust filter, filter cleaning system and a dust removal system to capture particulate.
Low Pressure Cyclone
Uses centrifugal force to remove particulate from the gas stream.
HEPA Filter
High-efficiency particulate arrestance or HEPA is a type of air filter consisting of a mat of randomly arranged fibers, often composed of fiberglass.

Low Pressure Venturi Scrubber
A wet scrubber that uses the energy from the inlet gas stream to atomize the liquid being used to scrub the gas stream at a lower pressure of around 2 to 5 kPa.
High Pressure Venturi Scrubber
A wet scrubber that uses the energy from the inlet gas stream to atomize the liquid being used to scrub the gas stream. High pressure typically means over 10 kPa.
Liquid Bed Scrubber
Removes pollutants by bringing the exhaust gas stream in contact with a scrubbing liquid which can be in the form of a spray or a pool of liquid.
Spray Chamber Scrubber & Cyclone Spray Chamber
Removes larger particulate by inertial or diffusional impact along with reaction or absorption in a liquid. Cyclone spray chamber also uses centrifugal force to drop out larger diameter particulate.
Packed Bed Filter
A type of wet scrubber consisting of a chamber containing layers of variously shaped packing material that provide a large surface area for liquid-particle contact. Particulate matter is scrubbed by the liquid and gaseous pollutants are absorbed by the liquid by forming a solution (dissolved).
Tri-Mer Chrome Scrubber
Tri-Mer Corporation is an air pollution control equipment vendor. Tri-Mer’s chrome scrubber (C/E-1) was engineered for the application of chromic anodizing and plating lines to reduce chrome mist and particulate and is a type of wet scrubber.
Replacing chromic oxide containing refractory with Zircon or other non-chrome containing refractory
Replacement of existing chromium oxide refractory with a non-chromium (zircon) refractory.
Substituting with Low Sublimation Chromium Refractory
Replacement of existing chromium oxide refractory with a newly developed chromium oxide refractory designed to release less chromium from the solid to gaseous state.
Modifying Batch ingredients
Based on chemical modelling conducted by SEFPRO, the presence of alkali materials in the batch is one of the drivers of the formation of hexavalent chromium compounds.
Using fused zirconia siderails (XiLEC) for forehearth and channels
The use of a two piece siderail, which would consist of a lower block of chromic oxide and an upper block of zircon (or fused zirconia, another non-chromic oxide refractory) and would eliminate the presence of chromic oxide at or above the glass line.
Using radiant electric heat
The use of radiant heat would eliminate the burner flame impingement and combustion velocity along the freeboard, theoretically reducing hexavalent chromium.
Using Substoichiometric combustion ratio
Operating the system (furnace and forehearth channels) at a reducing (substoichiometric) instead of an oxidizing atmosphere in the combustion area. If combustion maintains a reducing atmosphere, chromium volatiles are likely to exist in the trivalent not hexavalent form.
Adding e-boost
The use of supplemental electrical energy via electrodes submerged in the glass to reduce the energy required from natural gas combustion to maintain molten glass temperatures in the furnace and forehearths.
Converting furnace to air/gas combustion vs. oxygen/gas combustion
Flue gases from air/gas combustion have a lower water vapour concentration due to the volume of nitrogen in air that does not enter the combustion reaction. Anticipated to reduce free oxygen.
Converting forehearth to air/gas combustion vs. oxygen/gas combustion
Flue gases from air/gas combustion have a lower water vapour concentration due to the volume of nitrogen in air that does not enter the combustion reaction. Anticipated to reduce free oxygen.

Minimizing front end freeboard
Reducing the amount of exposed chromic oxide refractory above the glass line would reduce the potential for volatilization of chromic oxide in the presence of oxygen.
Incorporating horizontal burner firing in the furnace and/or forehearth (design change)
The conversion to a horizontal burner configuration as a way to reduce the flame impingement velocities on the refractory freeboard.
Using more accurate combustion control skids with constructing front end superstructures (two technologies must be combined to be effective)
Using state of the art gas and oxygen flow measurement & flow metering equipment to better control the combustion ratio which impacts the combustion atmosphere by reducing excess oxygen which contributes to the formation of hexavalent chromium. Improved channel superstructure construction techniques are also needed to prevent air ingress into the controlled combustion atmosphere.
Re-engineering the exhaust points to overcome site-specific dispersion challenges
Modifications to stack heights, velocities, and/or locations to improve dispersion.

Additional details are provided in the following sections.

6 TECHNICAL FEASIBILITY REVIEW

The pollution control options identified for the Owens Corning Guelph facility in the previous section consist of all possible options without consideration of technical feasibility. This is part of the required top-down approach. In this section, each pollution control option was reviewed and the technical feasibility assessed based on criteria set out in Appendix A of the GRSSS guidance.

Initial screening allows for the removal of technically infeasible options prior to the modelling assessment. This assessment was based on criteria such as:

- physical or chemical restrictions
- site-specific technical issues
- lack of performance data on new or emergent technologies
- resource availability
- final product specifications
- engineering principles
- significant safety concerns that cannot be reasonably mitigated

The technical feasibility of pollution control options were assessed using a number of resources including:

- Control Equipment Vendor Information
- Industrial Ventilation Handbook Thirtieth Edition
- Air Pollution Control Fourth Edition
- Air Pollution Engineering Manual Second Edition
- Consultation with Pollution Control Subject Matter Experts at Owens Corning

The following sections address the technical feasibility of options identified.

6.1 Particle Size Determination Challenges

Stack testing for hexavalent chromium in Ontario requires the use of U.S. EPA. Method 0061. This complex methodology does not allow for the determination of the particle size specific to hexavalent chromium. This creates a challenge when assessing techniques to control this contaminant as particle size is a significant factor in the determination of effective control equipment. The following section provides a summary of expected particle sizes.

Owens Corning subject matter experts expect that hexavalent chromium emitted from the glass composites processes are mostly submicron in size. While actual measurements of hexavalent chromium particle size are not available, the method of hexavalent chromium generation and a study of available literature supports this opinion.

In the glass fiber reinforcements (composites) process, the refractory in the hot end is the only source of chromium in the process. Based on studies and chemical modelling conducted by SEFPRO and experience by Owens Corning, a sublimation process can occur along the narrow area of chromic oxide refractory directly above the glass line called the freeboard. This area is subject to the combustion velocity of the flame in the presence of moisture and oxygen resulting in chromium moving from the solid refractory directly into a gaseous form where additional reactions can occur in the combustion space above the glass. Chromium emissions in air as a result of this sublimation are expected to exist as very small particle sizes.

Ambient air studies in both Windsor and Hamilton conducted between 1992 and 1994 (Bell and Hipfner 1997) suggested that the majority of the hexavalent chromium was in the inhalable fraction (<PM10).

Measurements of combustion emissions have shown the dominant particle size to be between 0.1 and 0.3 microns (US Patent 5972301; Linak and Wendt 1999) and measurements of emissions from an industrial heat treating furnace showed that the majority of hexavalent chromium particles were below 20 nm in diameter at 2,100°F and around 10 nm at 1,500°F (Karavalakis and McCaffery 2021). Additional studies have also indicated that the majority of airborne hexavalent chromium was in the inhalable size fraction (Miller et al. 1979).

6.2 Electrostatic Precipitator (EP)

An EP removes particles from a gas stream by using electrical energy to charge particles either positively or negatively. The charged particles are then attracted to collector plates carrying the opposite charge. In a DEP the collector plates are knocked or rapped by various mechanical means to dislodge the particulates, which slide down into a hopper where they are collected. In a wet electrostatic precipitator (WEP), a pre-quench (water spray) is typically used to cool and saturate gases prior to entering the electrical field. As particulate matter accumulates on the collector plates, they are cleaned by a continuous or intermittent film or spray of water.

6.2.1 Wet Electrostatic Precipitator (WEP)

Performance guarantees for electrostatic precipitators are typically provided as outlet concentrations. Through communication with vendors, the lowest particulate outlet concentration guarantee that a vendor would consider for a WEP is 0.004 gr/dscf which is approximately 9,158 µg/m^3. The tables below summarize the current source concentrations for hexavalent chromium and particulate compared to the WEP outlet concentration guarantee.

TABLE 5 Hexavalent Chromium Concentration Comparison for WEP

Source	Hexavalent chromium concentration (µg/m³) [1]	WEP particulate outlet concentration (µg/m³)
Furnace	17	9,158
Forehearth	31	
General Ventilation	0.16	

[1] Average concentration from the June 2024 source testing

TABLE 6 Particulate Concentration Comparison for WEP

Source	Particulate concentration (µg/m³) [2]	WEP particulate outlet concentration (µg/m³)
Furnace	16,500	9,158
Forehearth	2,535	

[2] Emission estimates and source testing

The in-stack concentrations of hexavalent chromium are 300 to 50,000 times lower than the WEP outlet guarantee for particulate. The vendor is unable to provide an outlet guarantee specifically for chromium or hexavalent chromium. This is an indicator that a WEP would have negligible removal efficiency for hexavalent chromium.

For completeness we have included a comparison for particulate. The concentration of particulate for the furnace is higher than the WEP outlet guarantee however, the temperature of the furnace exhaust is too high for a DEP or WEP and would require cooling by dilution (bleed-in) air at a ratio of approximately 2 times dilution air to exhaust. This cooling of the air stream would reduce the particulate concentrations at the inlet to the WEP to 5,400 µg/m^3 which is less than the outlet guarantee.

A WEP may reduce particulate; however, hexavalent chromium concentrations are less than 2% of the particulate concentrations for process sources. McGill AirClean was consulted and they confirmed that they have never installed an EP for the purpose of controlling hexavalent chromium.

Good engineering practices dictate that the use of wet control technologies is not advisable for hot, dry sources such as the furnace or forehearth stacks. This is corroborated by McGill AirClean personnel who provided the following statement:

“McGill AirClean would never consider the installation of a wet ESP on a glass furnace for several reasons: 1) The extreme amount of cooling required to saturate the flue gas coming from the furnace. 2) The wastewater handling system required to deal with the effluent coming out of the wet ESP.”

Based on the information reviewed to date, a WEP is not expected to be technically feasible or effective for the sources at this facility based on:

- Source concentrations being less than the outlet guarantee
- Insufficient data to determine effectiveness
- Vendor input that they would not consider this an appropriate application

The site-specific standard process sets a compliance limit for the facility. As such, there needs to be confidence that the technology will achieve quantified reductions used in the standard setting process. Our assessment to date has not identified any data/technical information available to support or quantify a reduction in hexavalent chromium emissions by using a dust collector at this facility. More research is required into the expected effectiveness specific to hexavalent chromium before it can be ranked in the technical benchmarking assessment.

6.2.2 Dry Electrostatic Precipitator (DEP)

Performance guarantees for electrostatic precipitators are typically provided as outlet concentrations. Through communication with vendors, the lowest particulate outlet concentration guarantee that a vendor would consider is 0.005 gr/dscf which is approximately 11,500 µg/m^3. The current hexavalent chromium concentrations from all stacks are orders of magnitude below this outlet guarantee for a DEP.

The tables below summarize the source concentrations for hexavalent chromium and particulate compared to the DEP outlet concentration guarantee.

TABLE 7 Hexavalent Chromium Concentration Comparison for DEP

Source	Hexavalent chromium concentration (µg/m^3) [1]	DEP particulate outlet concentration (µg/m^3)
Furnace	17	11,447
Forehearth	31	
General Ventilation	0.16	

[1] Average concentration from the June 2024 source testing

TABLE 8 Particulate Concentration Comparison for DEP

Source	Particulate concentration (µg/m^3)[2]	DEP particulate outlet concentration (µg/m^3)
Furnace	16,500	11,447
Forehearth	2,535	

[2] Emission estimates and source testing

The in-stack concentrations of hexavalent chromium are 300 to 70,000 times lower than the DEP outlet guarantee for particulate. The vendor is unable to provide an outlet guarantee specifically for chromium or hexavalent chromium. This is an indicator that a DEP would have negligible removal efficiency for hexavalent chromium. A DEP may reduce particulate however; hexavalent chromium concentrations are less than 2% of the particulate concentrations for process sources.

For completeness we have included a comparison for particulate. The concentration of particulate for the furnace is higher than the DEP outlet guarantee however, the temperature of the furnace exhaust is too high for a DEP or WEP and would require cooling by dilution (bleed-in) air at a ratio of approximately 2 times dilution air to exhaust. This cooling of the air stream would reduce the particulate concentrations at the inlet to the DEP to 5,400 µg/m^3 which is less than the outlet guarantee.

The use of a heat exchanger is not technically feasible on the hot end sources as particulate generated in the hot end has a propensity to plate out on metal during significant temperature changes. If a heat exchanger were used, these particles would plate out inside the heat exchanger tubes, fouling them in a manner that would render the heat exchanger unusable. McGill AirClean has confirmed that they have never installed a heat exchanger on any glass furnace applications but have observed several installations, all of which experience severe plugging issues.

The use of a DEP is not a demonstrated control technology for hexavalent chromium emissions from a glass melting furnace. There is a significant lack of performance data for hexavalent chromium. While data exists which indicates that some wool fiberglass manufacturing facilities that have an electrostatic precipitator for controlling particulate from a glass melting furnace have lower total chromium emissions than the Guelph Glass facility, there is no data comparing EP inlet and outlet emissions of total chromium and there is no data specifically looking at hexavalent chromium. Without inlet (pre-controlled) concentrations, it is not possible to determine to what extent the equipment are controlling emissions of total chromium and to what extent variations in emission rates are due to process differences. Furthermore, while hexavalent chromium is a subset of total chromium, it cannot be assumed to have the same characteristics or properties as total chromium. Therefore, even if reduction efficiencies could be determined for total chromium, it may not be applicable to hexavalent chromium.

Based on the information reviewed to date, a DEP is not expected to be technically feasible or effective for the sources at this facility based on:

- Source concentrations being less than the outlet guarantee
- Insufficient data to determine effectiveness
- Vendor input that they would not consider this an appropriate application

The site-specific standard process sets a compliance limit for the facility. As such, there needs to be confidence that the technology will achieve quantified reductions used in the standard setting process. Our assessment to date has not identified any data/technical information available to support or quantify a reduction in hexavalent chromium emissions by using a dust collector at this facility. More research is required into the expected effectiveness specific to hexavalent chromium before it can be ranked in the technical benchmarking assessment.

6.2.3 Next Steps

As part of pre-consultation regarding the above conclusions, the MECP has requested additional literature review with respect to the technical feasibility of electrostatic precipitators. This additional review will focus on still potentially viable add on controls such as EPs. If warranted, additional findings will be addressed as an addendum to this report.

6.3 Dust Collector (DC) - Furnaces and Forehearth

Dust collectors are typically composed of a blower, dust filter bag or cartridge, filter cleaning system, and a dust removal system to capture particulate. The application of a dust collector has been assessed for technical feasibility for the furnace and forehearth sources as outlined below.

For assistance in assessing the technical feasibility of dust collectors, the Industrial Accessories Company (IAC; an air pollution control device vendor) was consulted. IAC has indicated that a baghouse would not provide effective capture for hexavalent chromium in the particle size range of <1 µm and in their opinion the hexavalent chromium particle size is typically between 0.05 to 2 µm. The small particle size range referenced is generally consistent with other published data and expectations for these processes. IAC also indicated that they do not have data regarding the effectiveness of any existing baghouse installations for the control of chromium compounds for other industrial applications (Industrial Accessories Company, pers. comm., December 10 and 12, 2024). Although dust collectors are effective control devices for larger particulate (and in many cases, metals that exist as larger particulate), we have been unable to locate dust collector performance data with respect to hexavalent chromium.

In early conversations with IAC, a membrane filter bag was referenced as an option to enhance the capture of particulate matter. However, their application is limited to exhaust streams with temperatures less than 500°F. IAC also cautioned that membrane bags are not recommended when hydrocarbons are present as that 'blinds' the membrane. Both the furnace and forehearth sources are expected to contain hydrocarbons as byproducts of combustion. Historical Owens Corning experience with PTFE membrane filters has identified rapid plugging and fouling regardless of the cleaning/purging mechanisms. The use of membrane bags is not considered technically feasible for the furnace or forehearth stacks based on a conflict between the constituents in the exhaust stream and the 'blinding' of the membrane on the bags.

Additional technical challenges exist for the furnace for most baghouse dust collectors as they have an upper inlet temperature limit of 500°F. The exhaust temperatures for the furnace stacks at this facility are over 560°F with possible temperature excursions greater than 700°F if the e-boost is not fully operational. A heat exchanger or the addition of ambient air would be needed to cool the exhaust stream. As documented in other sections of the report, a heat exchanger is not technically feasible on the hot end sources due to plating out inside the tubes, causing fouling. High temperature cartridges (potentially ceramic based) could be investigated; however, the same challenge exists in that there is no technical data available to support a reduction in hexavalent chromium emissions.

The use of a dust collector is not a demonstrated control technology specifically for this compound of interest. There is a significant lack of performance data for hexavalent chromium. While data exists which indicates that some facilities with dust collectors for controlling particulate have lower total chromium emissions than OC Guelph, there is no data comparing dust collector inlet and outlet emissions of total or hexavalent chromium. Without inlet concentrations, it is not possible to determine to what extent dust collectors are controlling emissions of total chromium and to what extent variations are due to process differences. Furthermore, while hexavalent chromium is a subset of total chromium, it cannot be assumed to have the same characteristics or properties as total chromium. Therefore, even if reduction efficiencies could be determined for total chromium, it may not be applicable to hexavalent chromium.

The site-specific standard process sets a compliance limit for the facility. As such, there needs to be confidence that the technology will achieve quantified reductions used in the standard setting process. Our assessment to date has not identified any data/technical information available to support or quantify a reduction in hexavalent chromium emissions by using a dust collector at this facility. More research is required into the expected effectiveness specific to hexavalent chromium before it can be ranked in the technical benchmarking assessment.

6.3.1 Next Steps

As part of pre-consultation regarding the above conclusions, the MECP has requested additional literature review with respect to the technical feasibility of dust collectors. This additional review will focus on still potentially viable add on controls such as dust collectors. If warranted, additional findings will be addressed as an addendum to this report.

6.4 Dust Collector (DC) General Ventilation

Dust collectors are typically composed of a blower, dust filter bag or cartridge, filter cleaning system and a dust removal system to capture particulate. As shown in the excerpt from ACGIH (2019) below, dust collectors are intended for concentrations greater than 5 mg per 1000 m^3.

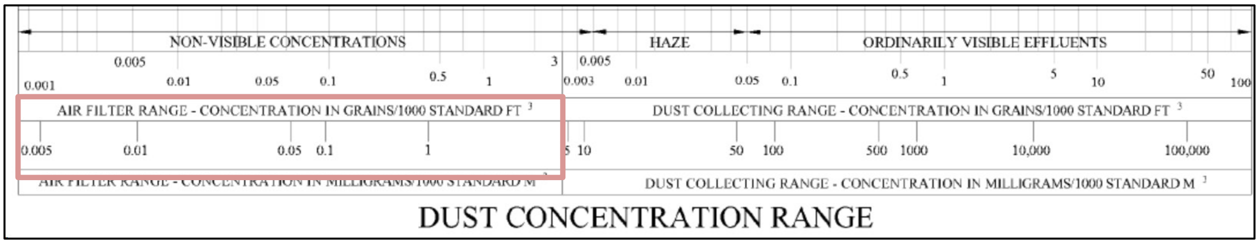

FIGURE 1 Dust Concentration Range (Part of Figure 8-15, Industrial Ventilation, ACGIH 2019)

The maximum measured concentration from the 2024 general ventilation source tests is more than 10x lower than the rated concentration range for a dust collector. Therefore, a dust collector would not be technically feasible for these sources.

6.5 Low Pressure Cyclone

A low pressure cyclone uses centrifugal force to remove particulate from the gas stream. They are typically used as a pre-cleaner to remove larger diameter particulate. Available information indicates that the hexavalent chromium emitted from this facility is expected to be very small diameter particulate. Refer to Section 6.20 for more information regarding particle size.). Cyclone technology is neither intended nor effective for particles smaller than 10 µm as noted in the reference below and is therefore not technically feasible for any of the sources at the facility.

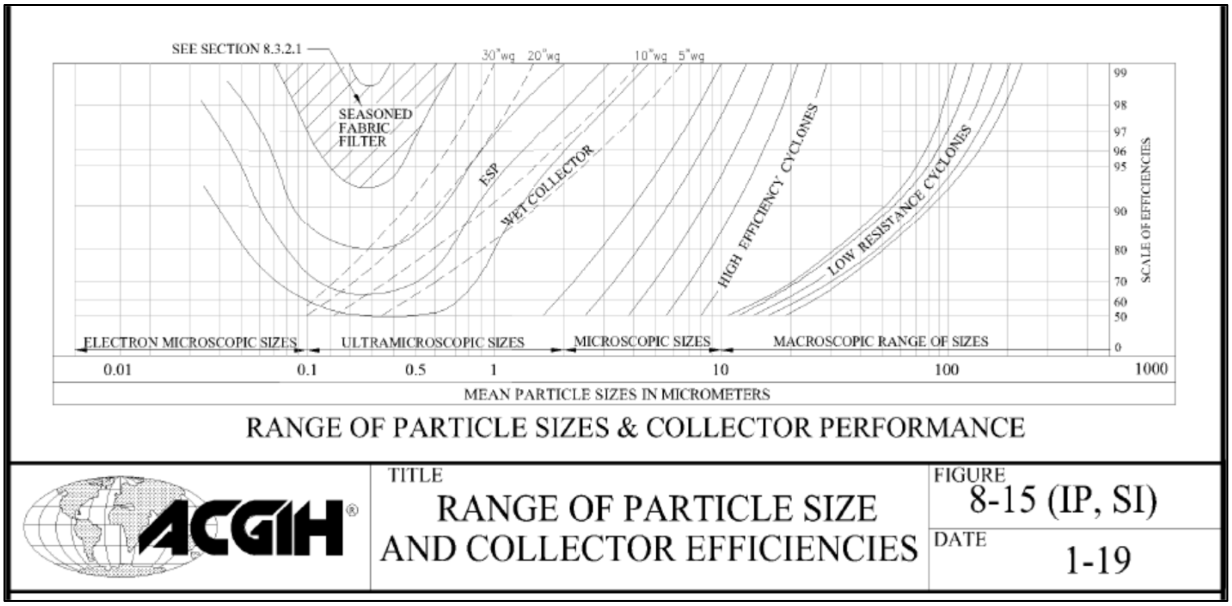

FIGURE 2 **Range of Particle Size and Collector Efficiencies (Part of Figure 8-15, Industrial Ventilation, ACGIH 2019)**

6.6 HEPA Filter

6.6.1 General Ventilation

High-efficiency particulate arrestance or HEPA is a type of air filter that consists of a mat of randomly arranged fibers, often composed of fiberglass. This technology is unproven in the glass manufacturing industry and therefore would require pilot testing.

A jurisdictional review of permits and regulatory requirements across North America and Europe for the glass manufacturing industry (as well as the fiberglass industry) did not identify any HEPA (air filter) type systems required or in use.

HEPA filter systems are most commonly used in very low particulate loading scenarios including pharmaceutical, laboratories, food processing and microelectronics. Where HEPA filters are in use they are typically installed as a final component in a larger particulate collection system.

HEPA filters are commonly limited to low capacity air flow applications in the range of 0.1 to 1.0 sm^3/s for off-the-shelf units. Custom applications can be designed for higher capacities in the range of 5 to 12 sm^3/s (U.S. EPA n.d.). Each general ventilation exhaust currently has a flowrate that ranges from 12.8 to 19.5 sm^3/s, putting them beyond the upper range of most custom designed applications for this equipment. The size of a HEPA filter is proportional to the volumetric flowrate requiring treatment. This is consistent with the experience of Owens Corning subject matter experts that the resulting size of these HEPA units would be well beyond practical engineering recommendations.

A HEPA filter is not a technically feasible option for the general ventilation emission sources at the facility based on concentration loading, lack of demonstrated successful applications in this industry, and practical engineering constraints.

6.6.2 Furnace and Forehearth

High-efficiency particulate arrestance or HEPA is a type of air filter that consists of a mat of randomly arranged fibers, often composed of fiberglass. This technology is unproven for the capture of hexavalent chromium from hot sources and unproven in this industry and therefore would require pilot testing. In addition, a HEPA filtration system is designed for dry gas streams and inlet concentrations less than 5 mg/1,000 m^3.

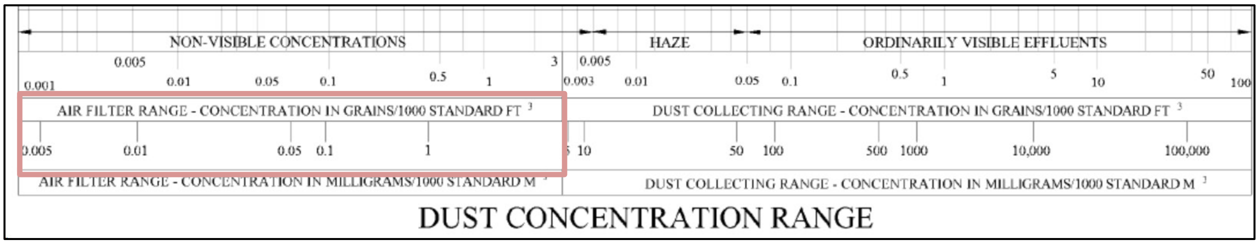

FIGURE 3 Dust Concentration Range (Part of Figure 8-15, Industrial Ventilation, ACGIH 2019)

The furnace and forehearth hexavalent chromium concentrations are 4 to 10 times higher than the maximum inlet concentrations recommended for HEPA filters. If used on more particulate-laden air streams, HEPA filters would require constant cleaning and maintenance and could not reasonably be operated as a stand-alone device under these conditions.

A HEPA filter is not a technically feasible option for the furnace and forehearth emission sources at the facility based on concentration loading.

6.7 Low Pressure Venturi Scrubber and High Pressure Venturi Scrubber

A venturi scrubber, consisting of a duct that narrows to a “throat” section which then expands, is designed to accelerate waste gas streams to atomize the scrubbing liquid to improve gas-liquid contact and capture of particles by the liquid.

Good engineering practices dictate that wet scrubbers are not advisable with hot, dry sources such as the furnace or forehearth stacks. A venturi scrubber would require pre-cooling of a high temperature air stream to avoid vapourizing the scrubbing liquid. The use of a heat exchanger is not technically feasible on the hot end (furnace stacks and forehearth). This is because particulate generated in the hot end has a propensity to plate out on metal during significant temperature changes. If a heat exchanger were used, these particles would plate out inside the heat exchanger tubes, fouling them in a manner that would render the heat exchanger unusable.

In addition, use of a wet scrubber would create an additional waste stream since it would simply transfer the hexavalent chromium to water which would then have to undergo additional mitigation.

Venturi scrubbers are not technically feasible for any sources at the facility because the hexavalent chromium concentration from every source is well below the recommended minimum pollutant loading level at which venturi scrubbers are effective (1 g/m^3); (U.S. EPA n.d.). Source concentrations at the facility are in the range of 10^{-5} to 10^{-7} g/m^3.

6.8 Liquid Bed Scrubber

Liquid bed scrubbers remove pollutants by bringing the exhaust gas stream in contact with a scrubbing liquid which can be in the form of a spray or a pool of liquid. Liquid scrubbers are capable of controlling both gaseous pollutants and particulates; however, good engineering practices dictate that wet scrubbers are not advisable with a hot, dry source such as the furnace or forehearth stacks. Use of a liquid scrubber would require pre-cooling of a high temperature air stream to avoid vapourizing the scrubbing liquid. The use of a heat exchanger is not technically feasible on the hot end (furnace stacks and forehearth). This is because particulate generated in the hot end has a propensity to plate out on metal during significant temperature changes. If a heat exchanger were used, these particles would plate out inside the heat exchanger tubes, fouling them in a manner that would render the heat exchanger unusable.

Further, use of a liquid bed scrubber would result in a hazardous liquid waste stream which would then have to undergo additional mitigation.

The use of liquid bed scrubbers to control emissions of hexavalent chromium is not a proven technology in the fiberglass manufacturing industry and would require pilot scale testing to verify it would actually remove hexavalent chromium from the process air stream. Until improvements to the technology are made and become commercially available for use in the glass manufacturing industry, liquid bed scrubbers are not considered technically feasible for the furnace and forehearth sources.

It is the experience of Owens Corning subject matter experts that equipment vendors will not guarantee an outlet concentration that is less than the current concentration of the general ventilation exhausts.

Therefore, a liquid bed scrubber would not be a technically feasible option for reducing general ventilation emissions based on concentration levels.

6.9 Spray Chamber Scrubber or Cyclone Spray Chamber

A spray chamber scrubber is a type of tray-tower scrubber and removes larger particulate by inertial or diffusional impact along with reaction or absorption in a liquid. Good engineering practices dictate that wet scrubbers are not advisable with a hot, dry source such as the furnace or forehearth stacks. Pre-cooling of a high temperature air stream would be needed to avoid vapourizing the liquid. The use of a heat exchanger is not technically feasible on the hot end sources. This is because particulate generated in the hot end has a propensity to plate out on metal during significant temperature changes. If a heat exchanger were used, these particles would plate out inside the heat exchanger tubes, fouling them in a manner that would render the heat exchanger unusable.

The use of a wet scrubber would also create an additional waste stream since it would simply transfer the hexavalent chromium to water which would then have to undergo additional mitigation.

According to the U.S. EPA APC Technology Fact sheet EPA 452/F-03-012 for Tray-tower scrubbers (U.S. EPA n.d.), collection efficiencies for small particles (<1 µm) are low for these scrubbers, hence, they are not recommended for fine PM control. The EPA also states in the U.S. EPA Air Pollution Control Technology Fact Sheet EPA452/F-03-016 (U.S. EPA n.d.) that spray tower scrubbers are generally not used for fine PM applications because high liquid to gas ratios (greater than 3 L/m^3) are required. Available information indicates that the hexavalent chromium emitted from this facility is expected to be very small diameter particulate. Refer to Section 6.20 for more information regarding expected particle sizes.

Therefore, a spray chamber scrubber is not technically feasible for any sources at this facility on the basis of good engineering practices and recommendations from regulatory agencies.

6.10 Packed Bed Filter

A packed bed filter is a type of wet scrubber consisting of a chamber containing layers of variously shaped packing material that provide a large surface area for liquid-particle contact. Particulate matter is scrubbed by the liquid and gaseous pollutants are absorbed by the liquid by forming a solution (dissolved). The primary applications for packed bed filters are VOCs, NOx, SO_2, acids and ammonia. However, plugging is a serious problem for packed bed filters, therefore, they are more suitable for gas scrubbing than PM scrubbing because of high maintenance requirements.

Packed bed filters are capable of controlling both gaseous pollutants and particulates; however, good engineering practices dictate that wet scrubbers are not advisable with a hot, dry source such as the furnace or forehearth stacks. The U.S. EPA Air Pollution Control Technology Fact Sheet EPA452/F-03-015 (U.S. EPA n.d.) supports this as it indicates that as temperature increases, the absorption rate decreases and high temperatures can lead to solvent or scrubbing liquid losses through evaporation. In addition, use of a wet scrubber would create a liquid waste stream requiring further mitigation. For the above reasons, a packed bed filter is not considered technically feasible for the furnace or forehearth sources.

The U.S. EPA Air Pollution Control Technology Fact Sheet EPA452/F-03-015 (U.S. EPA n.d.) indicates that where low outlet concentrations are required from a packed bed filter, the result is impractically tall absorption towers, long contact times and high liquid-gas ratios that may not be practical. As the general ventilation exhaust concentrations are nearing sampling detection limits, a packed bed filter design which could guarantee a lower outlet concentration would not result in a practical engineering solution and is therefore not technically feasible.

6.11 Tri-Mer Chrome Scrubber

Tri-Mer Corporation is an air pollution control equipment vendor that manufactures several types of scrubbers and filters. Tri-Mer’s chrome scrubber (C/E-1) was engineered for the application of chromic anodizing and plating lines to reduce chrome mist and particulate and is a type of wet scrubber. Tri-Mer advertises a removal efficiency of 99.5% or higher using a multilayer polypropylene pad system.

Good engineering practices dictate that wet scrubbers are not advisable with a hot, dry source such as the furnace or forehearth stacks. Pre-cooling of a high temperature air stream would be needed to avoid vapourizing the liquid. The use of a heat exchanger is not technically feasible on the hot end sources. This is because particulate generated in the hot end has a propensity to plate out on metal during significant temperature changes. If a heat exchanger were used, these particles would plate out inside the heat exchanger tubes, fouling them in a manner that would render the heat exchanger unusable. Chrome anodizing and plating activities are the current application for this technology and are conducted at ambient temperatures.

However, to ensure this option was adequately considered, Montrose contacted Tri-Mer to request additional information on this technology; however, the vendor did not provide sufficient information to support the advertised claims. Specifically, Tri-Mer indicated they did not have any testing data for installations completed, any examples of industries or the number of companies where they have installed this equipment. There is no demonstrated application of this technology in the glass manufacturing industry and insufficient evidence that this technology would perform as claimed, therefore it is not technically feasible.

6.12 Substituting with Zircon or other Non-chrome Containing Refractory

Zircon is a glass contact refractory that has no chromium content. Decades ago, zircon refractory was used for front end siderails and glass contact melter sidewalls but the corrosion that occurred at the glass surface level was so significant that the use of zircon in these locations was eliminated with the introduction of chromic oxide refractories in fiberglass front ends which commenced in the 1980s.

Accelerated laboratory corrosion test data illustrates the corrosion related benefit of chromic oxide refractory. The corrosion rate is approximately 16 times lower for chromic oxide exposed to Advantex® glass than zircon. Corrosion increases with glass temperature which explains the accelerated corrosion rate for Advantex® vs. traditional boron containing E glass. As the hottest glass is at the surface of the glass bath in a front end channel, the siderails experience the highest corrosion rates of the refractory blocks in a front end. In 2012, the possibility of going back to zircon front end siderails was evaluated and rejected due to the negative impacts. Supplier information provided in Appendix C clarifies that zircon refractory (specifically ZS1300 or zirconium silicate containing refractory) is not recommended for melter sidewalls or front end siderail applications for reinforcement furnaces.

Zircon causes defects in the glass called stoning, in which particles of refractory end up in the glass. The particles disrupt the fiberizing process due to the very fine diameter of the fibers required. The result is large amounts of waste that cannot be recycled back into the furnace. The use of chromic oxide for front end siderails results in less stoning. Reduced stoning has a positive impact on conversion efficiency (CE) which is defined as the mass ratio of glass fiber and binder leaving forming as good product to the mass of the glass and binder supplied as inputs. Improved CE reduces environmental impact by reducing the energy and emissions per unit of finished goods made and by reducing waste to landfill.

The use of zircon refractory in place of chromic oxide is not considered technically feasible on the basis of impact to the process and manufacturer recommendations. Additional confidential information is provided in Appendix C.

6.13 Modifying Batch Ingredients

Based on chemical modelling conducted by SEFPRO, the presence of alkali materials in the batch is one of the drivers of the formation of hexavalent chromium compounds. As a result, in 2018, the OC Guelph facility removed the soda ash from their batch materials which reduced the alkali content of the batch materials from approximately 0.8 to 0.1%. It is possible that reducing the alkali content further could result in marginal changes to hexavalent chromium emissions but it is expected that the vast majority of reductions have been achieved with work already conducted. There would be diminishing returns for any additional alkali reductions from the current level. Although a reduction in alkali is chemically predicted to result in a decrease in hexavalent chromium, there is not currently any data to accurately quantify a reduction.

As there is an ASTM standard for glass products produced at this facility and the inputs to the process are all mined materials with no post-consumer cullet, opportunities to modify the batch composition are limited.

6.14 Using Fused Zirconia Siderails (XiLEC) for Forehearth and Channels

As part of the technical benchmarking brainstorming process, ideas were discussed related to methods of reducing the freeboard area. The freeboard area is the area of exposed chromic oxide refractory just above the glass line. This freeboard area is the location of the most corrosive conditions and subject to a variety of reaction kinetics in the adjacent combustion space.

An option discussed was the use of a two piece siderail, which would consist of a lower block of chromic oxide and an upper block of zircon (or fused zirconia, another non-chromic oxide refractory) and would eliminate the presence of chromic oxide at or above the glass line. Eliminating the presence of chromic oxide above the glass line would eliminate the potential for volatilization of chromic oxide in the presence of oxygen, leading to reduction/elimination chromium emissions including hexavalent chromium.

All known refractory materials that can be used for an upper block of the glass contact sidewalls that are not high chromic oxide have higher corrosion rates. Additionally, dividing the siderail into an upper and lower block to introduce a non-chrome bearing refractory above the glass line would introduce a horizontal joint that would experience higher rates of corrosion. Corrosion results in higher fiber break rates in the fiberizing process which disrupts the production of the small diameter fiber products. Additionally, this generates more scrap and lowers forming efficiency.

The use of a non-chromic oxide refractory for an upper siderail in the furnace and forehearth is considered not technically feasible as the production of very fine glass fibers is disrupted. Additional confidential information is provided in Appendix C.

6.15 Using Radiant Electric Heat

As part of reviewing process control changes that may reduce hexavalent chromium, alternative approaches were reviewed for providing the necessary energy inputs to the system. The implementation of radiant electric heating instead of natural gas combustion to maintain molten glass temperatures in the furnace and forehearth was examined. The use of radiant heat would eliminate the burner flame impingement and combustion velocity along the freeboard, theoretically reducing hexavalent chromium. By using radiant heating exclusively, flue gases from fossil fuel combustion are eliminated. Volatiles above the glass surface would not exit the space above the glass but rather condense and coat the inside of the refractory superstructure in a covered front end as there is no flue gas leaving the space.

Materials of construction for present day radiant heating elements are not compatible with the materials of construction for the “bushings”, or extrusion dies, constructed of metallic alloys. The bushings are the devices through which molten glass is fiberized into filaments that are the key component of the finished goods products produced. When the incompatible materials are in contact, at typical operating temperatures, the bushings are damaged resulting in their near immediate failure. Element failure over the life of melting systems is expected, based on a supplier’s estimate of element life. Present day radiant heating technology has the elements positioned such that their failure would ultimately result in mixing of these materials, leading to the rapid failure of the bushings. Therefore, this option is not technically feasible for the furnace or forehearth.

6.16 Using Substoichiometric Combustion Ratio

Operating the system (furnace and forehearth channels) at a reducing (substoichiometric) atmosphere instead of an oxidizing atmosphere in the combustion area was evaluated. If combustion maintains a reducing atmosphere, chromium volatiles are likely to exist in the trivalent not hexavalent form.

However, this reducing atmospheric environment interferes with the redox state of the glass causing the glass to be greener from the reducing atmosphere's impact on iron in the glass resulting in off-specification final product. This change in colour would not be acceptable to some customers.

A further challenge is that substoichiometric combustion in a melter can cause damage to the metal stacks when unburned gas combusts after mixing with dampering air above the refractory stack and below the metal stack.

Additionally, substoichiometric combustion is known to cause fouling of front end oxy/gas burners. Carbon deposits on the burner tip are known to deflect the flame so that it impinges on the burner block which melts the refractory causing stoning contamination and the need for hot repair of the front end superstructure.

The use of substoichiometric combustion is not technically feasible at this facility.

6.17 Adding E-boost

The use of supplemental electrical energy via electrodes submerged in the glass to reduce the energy required from natural gas combustion to maintain molten glass temperatures in the furnace and forehearths was examined as it would reduce the temperature of the combustion space as well as the intensity of flame impingent and combustion gas velocities upon the freeboard area.

Electrodes submerged in the glass are currently used in the furnace in conjunction with fossil fuel combustion to provide energy to melt glass but are not used in forehearths for textile/composites glass manufacturing. The Guelph facility installed an e-boost system in the furnace during the 2022 rebuild.

The implementation of the electrodes in the forehearth has been investigated in the past but is not technically feasible due to electrical interference with the bushings in the forehearth which cannot be overcome. The bushings are the electrically heated plates located along the bottom of the forehearth that extrude the glass into very fine fibers.

Additionally, the principles of e-boost are based on molten glass having sufficiently low electrical resistance, allowing the conductance of electricity. As glass temperature decreases, resistance increases, to the extent that solid glass is an electrical isolator. Given glass temperatures in the forehearths are approx. 300°F colder than the furnace, significant research would be required to determine if e-boost is possible given the electrical properties of glass at the required lower operating temperatures.

6.18 Converting to Air/Gas Combustion vs. Oxygen/gas Combustion

The furnace and forehearth operate with an oxygen/natural gas firing system instead of an air/natural gas firing system. The use of oxygen for combustion instead of air is advantageous for several reasons including:

- Substantially reduces the amount of natural gas required due to improved combustion efficiency
- Reduces emissions of nitrogen oxides and CO_2

The type of glass produced at this facility requires higher melting temperatures than many other types of glass, including insulation fiberglass. An oxygen/gas combustion system produces hotter flames with less fuel input. An oxygen/natural gas combustion system is more efficient as it does not require heating the nitrogen in the air, resulting in about a 60% reduction in natural gas used. This directly translates to a reduced carbon footprint by decreasing greenhouse gas emissions. Natural gas used for the furnace and forehearth account for approximately 55% of the total natural gas used by the facility.

Due to the reduced natural gas consumption required when using an oxygen/gas combustion system, total facility CO_2 emissions from natural gas consumption would increase to approximately 150% of the current emissions if the facility were to convert to an air/gas combustion system.

Due to the increase in fuel combustion as well as the increased availability of nitrogen in the combustion space, literature suggests that total facility NOx emissions would increase to approximately 300% of the current emissions if the facility were to convert to an air/gas combustion system (Baukal and Eleazer 1998).

A reduction in hexavalent chromium might occur by converting to air/gas combustion on the basis that it would reduce flame temperature and hot spots along the refractory freeboard. However, there is no data available to support potential reductions, creating a high level of uncertainty with respect to the expected success of this option.

The 2022 furnace rebuild incorporated several changes to the design of the furnace which were successful in significantly reducing hexavalent chromium emissions from that source. Emission reductions for the furnace have been substantial to the point where the furnace stack emissions comply with the Schedule 3 standards. It is unclear the extent to which each modification contributed to the reduction in emissions. Therefore, the effects on hexavalent chrome emissions of a major design change to the furnace in order to convert to air/gas combustion are unknown. The impact of the increased natural gas combustion may have unforeseen impacts on the reductions that have been previously achieved.

As indicated in the GIASO Section 2.4.2, "…screening-out technically infeasible options might consider… a significant lack of performance data for options that are based upon new or emerging technologies."

The conversion of the furnace and forehearth to air/natural gas combustion is not technically feasible at this facility on the basis that an emission reduction cannot be quantified with any reasonable level of accuracy, may cause compliance challenges for other emissions such as NOx and may nullify the hexavalent emissions reductions achieved to date.

6.19 Minimizing Front End Freeboard

As part of the technical benchmarking brainstorming process, potential methods of reducing the freeboard area were discussed. The freeboard area is the area of exposed chromic oxide refractory just above the glass line.

An option discussed was the modification of glass levels by way of throughput control to raise the glass level slightly so that less freeboard is exposed. Reducing the amount of exposed chromic oxide refractory above the glass line would reduce the potential for volatilization of chromic oxide in the presence of oxygen, leading to a reduction of chromium emissions including hexavalent chromium.

Upon review of the current glass levels in the furnace and forehearth, it was determined that due to the variation in glass level in the forehearth, there are already locations where the glass height is approaching the top of the freeboard. The glass flows through the forehearth by gravity and therefore it is not possible to selectively increase the glass level in specific areas of the forehearth without increasing the glass levels in the areas where the glass already approaches the top of the freeboard which would cause the glass line in these areas to be above the chromic oxide refractory.

Therefore, increasing the glass level in the forehearth to reduce the amount of freeboard is considered not technically feasible as it would involve glass contact with the non-chromic oxide refractory which results in higher levels of refractory corrosion and potential stoning. Corrosion and stoning results in higher fiber break rates in the fiberizing process which disrupts the production of the small diameter fiber products. Additionally, this generates more scrap and lowers forming efficiency.

The freeboard area has been minimized to the extent possible in both design and implementation for the furnace and forehearth and there are no additional gains available.

6.20 Substituting with Low Sublimation Chromium Refractory

A low sublimation chromic oxide (LSC) refractory was formulated by SEFPRO (2010-2013) with the objective of a lower rate of total chrome volatilization. The manufacturer’s published data on emissions is related to total chrome volatilization, not the generation of the hexavalent form of chromium. Currently there is insufficient data to confirm that there is a beneficial impact from the use of this low sublimation chromium refractory on hexavalent chromium emissions. SEFPRO has not indicated there are any more recent developments in their LSC refractory in the last decade.

Owens Corning installed this LSC refractory in 2013 as a siderail trial in the CFM forehearth and it is still in-service today. When the CFM forehearth reaches end of life and requires a rebuild, the wear on the in-service LSC refractory will be observed for any concerning wear patterns which would indicate it failed to perform as designed.

Testing at the stack exhausting the forehearth has not yielded any discernable reduction in hexavalent chromium emissions that could be assigned to the use of LSC. Other limited available data (Owens Corning R&D) did not indicate a statistically significant difference between the combustion space hexavalent chromium concentrations for the normal chromic oxide refractory versus the LSC oxide refractory.

Despite the absence of data to support reduction efficiencies, OC will continue to consider and implement the best available options in refractory. If the performance of the in-service LSC refractory is confirmed, Owens Corning plans to install LSC refractory as a best practice for the CFM forehearth rebuild for the siderails. The asset life (rebuild schedule) for the furnace and WUCS channels and forehearth are beyond the expected expiry date of the renewed site-specific standard and will be reviewed at a later date.

Reductions from this option have not been quantified (assumed to be zero) for the purposes of setting a future POI limit due to a lack of reliable data.

6.21 Incorporating Horizontal Burner Firing (Design Change)

Research and development conducted over the past several years has led to a deeper understanding of the influence of peak surface temperatures and burner exhaust velocities at the chromium refractory freeboard area and its relationship to hexavalent chromium generation. As a result, Owens Corning is in the final stages of an alternative oxygen/gas combustion design for the forehearth. This design change involves repositioning the “top fired’ burners to a horizontal “side fired” configuration and the use of smaller, more frequently spaced burners to reduce exhaust gas velocity at the freeboard face. Thermodynamic modelling of this redesign predicts a meaningful reduction of the exhaust gas velocity at the freeboard area which is expected to reduce the generation of hexavalent chromium.

For the purpose of proceeding with this option, a small reduction quantification of 6.75% has been assigned. The expected reduction is anticipated to be more substantial. At this time, there is insufficient research or data to more accurately quantify the impact.

Additional confidential information is located in Appendix C.

6.22 Re-Engineering Exhaust Stacks

In addition to the required categories for pollution control considerations (material substitution, process changes and add-on controls), Owens Corning has also incorporated the use of stack modifications in the POI reduction strategy. Modifications are planned for the furnace and forehearth stacks to improve dispersion. Fans will be installed to increase the flowrate from the furnace and forehearth stacks. Initial plans are for these fans to draw air from inside the furnace hall into the furnace and forehearth stacks; however, this feasibility assessment is ongoing. This action will increase the exit velocity to improve dispersion and enhance emission capture into process stacks and reduce concentrations from general ventilation. The forehearth stack will also be extended to a total height of 32 m aboveground to overcome the influence of the building on dispersion. These planned actions are not expected to require any downtime of the facility operations and can therefore be implemented in a timely manner with a high degree of certainty for quantifying a POI reduction.

Quantification of the POI reduction for these actions is based on dispersion modelling using estimated parameters for both flowrates and final exhaust gas temperatures.

6.23 Technical Feasibility Summary by Source

The previous sections provided details supporting that many of the potential options identified are not technically feasible for this facility. The following table provides a summary of the technical feasibility assessment by source.

TABLE 9 Summary of Technical Feasibility by Source

Category	Individual Option Description	Feasible?		
		Furnace	Forehearth	General Ventilation
Add-on Control	Dry Electrostatic Precipitator (DEP)	[1]	[1]	No
	Wet Electrostatic Precipitator (WEP)	[1]	[1]	No
	Dust collector/baghouse (DC)	[1]	[1]	No
	Low Pressure Cyclone	No	No	No
	HEPA Filter	No	No	No
	Low Pressure Venturi Scrubber	No	No	No
	High Pressure Venturi Scrubber	No	No	No
	Liquid Bed Scrubber	No	No	No
	Spray Chamber Scrubber or Cyclone Spray Chamber	No	No	No
	Packed Bed Filter	No	No	No
	Tri-Mer Chrome Scrubber	No	No	No
Material Substitution	Replacing chromic oxide containing refractory with Zircon or other non-chrome containing refractory	No	No	N/A
	Substituting with Low Sublimation Chromium Refractory	Yes	Yes	N/A
	Modifying Batch ingredients	No	No	N/A
	Using fused zirconia siderails (XiLEC) for forehearth and channels	No	No	N/A
Process Change	Using radiant electric heat	No	No	N/A
	Using Substoichiometric combustion ratio	No	No	N/A
	Adding e-boost	[2]	No	N/A
	Converting furnace to air/gas combustion vs. oxygen/gas combustion	No	N/A	N/A
	Converting front end to air/gas combustion vs. oxygen/gas combustion	N/A	No	N/A
	Minimizing front end freeboard minimization	N/A	No	N/A
	Incorporating horizontal burner firing in the furnace and/or forehearth (design change)	N/A	Yes	N/A
	Using more accurate combustion control skids with constructing front end superstructures (two technologies must be combined to be effective)	[2]	[2]	N/A
Other	Re-engineering the exhaust points to overcome site-specific dispersion challenges	Yes	Yes	N/A

[1] The action plan will include further technical feasibility and efficiency review
[2] Feasible and previously implemented

Material substitution and process changes considered for process sources may indirectly impact general ventilation emissions. However, material substitution and process changes are not applicable for the general ventilation exhausts as they are not generation points.

7 RANKING OF TECHNICALLY FEASIBLE POLLUTION CONTROL OPTIONS

The ranking of the technically feasible pollution control options and combinations has been conducted based on a top-down analysis, from the greatest reduction to the smallest reduction. This approach was used to identify the options which are most effective at minimizing the POI concentration for each source or group of similar sources.

7.1 Initial Ranking of Pollution Control Options

The initial ranking was conducted by assessing each individual option for each individual source or source group. The ranking of individual options was based on POI reductions quantified with dispersion modelling. The individual options are ranked within each category of add-on controls, material substitutions and process changes. OC Guelph has also included an optional category for stack re-engineering options. The results of the initial ranking can be found in the following table.

TABLE 10 Initial Ranking of Individual Pollution Control Options

Source Group	Category	Individual Option Description	Reduction Efficiency	Ranking
Furnace	Add-on Control	Dust collector (DC) or Electrostatic Precipitator (EP)	NA[1]	NA[1]
	Material Substitution	Substituting with Low Sublimation Chromium Refractory	0%[2]	NA
	Process Change	No technically feasible options	NA	NA
	Stack Re-engineering	Furnace volumetric flow rate increased to 5.13 m^3/s. Temperature estimated based on relative volumes of air and added air at 25C	53%	1
Forehearth	Add-on Control	Dust collector (DC) or Electrostatic Precipitator (EP)	NA[1]	NA[1]
	Material Substitution	Substituting with Low Sublimation Chromium Refractory	0%	NA
	Process Change	Horizontal burner firing in the CFM forehearth	7%	1
	Stack Re-engineering	Forehearth volumetric flow rate increased to 11 m^3/s Temperature estimated based on relative volumes of air and added air at 25C	71%	1
		Forehearth stack height increase (to 32mag)	63%	2
		Forehearth stack diameter reduced to 0.45 m	38%	3
General Ventilation		No technically feasible options	NA	NA

[1] Research to date indicates these controls are not expected to be technically feasible or effective. Additional review will be conducted as part of the action plan. DC and EP will not be continued forward in this report.

[2] LSC is technically feasible for the furnace. Asset life dictates this won't be implemented prior to 2036.

7.2 Pollution Control Strategies

Once the initial ranking of individual pollution control options was completed, the options were then combined to create pollution control strategies for each source. The GRSSS MECP guidance document describes a process for determining the default strategy by combining the best add-on control, plus the best material substitution, plus the best process change for each source to create the Default Technically Feasible Pollution Control Strategies.

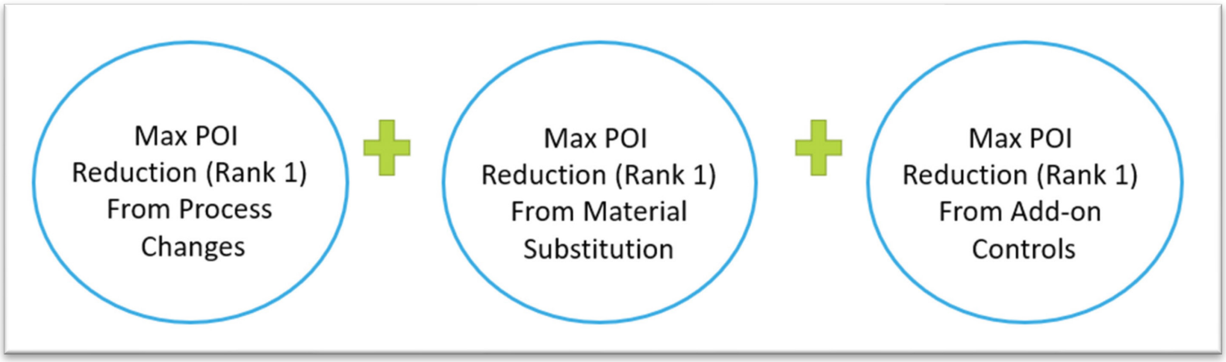

FIGURE 4 Default Technically Feasible Pollution Control Strategy by Source

The Default Technically Feasible Pollution Control Strategy for each source group will be the strategy with the greatest potential to reduce the POI concentration for its respective source group. The following table outlines the technically feasible pollution control strategies for this facility.

TABLE 11 Initial Ranking of Pollution Control Strategies By Source

Source Group	Strategy	Strategy ID	% POI Reduction by Source Group	Ranking
Furnace	Furnace volumetric flow rate increased to 5.13 m^3/s [1]	VFN2	53%	1
	Substituting with Low Sublimation Chromium Refractory	FN2	0%	2
	No modifications	VFN1	0%	3
Forehearth	Horizontal burner firing in the CFM forehearth Forehearth stack height increase (to 32mag) Forehearth volumetric flow rate increased to 11 m^3/s [1] Substituting with Low Sublimation Chromium Refractory in CFM forehearth	VFH9	82%	1
	Forehearth stack height increase (to 32mag) Forehearth volumetric flow rate increased to 11 m^3/s [1] Substituting with Low Sublimation Chromium Refractory in CFM forehearth	VFH4	80%	2
	Horizontal burner firing in the CFM forehearth Forehearth volumetric flow rate increased to 11 m^3/s [1] Substituting with Low Sublimation Chromium Refractory in CFM forehearth	VFH7	73%	3
	Forehearth volumetric flow rate increased to 11 m^3/s [1] Substituting with Low Sublimation Chromium Refractory in CFM forehearth	VFH6	71%	4
	Forehearth stack height increase (to 32 mag) FH stack diameter reduced to 0.45 m Substituting with Low Sublimation Chromium Refractory in CFM forehearth	VFH3	69%	5
	Horizontal burner firing in the CFM forehearth Forehearth stack height increase (to 32 mag) Substituting with Low Sublimation Chromium Refractory in CFM forehearth	VFH8	65%	6
	Forehearth stack height increase (to 32 mag) Substituting with Low Sublimation Chromium Refractory in CFM forehearth	VFH5	63%	7
	FH stack reduced diameter to 0.45 m Substituting with Low Sublimation Chromium Refractory in CFM forehearth	VFH10	38%	8
	Horizontal burner firing in the CFM forehearth Substituting with Low Sublimation Chromium Refractory in CFM forehearth	FH2	7%	9

[1] Temperature estimated based on relative volumes of air and added air at 25C

7.3 Ranking of Control Combinations

Once the initial ranking of pollution control strategies was completed, combinations of the various pollution control strategies for each source group were modelled to determine the most effective, technically feasible combination. Figure 5 below provides an outline of the approach.

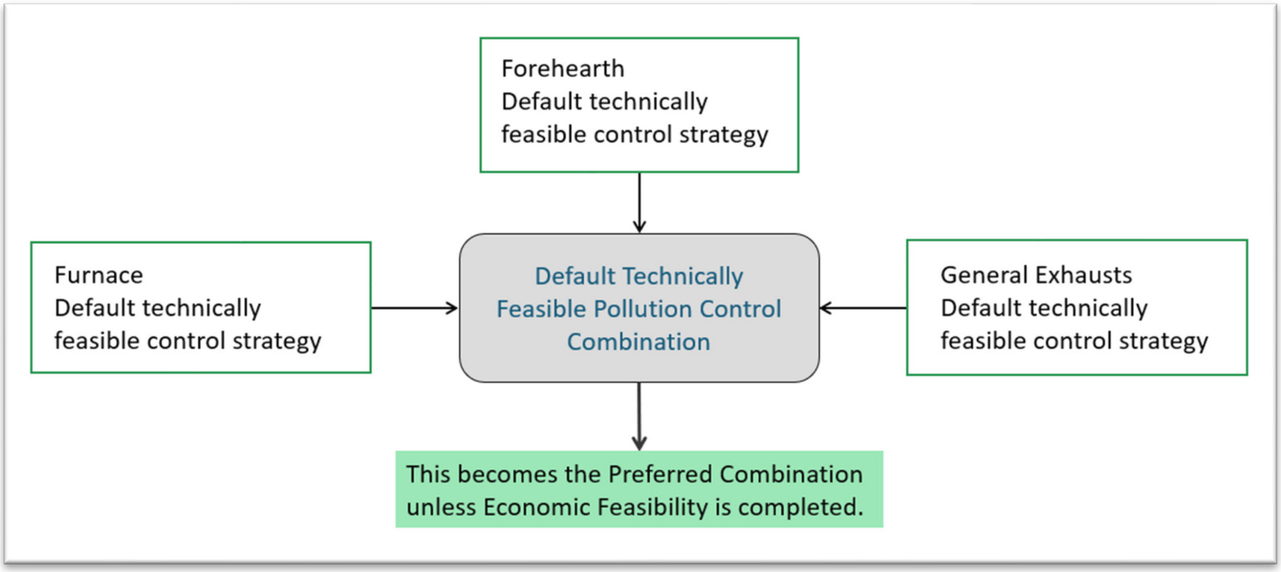

FIGURE 5 Pollution Control Combination Development

The following table outlines the technically feasible pollution control combinations for this facility.

TABLE 12 Ranking of **Pollution Control Combinations**

Facility Combination Description[1]	Combination ID	Overall Percent Reduction	Ranking
Furnace: VFN2 Forehearth: VFH9	VPCC13_SSS[2]	49%	1
Furnace: VFN2 Forehearth: VFH4	VPCC5_SSS	48%	2
Furnace: VFN1 Forehearth: VFH9	VPCC10_SSS	45%	3
Furnace: VFN1 Forehearth: VFH4	VPCC4_SSS	45%	4
Furnace: VFN2 Forehearth: VFH8	VPCC12_SSS	42%	5
Furnace: VFN2 Forehearth: VFH5	VPCC14_SSS	42%	6
Furnace: VFN2 Forehearth: VFH7	VPCC11_SSS	41%	7
Furnace: VFN1 Forehearth: VFH3	VPCC3_SSS	41%	8
Furnace: VFN2 Forehearth: VFH6	VPCC15_SSS	41%	9

Facility Combination Description[1]	Combination ID	Overall Percent Reduction	Ranking
Furnace: VFN1 Forehearth: VFH8	VPCC9_SSS	39%	10
Furnace: VFN1 Forehearth: VFH5	VPCC6_SSS	38%	11
Furnace: VFN1 Forehearth: VFH7	VPCC8_SSS	38%	12
Furnace: VFN1 Forehearth: VFH6	VPCC7_SSS	37%	13
Furnace: VFN1 Forehearth: VFH10	VPCC16_SSS	18%	14
Furnace: FN2 Forehearth: FH2	PCC4_SSS	3%	15

[1] Descriptions for each strategy ID can be found in Table 8

[2] The highest ranked pollution control combination (a combination of the default technically feasible control strategies for each source) becomes the Default Technically Feasible Pollution Control Combination

Each scenario was assessed using AERMOD to determine the POI reduction for each combination. The modelling files for all scenarios can be found in appendices of the ESDMR. The combinations were ranked based on the anticipated POI concentration reduction using the top-down approach prescribed in Appendix A of the GRSSS MECP guidance document.

7.4 Final Selection of Preferred Pollution Control Combination

A final assessment was conducted comparing the default pollution control combination (PCC) to the other pollution control combinations, along with the current scenario to provide perspective on the anticipated POI concentration reductions. Cost effectiveness was not completed as part of this application. Therefore, the default (best) technically feasible PCC is selected as the preferred technically feasible PCC. The results of this assessment are outlined in the table below.

TABLE 13 Detailed Ranking and Final Selection of Preferred Option

	Source ID (group)	Strategy ID[1]	% POI Reduction by Source Group	Overall % of Schedule 3 Standard
Current (with uncertainty)	All	NA	NA	952%
Default/Preferred Technically Feasible Pollution Control Combination (DPCC)	Furnace	VFN2	53%	489%
	Forehearth	VFH9	82%	
	General Ventilation	NA	0%	
Second Best Technically Feasible PCC	Furnace	VFN2	53%	491%
	Forehearth	VFH4	80%	
	General Ventilation	NA	0%	
Third Best Technically Feasible PCC	Furnace	VFN1	0%	523%
	Forehearth	VFH9	82%	
	General Ventilation	NA	0%	
Fourth Best Technically Feasible PCC	Furnace	VFN1	0%	525%
	Forehearth	VFH4	80%	
	General Ventilation	NA	0%	

	Source ID (group)	Strategy ID[1]	% POI Reduction by Source Group	Overall % of Schedule 3 Standard
Fifth Best Technically Feasible PCC	Furnace	VFN2	53%	549%
	Forehearth	VFH8	65%	
	General Ventilation	NA	0%	
Sixth Best Technically Feasible PCC	Furnace	VFN2	53%	555%
	Forehearth	VFH5	63%	
	General Ventilation	NA	0%	
Seventh Best Technically Feasible PCC	Furnace	VFN2	53%	557%
	Forehearth	VFH7	73%	
	General Ventilation	NA	0%	
Eighth Best Technically Feasible PCC	Furnace	VFN1	0%	558%
	Forehearth	VFH3	69%	
	General Ventilation	NA	0%	
Ninth Best Technically Feasible PCC	Furnace	VFN2	53%	564%
	Forehearth	VFH6	71%	
	General Ventilation	NA	0%	
Tenth Best Technically Feasible PCC	Furnace	VFN1	0%	584%
	Forehearth	VFH8	65%	
	General Ventilation	NA	0%	
Eleventh Best Technically Feasible PCC	Furnace	VFN1	0%	590%
	Forehearth	VFH5	63%	
	General Ventilation	NA	0%	
Twelfth Best Technically Feasible PCC	Furnace	VFN1	0%	591%
	Forehearth	VFH7	73%	
	General Ventilation	NA	0%	
Thirteenth Best Technically Feasible PCC	Furnace	VFN1	0%	598%
	Forehearth	VFH6	71%	
	General Ventilation	NA	0%	
Fourteenth Best Technically Feasible PCC	Furnace	VFN1	0%	783%
	Forehearth	VFH10	38%	
	General Ventilation	NA	0%	
Fifteenth Best Technically Feasible PCC	Furnace	FN2	0%	921%
	Forehearth	FH2	7%	
	General Ventilation	NA	0%	

[1] Descriptions for each strategy ID can be found in Table 8

7.5 Frequency of Exceedance at Specific Receptors

The default pollution control combination (DPCC) was assessed and compared to the current scenario according to the POI concentration results from the modelling assessment. The DPCC was modelled to determine the predicted concentration at the location of the maximum POI, as well as the impacted sensitive receptors. A frequency analysis was also completed for both scenarios, which assessed the frequency of exceedance at the most impacted receptors. The table below presents additional information regarding the magnitude and exceedance frequency of modelled concentrations at sensitive receptors and the location of the maximum concentration. The modelling files can be found in appendices of the ESDMR.

TABLE 14 Frequency of Exceedance

Ranking	Source ID (group)	Strategy ID	Overall % of Sch 3 Standard	% of Schedule 3 Standard at Specified Receptor (Receptor with the highest % Max POI)	POI Exceedance Frequency [2]
Current (with uncertainty)	Status quo		952%	348% (at 95 Toronto St)	100% (at 95 Toronto St)
Best (Default) Technically Feasible PCC[1]	Furnace	VFN2	489%	165% (at 83/79 Toronto St)	100% (at 83/79 Toronto St)
	Forehearth	VFH9			
	General Ventilation	NA			

[1] PCC is Pollution Control Combination

[2] % of time exceedance occurs at the receptor. Since hexavalent chromium has an annual standard, the frequency refers to the % of modelled years above the standard.

8 CLOSURE

Owens Corning has conducted a thorough and complete jurisdictional review and technology feasibility assessment regarding air emissions for hexavalent chromium. The result is the development of the preferred technically feasible pollution control combination for the facility. This provides the basis for the Action Plan, provided as a separate document in the application requesting a site-specific standard for hexavalent chromium.

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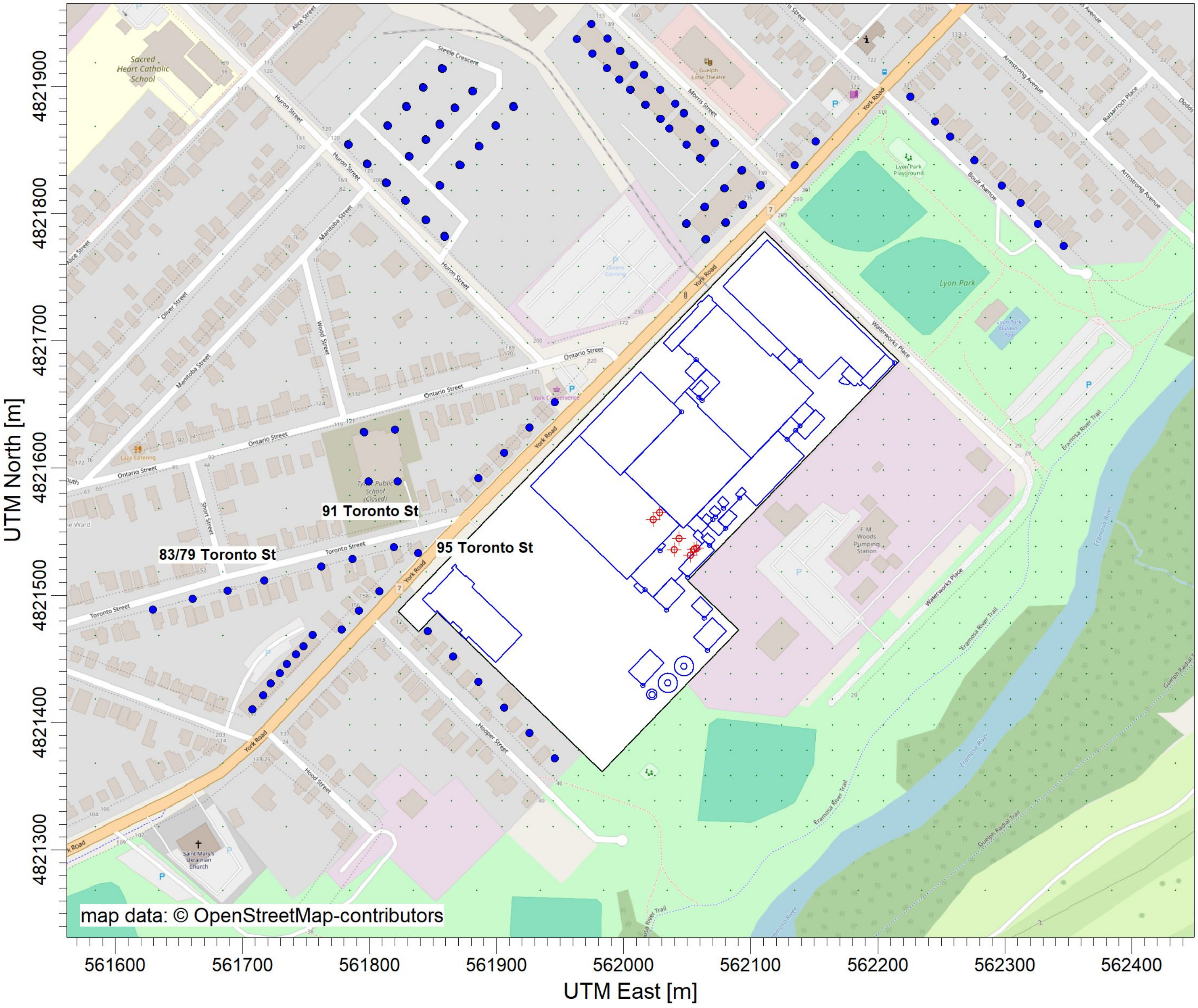
APPENDIX A
Source Contributions – Current Operations

Current Contributions at Max POI Locations

Source (Group)	Maximum Contribution to Point of Impingement Concentrations											
	At Point of Maximum Concentration			At Receptor 1 (95 Toronto St)			At Receptor 2 (91 Toronto St)			At Receptor 3 (83/79 Toronto St)		
	UTM Coordinates	Year	(ng/m3)	UTM Coordinates	Year	(ng/m3)	UTM Coordinates	Year	(ng/m3)	UTM Coordinates	Year	(ng/m3)
All	562063.97mE 4821525.92mN	2017	1.33	561838.11mE 4821533.49mN	2018	0.49	561818.97mE 4821537.84mN	2018	0.47	561786.42mE 4821528.84mN	2018	0.46
Forehearth	562070.91mE 4821533.11mN	2017	0.66		2018	0.33		2018	0.32		2018	0.30
Furnace	562224.35mE 4821638.39mN	2020	0.11		2018	0.07		2018	0.07		2018	0.07
General Ventilation	562063.97mE 4821525.92mN	2020	0.65		2018	0.09		2018	0.08		2018	0.08

PROJECT TITLE:

OC Guelph Glass Plant
Sensitive Receptors



COMMENTS:

Three most impacted receptors are 95 Toronto St., 91 Toronto St. and 83/79 Toronto St.

SOURCES:

7

RECEPTORS:

2640

COMPANY NAME:

Owens Corning Guelph Facility

MODELER:

Montrose Environmental Solutions Canada Inc.

DATE:

2/21/2025

SCALE: 1:5,000

0 0.1 km

MONTROSE ENVIRONMENTAL

PROJECT NO.:

24-035387

AERMOD View - Lakes Environmental Software

E:\OC_Guelph\24035387_SSS\VPCC13_R1\VPCC13_R1.isc

APPENDIX B
Jurisdictional Review Documentation

JRC Reference Report – Best Available Techniques (BAT) Reference Document for the Manufacture of Glass (European Commission), 2013

Section reference	Key items	Rationale/Applicability
Section 2.3		
Table 2.3	only 5.6% of the furnace types in the EU in 2005 (>20 t/day) are oxygen fired (mostly continuous filament industry)	Provides context that the Guelph facility furnace is fairly unique compared to the most common furnace types in the EU when this report was prepared.
Section 2.6		
2.6 Continuous filament glass fibre	At the time of the report (2010-2013) E-glass was the typical glass composition for this sector. Table 6 shows boron and fluoride as part of the mix at 0-10% wt each	Guelph facility uses an Advantex formulation that does not contain any added boron or fluoride
3.5 CF glass fibre		
Table 3.25 Overview of CFGF inputs and outputs	Dust without abatement system 1.4 - 2 kg/tonne of glass produced	Guelph furnace total PM emission rate = 0.07 kg/tonne of glass melted. Without abatement, dust from Guelph furnace is estimated to be 20x lower than the value stated in the report.
Table 3.25 Overview of CFGF inputs and outputs	Dust with low or boron-free formulation as a reduction measure <0.14 - 0.35 kg/tonne of glass produced	Guelph furnace total PM emission rate = 0.07 kg/tonne of glass melted. Guelph does not add boron and so this is a reasonable comparator for dust emissions expectations. Guelph is half of the lower limit of this range.
Table 3.25 Overview of CFGF inputs and outputs	Dust with end-of-pipe abatement system 0.02 - 0.24 kg/tonne of glass produced	Guelph furnace total PM emission rate = 0.07 kg/tonne of glass melted. Guelph furnace PM emissions (without end of pipe abatement) are within the range stated by the EU for end of pipe abatement)
2.5.2.2 Emissions to air - Melting (CFGF)	Note: CFGF is Continous filament glass fibre	
	Dust emissions from the melting process are predominantly alkali and alkaline earth sulphates and borates.	Guelph facility does not use Boron in the batch materials and has already reduced the alkali content of the batch materials.
Table 3.28 Emission levels from CFGF furnaces	PM (with primary abatement technique which is a boron free batch formulation) <0.14 - 0.35 kg/tonne of glass melted	Guelph furnace total PM emission rate = 0.07 kg/tonne of glass melted. Guelph does not add boron (which is the primary abatement technique) Guelph is half of the lower limit of this range.
Table 3.28 Emission levels from CFGF furnaces	PM (with secondary abatement techniques) <0.02 - 0.24 kg/tonne of glass melted	Guelph furnace total PM emission rate = 0.07 kg/tonne of glass melted. Guelph furnace PM emissions (without secondary abatement) are within the range stated by the EU for secondary abatement)
Table 3.28 Emission levels from CFGF furnaces	Metals Group 1 (As, Co, Ni, Cd, Se, CrVI) (with primary abatement of boron free batch) <0.0045 kg/tonne of glass melted	Guelph furnace emissions of these metals are several orders of magnitude lower than listed in Table 3.28.
Table 3.28 Emission levels from CFGF furnaces	Metals Group 1 (As, Co, Ni, Cd, Se, CrVI)(with secondary abatement techniques) <0.0045 kg/tonne of glass melted	Guelph furnace emissions of these metals are several orders of magnitude lower than listed in Table 3.28. Important note - Emission levels for primary vs. secondary emission levels are identical.
Chapter 4 - Techniques to consider in the determination of BAT	Primary techniques - to reduce or prevent the formation of the pollutant Secondary techniques act on the pollutants to render them less harmfull (conversion or collection)	
	The use of fossil fuel firing with electric boost. The electric boost can improve the convective currents within the furnace with helps heat transfer and can aid in primary fining.	This technique has been implemented at the Guelph facility
Section 4.2.1 Electric melting	Complete replacement of fossil fuels in the furnace eliminates flue gas emissions. The application of electric melting to the production of continuous filament glass fibre is not considered to be currently economically or technically viable, since E-glass often used for this type of product has a low alkali content resulting in very low electrical conductivity.	The European commission specifically states that complete replacement of fossil fuels in the furnace is not technically viable for continuous filament glass fiber formulations due to low electrical conductivity.

4.2.2 Operation and Maintenance of furnaces	O&M is the primary technique for minimizing the environmental impact due to furnace ageing by ensuring that the furnace and regenerator walls are sealed to avoid parasitic air infiltrations, close /seal all furnace openings when not in use, heat exchanger maintenance, maximum insulation possible.	The activities that apply to the Guelph facility were implemented around 2016, including furnace and forehearth resealing. These furnace operating parameters and O&M activities are identified as part of reducing NOx and energy usage. However,through Owens Corning's R&D several of these parameters and good practices also minimize the formation of hexavalent chromium.
	Other key furnace operating parameters include: - positioning burners and ensuring they are sealed with burner blocks - controlling the stablised flame conditions (length, temperature distribution) - controlling air/fuel ratio	These are all regularly reviewed and monitored.
	Monitoring furnace parameters and closing all furnace holes should be included in the good operating practices including: - daily inspection and action for parasitic air entries	This is in place at the Guelph facility.
4.4.1 techniques for controlling particulate emissions to air from melting activities	particulate meaning all material that is solid at the point of measurement. (synonymous with dust)	
	Several references to emission profiles of soda lime glass furnaces	Not applicable to the Guelph facility as it is not a soda lime glass formulation.
	"Recent studies showed that PM in the emissions from a flat glass furnace is composed of particles with a diameter in the range of 0.2 to 2 um.	Although not exactly the same glass subsector, this futher supports small particle size expectations.
	The main sources of metals (in particulate emissions) are impurities in raw materials, cullet and fuel and the use of specific substances and additives in the batch formulation.	In the case of Guelph, cullet is not used and natural gas is used instead of fuel oil, reducing metals as an impurity in fuel. Guelph has eliminated the use of specific additives containing boron and fluorides and any other metals.
	The BAT identifies 3 main approaches for controlling emissions of metals either within the dust or as gaseous components: 1. Raw material selection to minimise contamination and where practicable to use alternative additives. Raw material selection includes specifications on cullet quality. Where only internal cullet is used due to the limited availability of external cullet, emissions of metals may be much easier to control. 2. Dust abatement techniques, particularly bag filter systems and electrostatic precipitators. Where emissions contain significant metal concentration, up to 70 – 80 % of total dust (i.e. lead crystal glass production), high efficiency dust abatement systems can generally reduce both dust and metal emissions. 3. Gaseous metal emissions (e.g. selenium) can be substantially reduced by the use of dry or semi-dry scrubbing techniques in combination with dust abatement	1) raw material selection has been implemented at the Guelph facility. 2) Dust abatement techniques such as bag filter systems and electrostatic precipitators are included in the list of options to be assessed for technical feasibility. 3) selenium is not a concern at this facility However, scrubbers have been included on the list of options to be assessed for technical feasibility. **NOTE 1: dust emissions from the Guelph facility are already within the emission levels stated in Table 3.28 for the use of both primary and secondary abatement.** **NOTE 2: hexavalent chromium is approximately 2% of the PM from the furnace.**
	Within the glass industry, secondary abatement techniques (e.g. electrostatic precipitators and bag filters) are widely applied and 100 % of the furnaces in some (european) Member States are fitted with secondary abatement for dust. So far, the need to reduce emissions of fine particulate matter, acid components and (heavy) metals has made the application of secondary measures the best option in terms of emissions to air.	With respect to the Guelph facility, particulate emissions are generally low, and similarly the acid emissions (HF, HCl) are also at levels that are not of regulatory concern. This leaves the control of heavy metals as the remaining driver for the potential use of secondary controls. Hexavalent chromium is the only metal emitted from the facility at levels of concern is is approximately 2% of the PM from the furnace.
	In general, secondary abatement techniques for dust in the glass industry are considered to be accessible, technically viable and, in the vast majority of cases, economically viable.	The continuous filament glass fibre industry is the smallest sector of the industries represented in this report at less than 2.5% of the Total EU production (see Table 1.1). Therefore, this blanket statement should be used with caution particularly due to the Guelph PM emission levels already being in the same range as other facilities after secondary abatement

4.4.1.1 Primary techniques		
	A glass furnace is a very dynamic environment and any changes to the chemistry or operating conditions can have consequential effects within the melting process, and on other emissions	The Owens Corning Guelph facility has invested heavily in R&D to advance understanding of the furnace environment, chemistry and operating conditions that impact the formation of hexavalent chromium. It is critical that the final product meets specifications.
	The majority of the discussion regarding chemistry is related to soda lime glass and the formation of sulfur species.	The guelph facility produces Advantex glass which is not soda lime or borosilicate glass.
	Dust formation by volatilisation occurs very readily for glasses which contain boron and the concentration of unabated emissions is generally higher than for soda-lime glasses. In some cases they are more than ten times higher.	The Guelph facility produces Advantex glass which does not contain boron. Boron is a component of E-glass which is not produced at this facility.
	When oxy-fuel combustion is used in the melting process the flue gas volume (and velocities) are significantly reduced and the combustion gases contain higher concentrations of water vapour and CO2 which affect volatilisation process. Total dust emissions (kg/tonne glass) will often decrease although this is strongly dependent on the furnace design, type and positioning of the burners.	This statement aligns with the fact that the Guelph facility PM emissions (without controls) are similar to other glass manufacturing facilities post secondary abatement.
	Raw material modifications to reduce sodium chloride (part of soda ash), sulphate, boron, fluoride.	Guelph has already removed soda ash, boron and fluoride to only trace amounts in mined raw materials. Sulphate is not a significant component of the batch composition.
	Raw Material Modifications - A number of companies in the continuous filament glass fibre sector have developed glass compositions that have low levels of boron and fluorine or only contain these elements due to trace levels in the raw materials. Emissions of particulate matter below 0.14 kg/tonne melted glass have been reported, to be compared with values of around 2 kg/tonne melted glass. This type of glass (without boron and fluoride) requires higher melting temperatures, is more difficult to fiberise and may have long term effects on refractory life.	Guelph is using a glass composition with only trace levels of boron and Fluoride. PM estimates from the Guelph furnace are 0.07 kg PM/tonne of melted glass.
	Temperature reduction at the melt surface - A correlation between crown temperature, the glass melt surface temperature and particulate formation has been shown in soda-lime furnaces. Reduction of furnace temperature must be balanced with glass quality, the productivity of the furnace: - furnace design and geometry to improve convective currents and heat transfer - use of electric boost to help reduce crown temperature by putting the energy directly into the melt and improving convective currents. - increased use of cullet to reduce melting energy	The guelph facility has been investing in furnace design changes (2022 rebuild) to improve geometry and added electric boost to reduce the crown temperatures, also resulting in reduce flue gas velocity at the refractory freeboard. Cullet is not used to produce Advantex glass.
	Burner positioning - Another important factor in the rate of volatilisation from the melt is the rate of replacement of the gases above the melt. A high gas velocity or a high level of turbulence at the surface of the melt will increase the rate of volatilisation. Progress has been made with burner positioning to optimise combustion air velocity and direction, and fuel velocity and direction.	The guelph facility has been investing in furnace design changes (2022 rebuild) to improve geometry and added electric boost. Thermodynamic modelling was done for several furnace design options to reduce exhaust gas velocity.
	Conversion to gas firing (from fuel oil firing) - to reduce Sox, heavy melts and Particulate.	The guelph facility operates using natural gas / oxygen firing and electric boost. Fuel oil is not used.
	Other - cold top electric furnace use - Emissions from cold top electric furnaces can be minimised by reducing airflows and turbulence during charging, and by raw material grain size and moisture optimisation.	The European commission specifically states that complete replacement of fossil fuels in the furnace is not technically viable for continuous filament glass fiber formulations due to low electrical conductivity.

subsection 4.4.1.2 Particulate control using EP		
4.4.1.2 Particulate Control using EP.	ESPs are very effective in collecting dust in the range of 0.1 to 10 µm, and overall collection efficiency can be 95 – 99 % (depending on inlet concentration, ESP size, waste gas characteristics)	ESPs have been included in the list of control devices to be assessed for technical feasibility.
4.4.1.2 Particulate Control using EP.	Typical outlet performance is 15 mg/Nm3 (10-20 mg/Nm3). Effective for particle sizes in 0.1 - 10 um range with overall effciiency of 95-99%. The waste gas temperature from oxy-fuel furnaces is usually >1000 °C and substantial cooling is required. An ESP operating temperature needs to be kept below 430F	ESPs have been included in the list of control devices to be assessed for technical feasibility. Outlet performance guarantees are similar to what has been provided by McGill Air. Concentrations of PM at the Guelph facility are less than the outlet performance guarantees once the required cooling air is considered.
4.4.1.2 Particulate Control using EP.	In principle, this technique is applicable to all new and existing furnaces in all glass sectors. Table 4.8 did not provide an actual example of costs for the continuous filament glass fibre sector.	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass did not clearly identify if there were continuous filament glass fibre manufacturing facilities with EP's installed. The continuous filament glass fibre industry is the smallest sector of the industries represented in the report at less than 2.5% of the Total EU production (see Table 1.1).
subsection 4.4.1.3 Bag filters		
4.4.1.3 Bag filters	Particulate emissions of between 0.5 and 5 mg/Nm3 can be achieved and levels below 5 mg/Nm3 could be expected in many applications. This generally equates to significantly less than 0.008 kg per tonne of glass melted and less than 0.02 kg/t glass in some specific cases.	Dust collectors such as bag filters have been included in the list of control devices to be assessed for technical feasibility.
	It is essential to maintain the waste gas temperature within the correct range. Conventional filter fabrics usually have a maximum operating temperature of between 130 and 220 °C and in general, the higher the operating temperature, the higher the cost. In most glass processes, the waste gas temperature is between 450 and 800 °C. Therefore, the gas must be cooled before the filter by dilution, quenching or by a heat exchanger.	Dust collectors such as bag filters have been included in the list of control devices to be assessed for technical feasibility. Cooling air would be required for the Guelph facility.
	In principle, fabric filters can be applied to all types of furnaces within the glass industry, and to both new and existing furnaces. However, in many of the sectors it has not often been the technique of choice due to relatively high maintenance requirements and the potential for the fabric to blind, resulting in the costly replacement of the filter medium.	Blinding of the filter fabric has been identified by vendors due to the presence of hydrocarbons. This technical challenge is included in the technical feasibility assessment.
	A further concern with bag filters is that most fossil fuel-fired furnaces require sensitive pressure control, and the presence of a fabric filter with a high pressure drop could make this more difficult. Modern materials and control systems have reduced this problem. Due to the mentioned concerns, it is considered more technically feasible to join multiple furnaces to an ESP rather than a bag filter.	Dust collectors such as bag filters have been included in the list of control devices to be assessed for technical feasibility.
	Filter blockages due to fabric blinding have been a particular concern in fossil fuel-fired glass wool furnaces (and some other boron-containing glasses), because of the sticky nature of the fine particulate matter, which without a dry scrubbing stage makes it difficult to avoid blockages	Blinding of the filter fabric has been identified by vendors due to the presence of hydrocarbons. This technical challenge is included in the technical feasibility assessment.
4.4.2.5 oxy-fuel melting		
	Effective at reducing NOx and CO2 but need to minimize air ingress into the furnace	

	Furnace waste gas flow volume is 4-7 times lower than air/fired so temperatures are higher	
	Due to high water content and concentration of corrosive species cooling is usually by dilution air. After dilution waste gas volumes are typically 30-100% of conventional furnace waste gas volumes	This aligns with Owens Corning subject matter expects regarding the technical feasibility of cooling the exhaust streams prior to any potential treatments.
	Oxygen/fuel firing can result in higher refractory wear and shorter furnace life. The new high emissivity burner systems are much more effective at transferring heat into the glass. Combined with careful design of the furnace, careful burner positioning and higher quality refractories, these burners make it easier to maintain operation within the thermal resistance limit of the refractories.	The guelph facility has been investing in furnace design changes (2022 rebuild) to address these items.
	The technique (oxygen-fuel firing) is applied particularly in the continuous filament glass fibre and special glass sectors; its use in the glass industry as a whole has been limited by a number of factors.	
4.4.3.2 Batch formulation	Related to the presence of suphates producting Sox	
4.4.3.3 dry or semi-dry scrubbing	Use of reactive materials (the absorbent) introduced and dispersed in the waste gas stream to react with Sox species to form a solid to them be removed by an EP. Typically see the use of dry hydrated lime.	Purpose is to reduce Sox which is not an issue for this facility and not the contaminant of interest for this review.
4.4.3.4 Wet scrubbers	Wet scrubbers are discussed as part of reducing gas species such as HF, HCl, SO3, SO2. Can also reduce H3BO3, HBO2 and SeO2.	Not applicable, not the contaminant of interest for this review.
	Wet scrubbers are not often used in the glass industry because of higher costs and waste water treatment aspects. Wet scrubber are used in the mineral wool sector for cleaning gases of the forming area and curing oven. There are very limited applications in the glass industry.	Wet scrubbers have been included in the list of control devices to be assessed for technical feasibility.
4.4.4 Fluorides and chlorides	HF and HCl are typically from impurities in the batch materials. Cullet can contain significant levels of these impurities and historically continuous filament glass fibre required flourodie to aid in fiberization. It's noted that many facilities now have boron and fluoride free E-glass; however, it requires higher melting temperatures.	The Guelph facility does not add fluoride to the batch.
Section 5 BAT conclusions for the manufacture of glass		
Scope/application	Applies to the manufacture of glass fibre with melting capacity exceeding 20 tonnes/day (in european union)	Guelph production limit is equivalent to 43.8 tonnes/day. (16000 tonnes/yr)
5.1.1 BAT EMS	BAT is to implement and adhere to an Environmental Management System (EMS)	Guelph facility has an EMS in place.
5.1.2 BAT Energy Efficiency	Energy efficiency (reduce energy consumption) Items that may apply to this facilty include: -application of combustion control techniques, regular maintenance of the furnace, control of operating parameters.	These BATs have already been implemented (and are ongoing) at the Guelph facility.
5.1.3 BAT Materials storage and handling	Material storage and handling	Not applicable, this relates to the raw material handling which is not related to hexavalent chromium emissions.
5.1.4 General Primary techniques	The technique consists of a series of monitoring and maintenance operations which can be used individually or in combination appropriate to the type of furnace, with the aim of minimising the ageing effects on the furnace, such as sealing the furnace and burner blocks, keep the maximum insulation, control the stabilised flame conditions, control the fuel/air ratio, etc.	These BATs have already been implemented (and are ongoing) at the Guelph facility.
5.1.4 General Primary techniques	Use of raw materials and external cullet with low levels of impurities (e.g. metals, chlorides, fluorides) -Use of alternative raw materials (e.g. less volatile) - Use of fuels with low metal impurities	These BATs have already been implemented (and are ongoing) at the Guelph facility or are not applicable as the cullet is not used at this facility.
5.1.4 General Primary techniques	continuous monitoring of critical process parameters to ensure process stability (temperature, fuel feed, airflow)	These BATs have already been implemented (and are ongoing) at the Guelph facility.
5.1.4 General Primary techniques	regular monitoring of process parameters to prevent/reduce pollution (ie. O2 content of combustion gases to control the fuel/air ratio	These BATs have already been implemented (and are ongoing) at the Guelph facility.

5.4 BAT conclusions for continuous filament glass fibre manufacturing		
5.4.1 dust from melting furnaces	BAT is to reduce dust emissions from the waste gases of the melting furnace by using **one** or a combination of the following techniques: -formulate the glass without boron. Boron is the main constituent of particulate matter from the melting furnace. -filtration system: EP or bag filter (maximum benefit achieved for application on new plants) -wet scrubbing sysem (application to existing plants may be limited by technical constraints)	3 items are listed, one or a combination satisfies the BAT - Guelph facility would be considered to meeting the BAT basedon removing boron from the glass formulation.
Table 5.22 BAT-AELs for dust from the melting furnace in the continuous filament glass fibre sector	Dust <10 - 20 mg/Nm3 Dust <0.045 - 0.09 kg/tonne of melted glass	Guelph furnace total PM emission rate is in this range at 0.07 kg/tonne of glass melted.
5.4.5 metals from melting furnaces	BAT is to reduce metal emissions from the melting furnace by using **one** or a combination of the following techniques: - selection of raw materials for the batch formulation with a low content of metals (subject to the constraints of the availability of the raw materials) - applying a dry or semi-dry scrubbing in combinaton with a filtration system -applying wet scrubbing (may have technical restraints)	3 items are listed, one or a combination satisfies the BAT - Guelph facility would be considered to meeting the BAT based having a glass formulation with a low metals content. The control technologies were included in the technology feasibility assessment.
Table 5.26 BAT-AELs for metal emissions from the melting furnace in continuous filament glass fibre sector	Σ (As, Co, Ni, Cd, Se, CrVI) <0.2 – 1 mg/Nm3 or <0.9 – 4.5 x 10^{-3} kg/tonne melted glass Σ (As, Co, Ni, Cd, Se, CrVI, Sb, Pb, CrIII, Cu, Mn, V, Sn) <1 – 3 mg/Nm3 or <4.5 – 13.5 x 10^{-3} kg/tonne melted glass	Guelph furnace emissions of these metals are several orders of magnitude lower than listed in Table 5.26.
5.4 BAT conclusions for mineral wool manufacturing		Note, these BATs are specific to fiberglass insultation manufacturing, not continuous filament fibre manufacturing
5.7.1 Dust from melting furnaces	BAT is to reduce dust emissions from the waste gases of the melting furnace by applying an electrostatic precipitator or a bag filter system	Not applicable. This BAT is for a different glass sector (mineral wool). BAT that is most appropriate for Guelph is the Continuous Filament Glass Fibre which is Section 5.4
6.0 Emerging techniques		
	Glas Flox® high-temperature combustion system (reduces NOx and CO)	Not applicable for the contaminants of concern
	Advanced cullet and batch pre-treaters for oxy/gas fired melters, reduce NOx and PM.	Cullet pre-heater is not applicable as there is no cullet use at Guelph. Batch pre-treatment. It's unclear if batch pre-treatment reduction in PM may be due to the reduction of fuel needed vs. other mechanisms for PM generation and emission. If this is an effective methodology on the basis of reduced fuel usage, the Guelph facility reduced fuel usage in the furnace with the 2022 rebuild of the furnace with e-boost.
	New glass composition for continuous filament glass fibre: A new glass composition for continuous filament glass fibre has been developed by one producer. This glass composition addresses two main air emission components typical of E- glass melting, i.e. particulates and fluorides. The batch formulation does not include boron or added fluorine.	The Guelph facility has already implemented a glass formulation without boron or added fluorine.

	Submerged combustion melting (SCM) technology (up to 5% savings in energy)	At the time of writing (2010), the applicability of the SCM melter is limited to the mineral wool production. The development and testing work that is underway should allow for the application of this technique to a wide range of glass compositions. E-boost added to the furnace in 2022 creates an energy savings of more than 5%.
	Application of ceramic and catalytic ceramic filters for the removal of multiple pollutants from process waste gases. The application of high temperature filtration systems within the glass industry is uncommon. A new type of ceramic filter which could operate at high temperature has been developed with promising results.	Literature associated with this technology is primarily related to the reduction of NOx, Sox, and acid gases. There is no mention of metals. To be included in further research associated with dust collectors.
	NASU electrostatic precipitator for nanoparticles	To be included in further research associated with electrostatic precipitators.
	Charged cloud scrubber At the time of writing (2010) the first full scale installation is being tested in the US. Efficiency claimed is 410 mg/Nm3 to 23 mg/Nm3 particulate.	Not aware of any additional information available regarding this technology and the success of the installation. Current untreated PM from the furnace is lower than the reported final outlet from this first full scale installation. Guelph furnace total PM = 16.5 mg/m3.

FACILITY_NAME	CORPORATE_OR_COMPANY_NAME	FACILITY_DESCRIPTION	PROCESS_NAME	POLLUTANT	CONTROL_METHOD_DESCRIPTION	Montrose Review comments	MEG Secondary notes
NORTH COUNTY RESOURCE RECOVERY ASSOC.	NORTH COUNTY RESOURCE RECOVERY ASSOC.		BOILER, SEE NOTE #1	Chromium / Chromium Compounds, -3 & -6	BAGHOUSE	Not applicable. Boiler control device. Cr is likely included as a product of combustion	Baghouse already considered
WARE COGEN	WARE COGEN	COAL COGENERATION FACILITY	BOILER, UNIT 2, COAL	Chromium / Chromium Compounds, -3 & -6	FABRIC FILTER	Not applicable. Coal burning boiler with a fabric filter. Cr likely included as a product of combustion.	Fabric filter already considered
CE - RESOURCE RECOVERY SYSTEMS	CE - RESOURCE RECOVERY SYSTEMS		BOILER, WATER WALL, 3	Chromium Compounds, -6 only	SEE NOTE 4	Not applicable. Boiler control device. Cr is likely included as a product of combustion	Control device not listed
JACKSON COUNTY BOARD OF PUBLIC WORKS	JACKSON COUNTY BOARD OF PUBLIC WORKS		INCINERATOR, MASS BURN, 2 TOTAL	Chromium / Chromium Compounds, -3 & -6		Not applicable. County incinerator. Control device not listed.	
KENT COUNTY DEPT. OF PUBLIC WORKS	KENT COUNTY DEPT. OF PUBLIC WORKS	WASTE TO ENERGY FACILITY	BOILER, SOLID WASTE, 2 EA	Chromium Compounds, -6 only	DRY SCRUBBER/BAGHOUSE	Not applicable. Waste to energy boiler. Uses dry scrubber and baghouse	scrubbers and baghouses already considered
CASTLE MEDICAL DISPOSAL	CASTLE MEDICAL DISPOSAL		INCINERATOR, 2	Chromium Compounds, -6 only		Not applicable. Haz/medical waste incinerator. Control device not listed	
CENTRAL WAYNE ENERGY RECOVERY LIMITED PARTNERSHIP	CENTRAL WAYNE ENERGY RECOVERY LIMITED PARTNERSHIP	COMMERCIAL WASTE INCINERATION AND ELECTRICAL GENERATION	MUNICIPAL WASTE, MUNICIPAL WASTE COMBUSTORS	Chromium Compounds, -6 only	HEXAVALENT CHROMIUM. FABRIC FILTER.	Not applicable. Municipal waste incinerator. Fabric filter used.	Fabric filter already considered
MINERGY DETROIT LLC	MINERGY DETROIT LLC	WWTP SOLIDS ARE INCINERATED IN A WET- BOTTOM FURNACE.	SLUDGE INCINERATOR/GLASS FURNACE	Chromium Compounds, -6 only	BAGHOUSE. COMPLIANCE DEMONSTRATION BY TESTING.	Glass aggregate facility (post consumer glass used in a kiln). Use fly ash and coal flux. Not applicable as the process and raw materials are very different. Baghouse is used.	Baghouse already considered
THE DOW CHEMICAL COMPANY	THE DOW CHEMICAL COMPANY	CHEMICAL PLANT	INCINERATOR, ROTARY KILN, HAZARDOUS WASTE	Chromium Compounds, -6 only	VENTURI, IWS. INPUT LIMIT OF 2.28 LB/H (12-HOUR AVERAGE). EMISSION LIMIT 1-HOUR AVERAGE. NOTE: ONE OF THE LOW-VOLATILE METALS (LVM).	Not applicable. Haz/medical waste incinerator. Venturi control device used.	Venturi scrubbers already considered
NEWSPRINT SOUTH, INC.	NEWSPRINT SOUTH, INC.		BOILER, BARK/SLUDGE FIRED	Chromium Compounds, -6 only	MULTICLONE, VENTURI SCRUBBER	Not applicable. Bark and sludge fired boiler. Multiclone and venturi scrubbers used.	Venturi scrubbers and cyclones already considered
WEYERHAEUSER CO.	WEYERHAEUSER CO.		BOILER, RECOVERY	Chromium Compounds, -6 only	ESP	Not applicable. Wood products manufacturing. Boiler has an ESP.	EP's already considered.
WEYERHAEUSER CO.	WEYERHAEUSER CO.		BOILER, POWER	Chromium Compounds, -6 only	ELECTROSCRUB	Not applicable. Wood products manufacturing. Boiler has an electroscrubber	
AMERICAN REF-FUEL OF ESSEX COUNTY	AMERICAN REF-FUEL OF ESSEX COUNTY		INCINERATOR, MASS BURN, 3	Chromium / Chromium Compounds, -3 & -6	DRY SCRUBBER & ESP	Not applicable. Waste to energy facility. Has scrubber and ESP.	Scrubbers and ESPs already considered
CASIE ECOLOGY OIL SALVAGE	CASIE ECOLOGY OIL SALVAGE	REFUSE SYSTEM PROCESSING NON-HAZARDOUS PETROLEUM AND COAL TAR CONTAMINATED SOIL.	KILN, (AFTERBURNER @ 1700 F)	Chromium / Chromium Compounds, -3 & -6	FABRIC FILTER, CYCLONE, AFTERBURNER, QUENCH	Not applicable. Waste management/reclamation using kiln/incineration, requiring controls.	
CASIE ECOLOGY OIL SALVAGE	CASIE ECOLOGY OIL SALVAGE	REFUSE SYSTEM PROCESSING NON-HAZARDOUS PETROLEUM AND COAL TAR CONTAMINATED SOIL.	KILN, (AFTERBURNER @ 1800 F)	Chromium / Chromium Compounds, -3 & -6	FABRIC FILTER, CYCLONE, AFTERBURNER, QUENCH	Not applicable. Waste management/reclamation using kiln/incineration, requiring controls.	
CASIE ECOLOGY OIL SALVAGE	CASIE ECOLOGY OIL SALVAGE	REFUSE SYSTEM PROCESSING NON-HAZARDOUS PETROLEUM AND COAL TAR CONTAMINATED SOIL.	ROTARY KILN DRYER	Chromium / Chromium Compounds, -3 & -6	CYCLONE, FABRIC FILTER, AFTERBURNER, QUENCH	Not applicable. Waste management/reclamation using kiln/incineration, requiring controls.	
CAMDEN RESOURCE-RECOVERY FACILITY	CAMDEN COUNTY RESOURCE-RECOVERY FACILITY	WASTE RECOVERY FACILITY	4 MASS BURNING WATER WALL INCINERATORS	Chromium / Chromium Compounds, -3 & -6	ESP, SCRUBBER	Not applicable. Waste recovery/waste incineration. Use fly ash.	

FACILITY_NAME	CORPORATE_OR_COMPANY_NAME	FACILITY_DESCRIPTION	PROCESS_NAME	POLLUTANT	CONTROL_METHOD_DESCRIPTION	Montrose Review comments	MEG Secondary notes
CHAMBERS COGENERATION LIMITED PARTNERSHIP (CCLP)	CHAMBERS COGENERATION LIMITED PARTNERSHIP (CCLP)	COGENERATION PLANT	PC BOILERS (2)	Chromium / Chromium Compounds, -3 & -6	NONE	Co-generation facility. Can burn fuel oil and coal.	
GLOUCESTER COUNTY RRF	WHEELABRATOR GLOUCESTER COMPANY, L.P.	RESOURCE RECOVERY FACILITY	WATER WALL INCINERATORS (2)	Chromium / Chromium Compounds, -3 & -6		Not applicable. Solid waste combustion.	
RECOVERY FACILITY	WARREN ENERGY RESOURCE CO., LP	MUNICIPAL WASTE RECOVERY	2 MUNICIPAL WASTE COMBUSTORS-WET WALL	Chromium / Chromium Compounds, -3 & -6	BAGHOUSE, SCRUBBER	Not applicable. Municipal waste combustion.	
GMC-CPC HAMILTON-FAIRFIELD	GMC-CPC HAMILTON-FAIRFIELD		BOILER, WASTE OIL FIRED	Chromium / Chromium Compounds, -3 & -6		Not applicable. Waste oil combustion.	
HALE CHROME SERVICE	HALE CHROME SERVICE		ELECTROPLATING, CHROME	Chromium / Chromium Compounds, -3 & -6	SCRUBBER, LIMIT 5 OZ CHROME/GAL H2O IN SCRUBBER	Electroplating activity. Scrubber equipment.	Scrubber equipment already considered.
SUPREME BUMPER, INC.	SUPREME BUMPER, INC.		EVAPORATOR	Chromium / Chromium Compounds, -3 & -6	CHEVRON ELIMINATORS, WET SCRUBBER, & MIST PAD	Electroplating activity. Chevron eliminator, wet scrubber, mist pad.	Controls listed are highly specific to this application.
SAN JUAN RESOURCE RECOVERY FACILITY	SAN JUAN RESOURCE RECOVERY FACILITY		COMBUSTOR, MASS BURN, 3	Chromium / Chromium Compounds, -3 & -6	DRY SCRUBBER/BAGHOUSE	Not enough information listed.	
SONOCO PRODUCTS COMPANY	SONOCO PRODUCTS COMPANY		BOILER, COAL/WASTE FUEL	Chromium / Chromium Compounds, -3 & -6		Not applicable. Combustion of waste fuel and coal.	
LEXINGTON US5 FACILITY	MICHELIN NORTH AMERICA, INC.	TIRE MANUFACTURING FACILITY	CM PROCESS - BOILER	Chromium / Chromium Compounds, -3 & -6	NONE INDICATED	Not applicable. Tire manufacturing facility.	
W.A. PARISH ELECTRIC GENERATING STATION	RELIANT ENERGY, INC.	RELIANT ENERGY, INC., PROPOSES TO INCREASE THE MAXIMUM HEAT INPUT OF THE COAL-FIRED BOILER UNIT	UTILITY BOILER UNIT 8	Chromium / Chromium Compounds, -3 & -6	NONE INDICATED	Cogeneration facility. Can include firing coal and distillate. Has a fuel gas desulfurization unit.	
WA PARISH ELECTRIC GENERATING STATION	RELIANT ENERGY INC	RELIANT ENERGY, INC. (REI) HAS SUBMITTED AN APPLICATION TO INCREASE PRODUCTION FROM (3) OF ITS PERMITTED COAL-FIRED UTILITY BOILERS (UNITS 5,6,&7). HOUSTON/GALVESTON OZONE NON-ATTAINMENT AREA. THE PROPOSED PROJECT IS A MAJOR MODIFICATION FOR VOC AND IS SUBJECT TO VOC NON-ATTAINMENT REVIEW. THE FACILITY MUST COMPLY WITH LAER FOR VOC.	(2) BOILERS, UNITS 5 & 6, WAP5&6, COAL	Chromium / Chromium Compounds, -3 & -6	NONE INDICATED	Not applicable. Power generation. Coal fired boilers.	
WA PARISH ELECTRIC GENERATING STATION	RELIANT ENERGY INC	RELIANT ENERGY, INC. (REI) HAS SUBMITTED AN APPLICATION TO INCREASE PRODUCTION FROM (3) OF ITS PERMITTED COAL-FIRED UTILITY BOILERS (UNITS 5,6,&7).	(2) BOILERS, UNITS 5 & 6, COAL & GAS, WAP5&6	Chromium / Chromium Compounds, -3 & -6	NONE INDICATED	Not applicable. Power generation. Coal fired boilers.	
WA PARISH ELECTRIC GENERATING STATION	RELIANT ENERGY INC	RELIANT ENERGY, INC. (REI) HAS SUBMITTED AN APPLICATION TO INCREASE PRODUCTION FROM (3) OF ITS PERMITTED COAL-FIRED UTILITY BOILERS (UNITS 5,6,&7).	BOILER UNIT 7, COAL, WAP7	Chromium / Chromium Compounds, -3 & -6	NONE INDICATED	Not applicable. Power generation. Coal fired boilers.	

FACILITY_NAME	CORPORATE_OR_COMPANY_NAME	FACILITY_DESCRIPTION	PROCESS_NAME	POLLUTANT	CONTROL_METHOD_DESCRIPTION	Montrose Review comments	MEG Secondary notes
WA PARISH ELECTRIC GENERATING STATION	RELIANT ENERGY INC	RELIANT ENERGY, INC. (REI) HAS SUBMITTED AN APPLICATION TO INCREASE PRODUCTION FROM (3) OF ITS PERMITTED COAL-FIRED UTILITY BOILERS (UNITS 5,6,&7).	BOILER UNIT 7, COAL & GAS, WAP7	Chromium / Chromium Compounds, -3 & -6	NONE INDICATED	Not applicable. Power generation. Coal fired boilers.	
CHAPPARRAL STEEL MIDLOTHIAN STEEL MILL	CHAPARRAL STEEL MIDLOTHIAN LP	THE FACILITY RECYCLES SCRAP IRON, SCRAP STEEL, AND CRUSHED AUTOMOBILES INTO STRUCTURAL STEEL BY THE FOLLOWING STEPS: (1) AUTOMOBILE AND SCRAP STEEL SHREDDING AND SEPARATION; (2) ELECTRIC ARC FURNACE MELTING, REFINING, CHARGING, TAPPING, AND SLAGGING; (3) CONTINUOUS NEAR NET SHAPE BEAM AND BILLETS CASTING WITH AUTOMATIC TORCH CUTOFF OF BEAMS; (4) REHEAT OF NEAR	MELTSHOP OVERHEAD CANOPY HOODS B	Chromium / Chromium Compounds, -3 & -6	BAGHOUSE	Not applicable. Steel works, EAF. Meltshop Baghouse control	
CHAPPARRAL STEEL MIDLOTHIAN STEEL MILL	CHAPARRAL STEEL MIDLOTHIAN LP	THE FACILITY RECYCLES SCRAP IRON, SCRAP STEEL, AND CRUSHED AUTOMOBILES INTO STRUCTURAL STEEL BY THE FOLLOWING STEPS: (1) AUTOMOBILE AND SCRAP STEEL SHREDDING AND SEPARATION; (2) ELECTRIC ARC FURNACE MELTING, REFINING, CHARGING, TAPPING, AND SLAGGING; (3) CONTINUOUS NEAR NET SHAPE BEAM AND BILLETS CASTING WITH AUTOMATIC TORCH CUTOFF OF BEAMS; (4) REHEAT OF NEAR	RAILCAR LOADING FROM PELLETIZER SILO/BAGHOUSE DUST	Chromium / Chromium Compounds, -3 & -6	NONE INDICATED	Not applicable. Steel works, EAF, Rail loading.	
CHAPPARRAL STEEL MIDLOTHIAN STEEL MILL	CHAPARRAL STEEL MIDLOTHIAN LP	THE FACILITY RECYCLES SCRAP IRON, SCRAP STEEL, AND CRUSHED AUTOMOBILES INTO STRUCTURAL STEEL BY THE FOLLOWING STEPS: (1) AUTOMOBILE AND SCRAP STEEL SHREDDING AND SEPARATION; (2) ELECTRIC ARC FURNACE MELTING, REFINING, CHARGING, TAPPING, AND SLAGGING; (3) CONTINUOUS NEAR NET SHAPE BEAM AND BILLETS CASTING WITH AUTOMATIC TORCH CUTOFF OF BEAMS; (4) REHEAT OF NEAR	PELLETIZER SILO, 15A	Chromium / Chromium Compounds, -3 & -6	BAGHOUSE	Not applicable. Steel works, EAF. Pelletizer silo.	

FACILITY_NAME	CORPORATE_OR_COMPANY_NAME	FACILITY_DESCRIPTION	PROCESS_NAME	POLLUTANT	CONTROL_METHOD_DESCRIPTION	Montrose Review comments	MEG Secondary notes
CHAPPARRAL STEEL MIDLOTHIAN STEEL MILL	CHAPARRAL STEEL MIDLOTHIAN LP	THE FACILITY RECYCLES SCRAP IRON, SCRAP STEEL, AND CRUSHED AUTOMOBILES INTO STRUCTURAL STEEL BY THE FOLLOWING STEPS: (1) AUTOMOBILE AND SCRAP STEEL SHREDDING AND SEPARATION; (2) ELECTRIC ARC FURNACE MELTING, REFINING, CHARGING, TAPPING, AND SLAGGING; (3) CONTINUOUS NEAR NET SHAPE BEAM AND BILLETS CASTING WITH AUTOMATIC TORCH CUTOFF OF BEAMS; (4) REHEAT OF NEAR	MELTSHOP OVERHEAD CANOPY HOODS A	Chromium / Chromium Compounds, -3 & -6	BAGHOUSE	Not applicable. Steel works, EAF. Meltshop Baghouse control	
CHAPPARRAL STEEL MIDLOTHIAN STEEL MILL	CHAPARRAL STEEL MIDLOTHIAN LP	THE FACILITY RECYCLES SCRAP IRON, SCRAP STEEL, AND CRUSHED AUTOMOBILES INTO STRUCTURAL STEEL BY THE FOLLOWING STEPS: (1) AUTOMOBILE AND SCRAP STEEL SHREDDING AND SEPARATION; (2) ELECTRIC ARC FURNACE MELTING, REFINING, CHARGING, TAPPING, AND SLAGGING; (3) CONTINUOUS NEAR NET SHAPE BEAM AND BILLETS CASTING WITH AUTOMATIC TORCH CUTOFF OF BEAMS; (4) REHEAT OF NEAR	FURNACES A&B 4TH HOLE EVACUATION SYSTEM	Chromium / Chromium Compounds, -3 & -6	BAGHOUSE	Not applicable. Steel works, EAF. EAF Furnace Baghouse control	
LIMESTONE ELECTRIC GENERATING STATION	RELIANT ENERGY INC	THE DATABASE INCLUDES TWO AMENDMENTS THE COMPANY PROPOSES TO INCLUDE WESTERN COAL AND PETROLEUM COKE AS FUEL FOR 2 ELECTRIC STEAM BOILERS.	(2) BOILER UNIT 1 & 2 SCRUBBER STACKS, LMS1 & 2	Chromium / Chromium Compounds, -3 & -6	NONE INDICATED	Not applicable, energy generation. Boilers to use petroleum coke and coal as fuel.	
WASHINGTON PARISH ELECTRIC GENERATING STATION	RELIANT ENERGY, INC	RELIANT ENERGY, INC. OPERATES THE WA PARISH GENERATING STATION & HAS SUBMITTED AN APPLICATION TO INCREASE PRODUCTION FROM 3 OF ITS PERMITTED COAL-FIRED UTILITY BOILERS (UNITS 5,6 & 7).	(2) BOILER STACKS, WAP 5 & 6 , COAL ONLY	Chromium / Chromium Compounds, -3 & -6	NONE INDICATED	Not applicable. Power generation. Coal fired boilers.	
WASHINGTON PARISH ELECTRIC GENERATING STATION	RELIANT ENERGY, INC	RELIANT ENERGY, INC. OPERATES THE WA PARISH GENERATING STATION & HAS SUBMITTED AN APPLICATION TO INCREASE PRODUCTION FROM 3 OF ITS PERMITTED COAL-FIRED UTILITY BOILERS (UNITS 5,6 & 7).	(2) BOILER STACKS, WAP 5 & 6 , COAL & NAT GAS	Chromium / Chromium Compounds, -3 & -6	NONE INDICATED	Not applicable. Power generation. Coal fired boilers.	

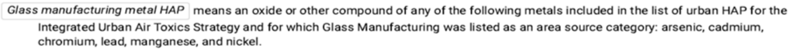
FACILITY_NAME	CORPORATE_OR_COMPANY_NAME	FACILITY_DESCRIPTION	PROCESS_NAME	POLLUTANT	CONTROL_METHOD_DESCRIPTION	Montrose Review comments	MEG Secondary notes
WASHINGTON PARISH ELECTRIC GENERATING STATION	RELIANT ENERGY, INC	RELIANT ENERGY, INC. OPERATES THE WA PARISH GENERATING STATION & HAS SUBMITTED AN APPLICATION TO INCREASE PRODUCTION FROM 3 OF ITS PERMITTED COAL-FIRED UTILITY BOILERS (UNITS 5,6 & 7).	BOILER STACK, WAP 7, COAL ONLY	Chromium / Chromium Compounds, -3 & -6	NONE INDICATED	Not applicable. Power generation. Coal fired boilers.	
SMI TEXAS	STRUCTURAL METALS INC	STEEL MINI-MILL	REVERSE AIR BAGHOUSE MONITO VENT-EAF DEC AND MELTSHOP VENTILATION	Chromium / Chromium Compounds, -3 & -6		Not applicable. Steel mini mill	
SMI TEXAS	STRUCTURAL METALS INC	STEEL MINI-MILL	PULSE-JET BAGHOUSE STACK EAF ANAD LMS DEC AND MELTSHOP VENTILATION	Chromium / Chromium Compounds, -3 & -6		Not applicable. Steel mini mill	
SMI TEXAS	STRUCTURAL METALS INC	STEEL MINI-MILL	WEST MELT SHOP ROOF MONITOR VENT	Chromium / Chromium Compounds, -3 & -6		Not applicable. Steel mini mill	
SMI TEXAS	STRUCTURAL METALS INC	STEEL MINI-MILL	NORTH SHOP ROOF MONITOR VENT	Chromium / Chromium Compounds, -3 & -6		Not applicable. Steel mini mill	
SMI TEXAS	STRUCTURAL METALS INC	STEEL MINI-MILL	SOUTH MELT SHOP WALL VENT AT CASTER RUN-OUT	Chromium / Chromium Compounds, -3 & -6		Not applicable. Steel mini mill	
SMI TEXAS	STRUCTURAL METALS INC	STEEL MINI-MILL	EAST/WEST CASTER PRAY CHAMBER STACK	Chromium / Chromium Compounds, -3 & -6		Not applicable. Steel mini mill	
SMI TEXAS	STRUCTURAL METALS INC	STEEL MINI-MILL	SHREDDER-Z-BOX SEPARATOR FABRIC FILTRE STACK	Chromium / Chromium Compounds, -3 & -6	DUST COLLECTOR	Not applicable. Steel mini mill	
SMI TEXAS	STRUCTURAL METALS INC	STEEL MINI-MILL	SHREDDER-HAMMERMILL	Chromium / Chromium Compounds, -3 & -6	WATER FLOOD	Not applicable. Steel mini mill	
TEXAS GENCO W.A. PARISH UNIT 8	TEXAS GENCO	THE W.A. PARISH UNIT 8 IS AN ELECTRIC UTILITY BOILER WHICH FIRES PULVERIZED, POWDER RIVER BASIN SUBBITUMINOUS COAL. EMISSION CONTROLS NOW INCLUDE MODERN LOW-NOX COMBUSTION CONTROLS, SCR, WET LIMESTONE SCRUBBER, AND BAGHOUSE. IT WAS PERMITTED UNDER NSPS DA AND COMMENCED OPERATION IN 1982. IT HAS ONE OF THE LOWEST EMISSION RATES FOR CRITERIA AIR POLLUTANTS OF ANY OPERATING COAL-FIRED BOILER.	BOILER STACK	Chromium / Chromium Compounds, -3 & -6		Not applicable. Power generation. Coal fired boilers. Has controls for CACs.	
TEXAS GENCO WA PARISH GENERATING STATION	TEXAS GENCO	RELIANT ENERGY, INC. (REI) OPERATES THE W. A. PARISH GENERATING STATION NEAR THE CITY OF THOMPSONS, IN FORT BEND COUNTY AND HAS SUBMITTED AN APPLICATION TO INCREASE PRODUCTION FROM THREE OF ITS PERMITTED COAL-FIRED UTILITY BOILERS (UNIT NOS. 5, 6 AND 7).	COAL AND GAS FIRED STACK	Chromium / Chromium Compounds, -3 & -6		Not applicable. Power generation. Coal fired boilers.	
MCKEE REFINERY HYDROGEN PRODUCTION UNIT	DIAMOND SHAMROCK REFINING COMPANY L.P.A VALERO COM	Hydrogen Production Unit	MSS activities	Chromium / Chromium Compounds, -3 & -6		Not applicable. Refinery hydrogen plant. Chromium is related to catalyst handling.	No control equipment stated.
VA DEPT. OF HIGHWAYS & TRANSPORTATION	VA DEPT. OF HIGHWAYS & TRANSPORTATION		BOILER, CLEAVER BROOKS	Chromium / Chromium Compounds, -3 & -6		Boiler listed. Cr is likely included as a product of combustion	No control equipment stated
LEE HY PAVING CORP.	LEE HY PAVING CORP.		MIXER, DRUM DRYER	Chromium / Chromium Compounds, -3 & -6	SEE NOTE #2	Not applicable. Paving mixer equipment.	No control equipment stated
C.R. HUDGINS PLATING CO., INC.	C.R. HUDGINS PLATING CO., INC.		DRYER, SLUDGE	Chromium / Chromium Compounds, -3 & -6	WET SCRUBBER	Electroplating activity. Scrubber equipment. (facility closed)	Scrubber equipment already considered.
VIRGINIA DEPT. OF TRANSPORTATION	VIRGINIA DEPT. OF TRANSPORTATION		HEATER, SPACE	Chromium / Chromium Compounds, -3 & -6	TESTING	Not applicable. Heater listed. Cr is likely included as a product of combustion	No control equipment stated
VIRGINIA DEPT. OF TRANSPORTATION	VIRGINIA DEPT. OF TRANSPORTATION		HEATER, SPACE	Chromium / Chromium Compounds, -3 & -6	TESTING	Not applicable. Heater listed. Cr is likely included as a product of combustion	No control equipment stated
WOOD PRESERVERS, INC.	WOOD PRESERVERS, INC.		BOILER, WOOD WASTE FIRED	Chromium / Chromium Compounds, -3 & -6	THROUGHPUT LIMITS	Not applicable. Wood combustion boiler.	No control equipment stated
BENDIX ELECTRONICS	BENDIX ELECTRONICS		LAB, SILICON MICROMACHINING	Chromium / Chromium Compounds, -3 & -6	GOOD OPERATING PRACTICE	Not applicable. Lab/silicon micromachining. No control eqiupment specified (good practices only)	
MERCEDES BENZ TRUCK CO.	MERCEDES BENZ TRUCK CO.		PAINT BOOTH, SPRAY	Chromium / Chromium Compounds, -3 & -6		Not applicable. Paint booth.	No control equipment stated

FACILITY_NAME	CORPORATE_OR_COMPANY_NAME	FACILITY_DESCRIPTION	PROCESS_NAME	POLLUTANT	CONTROL_METHOD_DESCRIPTION	Montrose Review comments	MEG Secondary notes
ENERGY RESOURCES OF HENRICO, INC.	ENERGY RESOURCES OF HENRICO, INC.		BOILER, 2 EA	Chromium / Chromium Compounds, -3 & -6	PERMIT LIMITS	Not applicable. Boiler listed. Cr is likely included as a product of combustion	
MEGA CONTRACTORS	MEGA CONTRACTORS		PAVING PLANT, CONCRETE	Chromium / Chromium Compounds, -3 & -6	BAGHOUSE	Not applicable. Paving plant. Baghouse is specified.	
HADSON POWER 12	HADSON POWER 12		BOILER, 2 EA	Chromium / Chromium Compounds, -3 & -6		Not applicable. Boiler listed. Cr is likely included as a product of combustion	
HADSON POWER II	HADSON POWER II		BOILER, 2 EA	Chromium / Chromium Compounds, -3 & -6		Not applicable. Boiler listed. Cr is likely included as a product of combustion	
WOOD PRESERVERS, INC.	WOOD PRESERVERS, INC.		BOILER	Chromium / Chromium Compounds, -3 & -6	OPERATING PARAMETERS	Not applicable. Boiler listed. Cr is likely included as a product of combustion	
HADSON POWER 13	HADSON POWER 13		BOILER	Chromium / Chromium Compounds, -3 & -6	PERMIT LIMITATION	Not applicable. Boiler listed. Cr is likely included as a product of combustion	
BEAR ISLAND PAPER COMPANY, L.P.	BEAR ISLAND PAPER COMPANY, L.P.		BOILER, PACKAGE (TOTAL)	Chromium / Chromium Compounds, -3 & -6		Not applicable. Never constructed	
BEAR ISLAND PAPER COMPANY, L.P.	BEAR ISLAND PAPER COMPANY, L.P.		TURBINE, COMBUSTION GAS & DUCT BURNER (TOTAL)	Chromium / Chromium Compounds, -3 & -6		Not applicable. Never constructed	
BEAR ISLAND PAPER COMPANY, L.P.	BEAR ISLAND PAPER COMPANY, L.P.		BOILER, CIRCULATING FLUIDIZED COMBUSTION	Chromium / Chromium Compounds, -3 & -6		Not applicable. Never constructed	
BEAR ISLAND PAPER COMPANY, L.P.	BEAR ISLAND PAPER COMPANY, L.P.		BOILER, B & W	Chromium / Chromium Compounds, -3 & -6		Not applicable. Never constructed	
HOECHST CELANESE CORPORATION	HOECHST CELANESE CORPORATION		PLATING, CHROME	Chromium Compounds, -6 only	DECREASED SURFACE AREA OF PLATING BATH	Chrome plating activity. Not applicable. No control equipment specified, used adminstrative control.	decrease SA of plating bath.
PATOWMACK POWER PARTNERS, LIMITED PARTNERSHIP	PATOWMACK POWER PARTNERS, LIMITED PARTNERSHIP		TURBINE, COMBUSTION, NATURAL GAS	Chromium / Chromium Compounds, -3 & -6	FUEL SPEC: CLEAN FUELS	Not applicable. Power generation. Restricted to clean fuels, no add on controls.	
SEI BIRCHWOOD, INC.	SEI BIRCHWOOD, INC.		BOILER, PULVERIZED COAL	Chromium / Chromium Compounds, -3 & -6		Not applicable. Power generation. Coal fired boilers.	
VAUGHAN FURNITURE COMPANY	VAUGHAN FURNITURE COMPANY		WOOD/COAL-FIRED BOILER	Chromium / Chromium Compounds, -3 & -6		Not applicable. Wood products manufacturing. Boiler uses wood and coat.	No control equipment listed.
SAFETY MEDICAL SYSTEMS	SAFETY MEDICAL SYSTEMS		INCINERATOR, 2	Chromium / Chromium Compounds, -3 & -6	WET VENTURI SCRUBBER, HIGH EFFICIENCY PARTICULATE FILTERS	Not applicable. Haz/medical waste incinerator. Wet scrubber and high efficiency PM filter.	
CHARTER STEEL DIVISION	Charter Steel Division	THE FACILITY OPERATES A MELT SHOP AND ROLLING MILL ASSOCIATED WITH ITS STEEL MILL IN SAUKVILLE. THE COMPANY PLANS TO INCREASE THE MELT SHOP CAPACITY TO 450,000 TONS PER YEAR.	ELECTRIC ARC FURNACE, MELT SHOP, P01, S01	Chromium / Chromium Compounds, -3 & -6	SYNTHETIC MINOR LIMIT	Not applicable. Steel works, EAF.	No control equipment listed.
MINERGY - FOX VALLEY GLASS AGGREGATE PLANT	MINERGY - FOX VALLEY GLASS AGGREGATE PLANT		P10, S10 350 MMBTU/H CYCLONE FURNACE	Chromium Compounds, -6 only	THE LIMIT IS ESTABLISHED TO ENSURE THAT THE HAP EMISSION RATE IS BELOW THE TABLE VOLUME OF SEE NR445 WIS. ADM. CODE	Glass aggregate facility. Not applicable as the process and raw materials are very different.	No control equipment listed
MINERGY - FOX VALLEY GLASS AGGREGATE PLANT	MINERGY - FOX VALLEY GLASS AGGREGATE PLANT		P10, S10 350 MMBTU/H CYCLONE FURNACE	Chromium / Chromium Compounds, -3 & -6		Glass aggregate facility. Not applicable as the process and raw materials are very different.	No control equipment listed

National Emissions Standards for Hazardous Air Pollutants (NESHAP) Applicability Assessment

Glass Manufacturing NESHAP (National Emission Standards for Hazardous Air Pollutants) for Area Sources	Applicability	Reference.
NAICS code 327212 is subject to the Glass Manufacturing NESHAP (National Emission Standards for Hazardous Air Pollutants for **Area Sources**: Clay Ceramics Manufacturing, Glass Manufacturing, and Secondary Nonferrous Metals Processing	This USA NAICS code represents the activities at the Guelph facility for "manufacturing textile glass fibers" as part of NAICS 327212.	2022 NAICS Manual page 196 under NAICS code 325220.
NESHAP applies to glass manufacturing plants that operate continuous furnaces and use one or more of the glass manufacturing metal HAP as raw materials • Cullet is not considered a raw material when determining if a furnace is an affected source • Raw material also does not include material that is recycled from the furnace control device • <u>Urban HAP</u> = arsenic, cadmium, chromium, lead, manganese and nickel	The Guelph facility does not use any of the glass manufacturing Metal HAP as raw materials (arsenic, cadmium, chromium, lead, manganese or nickel) and does not use cullet. Therefore, this NESHAP would not apply to the Guelph facility.	Subpart SSSSSS-National Emission Standards for Hazardous Air Pollutants for Glass Manufacturing Area Sources
<u>Area source of HAP emissions</u> = any stationary source or group of stationary sources within a contiguous area under common control that does not have the potential to emit any single HAP at a rate of 9.07 Mg/yr or more and any combination of HAP at a rate of 22.68 Mg/yr or more	The Guelph facility is below these single and combination HAPs rates, and the facility does not use any of the metal HAP as raw materials.	Subpart SSSSSS-National Emission Standards for Hazardous Air Pollutants for Glass Manufacturing Area Sources

Final Rule Emission Limits (Table 1 to Subpart SSSSSS of Part 63-Emission Limits)	Applicability	Reference.
○ For each new or existing glass melting furnace that produces glass at an annual rate of at least 45 Mg/yr <u>AND is charged with compounds of arsenic, cadmium, chromium, manganese, lead, or nickel as raw materials</u>, you must meet one of the following emission limits:	Not applicable as these materials are not used as raw materials.	Subpart SSSSSS-National Emission Standards for Hazardous Air Pollutants for Glass Manufacturing Area Sources
▪ The 3-hour block average production-based PM mass emission rate must not exceed 0.1 g/kg of		
▪ The 3-hour block average production-based metal HAP mass emission rate must not exceed		
○ *Raw material* (definition in 63.11458) means minerals, such as silica sand, limestone, and dolomite; inorganic chemical compounds, such as soda ash (sodium carbonate), salt cake (sodium sulfate), and potash (potassium carbonate); metal oxides and other metal-based compounds, such as lead oxide, chromium oxide, and sodium antimonate; metal ores, such as chromite and pyrolusite; and other substances that are intentionally added to a glass manufacturing batch and melted in a glass melting furnace to produce glass. Metals that are naturally-occurring trace constituents or contaminants of other substances are not considered to be raw materials. Cullet and material that is recovered		



Glass manufacturing metal HAP means an oxide or other compound of any of the following metals included in the list of urban HAP for the Integrated Urban Air Toxics Strategy and for which Glass Manufacturing was listed as an area source category: arsenic, cadmium, chromium, lead, manganese, and nickel.

National Emissions Standards for Hazardous Air Pollutants (NESHAP) Applicability Assessment

	Applicability
NAICS code 327212 is affected.	This USA NAICS code 327212 includes wet-formed fiberglass mat production.
Wet-Formed Fiberglass Mat Production Residual Risk and Technology Review (Final rule) 40 CFR Part 63, subpart HHHH. The industry consists of facilities that use formaldehyde-based resins to bond glass fibers together to make wet formed fiberglass mat. Methanol is also present in some but not all resins to produce wet formed fiberglass mat. The primary HAP emitted during production is formaldehyde.	The Guelph facility does not use any formaldehyde-based resins. Additionally, these rules are not applicable to the contaminant of interest based on the scope of this jurisidictional review.

National Emissions Standards for Hazardous Air Pollutants (NESHAP) Applicability Assessment

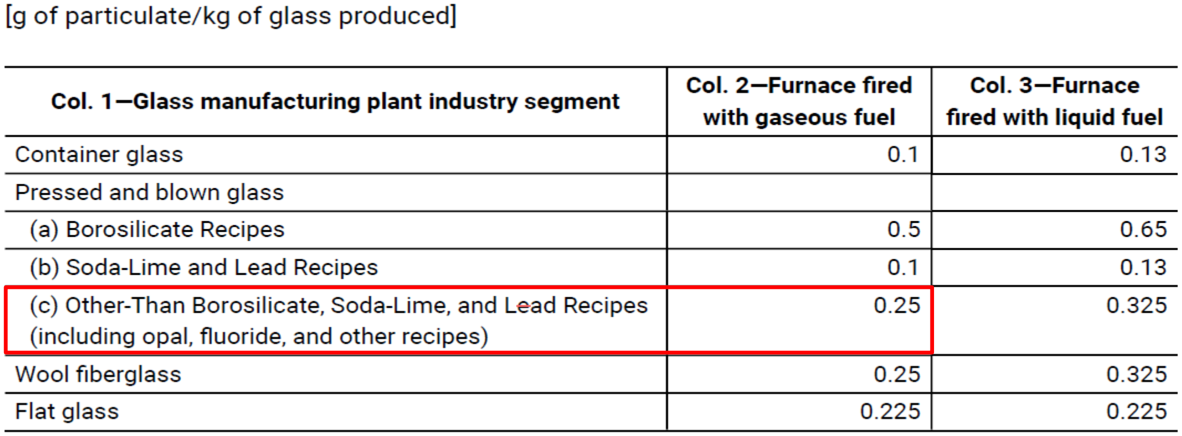
National Emission Standards for Hazardous Air Pollutants for Wool Fiberglass Manufacturing; Rotary Spin Lines Technology Review and Revision of Flame Attenuation Lines Standard (40 CFR Part 63) Federal Register /Vol. 82, No. 246 /Tuesday, December 26, 2017 /Rules and Regulations	Applicability
National Emission Standards for Hazardous Air Pollutants for Wool Fiberglass Manufacturing; Rotary Spin Lines Technology Review and Revision of Flame Attenuation Lines Standard (40 CFR Part 63) Federal Register /Vol. 82, No. 246 /Tuesday, December 26, 2017 /Rules and Regulations	
Applies to Mineral Wool Production and Wool Fiberglass Manufacturing → NAICS code 327993 (not exhaustive but an indicator of entities that may be affected)	Could be considered applicable / transferable for some of the processes (ie. furnace)
Major sources are those that emit or have the potential to emit any single HAP at a rate of 10 tons per year or more, or 25 tons per year or more of any combination of HAP	Would not apply to the Guelph facility as HAP emissions are below these thresholds.
40 CFR part 63 subpart NNN - Wool Fiberglass Manufacturing consists of facilities that produce wool fiberglass from sand, feldspar, sodium sulfate, anhydroux borax, boric acid, or any other materials.	The Guelph facility uses some of the raw materials (sand and sodium sulfate) but does not produce wool fiberglass and does not use borax or boric acid.
Existing and new gas-fired furnaces (at area sources) – chromium compounds: 0.00025 lb/ton glass pulled (emission limit for wool fiberglass manufacturing major sources)	If the Guelph facility were in the USA and produced wool fiberglass vs. textile glass, they would be considered an area source.
Existing and new gas-fired furnaces (at major sources) – chromium compounds: 0.00025 lb/ton glass pulled and Particulate = 0.33 lb/ton of glass pulled.	Chromium limit is identical for major and area sources
Any requirements related to Rotary Spin (RS) or Flame Attentuation (FA) processes are not included as these processes do not occur at the Guelph facility.	not applicable.

National Emissions Standards for Hazardous Air Pollutants for Mineral Wool Production and Wool Fiberglass Manufacturing (Federal Register / Vol. 80, No. 145 / Wednesday, July 29, 2015 / Rules and Regulations). Final Rule related to the Residual Risk and Technology Reviews (RTR).	Applicability
Applies to Mineral Wool Production and Wool Fiberglass Manufacturing → NAICS code 327993 (not exhaustive but an indicator of entities that may be affected)	Could be considered applicable / transferable for the furnace.
finalizes first-time generally available control technologies (GACT) standards for gas-fired glass melting furnaces at wool fiberglass manufacturing facilities that are area sources. [area sources are those that emit less than the major source threshold of HAP (<10 tons/yr single, or 25 tons/yr combination)	If the Guelph facility were in the USA and produced wool fiberglass vs. textile glass, they would be considered an area source.
HAPS from Area sources are regulated on the basis of generally available control technology (GACT), vs. major sources that have maximum achievable control technology (MACT) requirements.	for context only
USEPA review of control technologies for wool fiberglass manufacturing furnaces identified that they are essentially the same as previously but that there have been improvements in the operation and design of the furnaces and their control technologies since the original review.	
EPA has established work practice standards for periods of startup and shutdown: *gas-fired glass-melting furnaces (for wool fiberglass manufacturing) at area sources would have to comply with an alternative compliance provision for startup and shutdown that would require sources to keep records showing that emissions were routed to the air pollution control devices and that these control devices were operated at the parameters established during the most recent performance test that showed compliance with the applicable emission limits*	Not currently applicable as Guelph doesn't currently have control devices.
Startup and Shutdown requirements: - must not shut down items of equipment that are required or utilized for compliance - use only natural gas or other clean fuels to heat each furnace There are other requirements for cold top furnaces that are not included here as they are not applicable.	No impact expected as Guelph only uses natural gas.
Startup and Shutdown definitions: -Startup begins when the wool fiberglass glass-melting furnace has any raw materials added and reaches 50 percent of its typical operating temperature. -Startup ends when molten glass begins to flow from the wool fiberglass glass-melting furnace - Shutdown begins when the heat sources to the glass-melting furnace are reduced to begin the glass-melting furnace shut down process. -Shutdown ends when the glass-melting furnace is empty or the contents are sufficiently viscous to preclude glass flow from the glass-melting furnace.	No impact expected as Guelph only uses natural gas and no control devices.
Compliance testing for wool fiberglass manufacturing major sources for chromium compounds (method 29) is required annually.	The Guelph facility is not producing Wool Fiberglass and would be an area source not a major source, so the annual Method 29 testing for chromium would not be transferrable.
Wool Fiberglass Manufacturing Rule for Area sources (includes Generally available control technologies (GACT) analysis for Wool Fiberglass Manufacturing Area sources)	
The PM controls in place at gas-fired glass-melting furnaces achieve an average efficiency of 98%	
If sources attempted to remove their PM controls they would not be able to meet the chromium limit	Guelph facility PM emissions do not require controls
Revised the GACT analysis as two approaches could be used by industry to reduce chromium emissions from gas-fired furnaces	
▪ Rebuild the furnace	Data for the Guelph furnace does not indicate this would be an effective or relevant abatement technique.
▪ Replace one raw material (cullet) with another material (raw minerals)	Not applicable as the Guelph facility does not use cullet.

40 CFR Part 63 [EPA–HQ–OAR–2010–1041 and EPA–HQ– OAR–2010–1042; FRL–9918–22–OAR] RIN 2060–AQ90 NESHAP Risk and Technology Review for the Mineral Wool and Wool Fiberglass Industries; NESHAP for Wool Fiberglass Area Sources 2014-25125	Applicability
Based on information provided to the USEPA by industry, they evaluated eight different approaches to reducing chromium from gas-fired wool fiberglass furnaces. This included seven new options, and a re- evaluation of the costs associated witha sodium hydroxide scrubber control option discussed in the previous proposal. These air pollution control technologies or practices were identified by industry as potential compliance options to meet the standard. These options are as follows	These technologies are for wool fiberglass major sources, vs the glass manufacturing area sources that would most directly apply to the Guelph facility.
• Raw material substitution— discontinued use of green glass cullet in the raw material furnace charge; this is also a pollution prevention option;	Not applicable
• Furnace rebuild, when chromium emissions approach the limit, and before the end of the furnace's useful life;	Not applicable. Additional rationale provided in Section 4 of the report.
• Installation of high efficiency particulate air (HEPA) filters at the outlet of the dry electrostatic precipitator (DESP);	Included in the options for technical feasibility for Guelph
• Installation of Venturi scrubber technology at the outlet of the DESP;	Included in the options for technical feasibility for Guelph
• Installation of a 3-stage filter at the outlet of the DESP;	Included in the options for technical feasibility for Guelph
• Installation of a 3-stage filter with water cleaning at the outlet of the DESP;	Included in the options for technical feasibility for Guelph
• Installation of a membrane baghouse at the outlet of the DESP;	Included in the options for technical feasibility for Guelph
• Installation of a caustic scrubber at the outlet of the DESP, as previously proposed, but with new cost analyses	Included in the options for technical feasibility for Guelph

USEPA New Source Performance Standards for Glass Manufacturing Plants

40CFR Part 60 subpart CC (60.290 - 60.296)	Applicability
Specifies particulate emission standards for glass melting furnaces depending on the type of glass and fuel used.	Would apply to facilties constructed after 1979 and applies to textile fiberlgass



[g of particulate/kg of glass produced]

Col. 1—Glass manufacturing plant industry segment	Col. 2—Furnace fired with gaseous fuel	Col. 3—Furnace fired with liquid fuel
Container glass	0.1	0.13
Pressed and blown glass		
(a) Borosilicate Recipes	0.5	0.65
(b) Soda-Lime and Lead Recipes	0.1	0.13
(c) Other-Than Borosilicate, Soda-Lime, and Lead Recipes (including opal, fluoride, and other recipes)	0.25	0.325
Wool fiberglass	0.25	0.325
Flat glass	0.225	0.225

The limit that would apply to the Guelph facility if it were a new facility in the USA would be 0.25 g of particulate per kg of glass produced

Guelph PM furnace emissions from historical testing are 0.07 g PM/kg glass.

Summary of USA Permit Review for Composite Glass Facilities

Company Name	Site/Facility Name	Permitting State	Furnace Description from Permit	Permit Requirements related to Control Equipment
Owens Corning Composite Materials, LLC	Fiberglass Manufacturing Facility	Texas	2 furnaces; 10-01 Furnace Stack and 10-02 Furnace stack.	Furnace fuel limited to natural gas and electric power. No listed control equipment for furnaces. No listed emission limits for chromium or chromium compounds.
Owens Corning Composite Materials, LLC	Amarillo Plant Pressed and Blown Glass and Glassware	Texas	2 furnaces listed in the new source review table	No listed emission limits for chromium or chromium compounds. No listed control equipment for furnaces.
Owens Corning Composite Materials, LLC		Tennessee	Listed as furnace bins, and glass melting furnace and refiner. Glass Melting Furnace #1 (Natural gas fired with electric boost), Forehearth and Molten Glass Refiner	No listed emission limits for chromium or chromium compounds. No listed control equipment for furnaces.
Owens Corning Composite Materials, LLC	Starr Plant	South Carolina	U06 D Furnace no control device S06 U11 E Furnace no control device S11	Furnace fuel limited to natural gas. There are modelled emission rates for furnace chromium. No controls or testing required for chromium.
Johns Manville, Inc.		Tennesee	No furnace emission unit listed in permit. Manufacture wet-formed fiberglass mat only.	No furnace or glass melting requirements (glass melting not present). No listed emission limits or controls listed for chromium or chromium compounds.
Johns Manville, Inc.	Johns Manville - Waterville 07	Ohio	Permit lists 4 melters discharging through wet scrubbers.	No controls or testing requirements specific to chromium. Melters are equipped with scrubbers and subject to particulate emissions limit.
MW/MB, LLC.		Tennessee	Defined as glass melting furnace EP-51: a unit comprising a refractory vessel in which raw materials are charged, melted at high temperature, refined, and conditioned to produce molten glass. Permit indicates they have a borosilicate glass.	Furnace fuel limited to natural gas. No listed emission limits or controls for chromium or chromium compounds. Permit contains an estimated combined HAP emission rate. No listed control equipment for furnaces.
Saint-Gobain ADFORS America, Inc.	Saint-Gobain ADFORS America, Inc.	Georgia	Glass Melting Furnace FR01 subject to NSPS (for particulate)	No listed emission limits or controls for chromium or chromium compounds. Permit contains a requirement to report total combined HAPs for the year, however, there is no HAPs limit stated. Furnace has a Luhr Filter System (dry scrubber and baghouse control). Rationale for controls may be to achieve PM limits for NSPS.
Electric Glass Fiber America, LLC	Shelby	North Carolina	Double level fiberglass furnace No. 520, consisting or 2 forehearths, a refiner and melter. Double level fiberglass furnace No. 524 consiting of a melter, refiner, and one forehearth. Double level fiberglass furnace No.525 (same as 524)	No specific controls listed for chromium or chromium compounds. Modelled emission rate for soluble chromate compounds, chromium (VI) equivalent are set as 0.013 lb/day (as submitted by the proponent). No listed control equipment for furnaces.

Company Name	Site/Facility Name	Permitting State	Furnace Description from Permit	Permit Requirements related to Control Equipment
Electric Glass Fiber America, LLC	Lexington	North Carolina	Single level fiberglass furnace No. 502 consisting of one melter, refiner, and forehearth Single level fiberglass furnace No. 503 (consiting of same as 502) Double level fiberglass furnace No. 507 consisting of one melter, refiner, and forehearth Double level fiberglass furnace No. 509 (consisting of same as 507)	Modelled emission rates for chromium in lb/hr are set in the permit (as submitted by the proponent). No controls or testing required for chromium. Furnace 502 has a dry scrubber to control emissions of fluoride and filterable particulate.
AGY Aiken, LLC	Aiken	South Carolina	A-wing furnaces and forehearths EU ID: 12 D-wing furnaces and forehearths EU ID: 14 E-wing furnaces and forehearths EU ID: 15	Furnace fuel limited to natural gas. No listed emission limits or controls for chromium or chromium compounds. Multi-tex and MDM (modified direct melt) process used, some with controls. Operations are significantly different than most composite glass manufacturing with melting furnaces.
China Jushi USA Corporation	China Jushi USA Corporation Columbia, South Carolina	South Carolina	EU2: Glass Furnace (Two) with control device MC1 - MC2 (SNCR Denitrification; Cooling tower/Wet Scrubber; LoTox Oxidation; Double Alki Method; ESP, Draft Fan) The control devices control PM, SO2, NOx, and HF emissions	Facility is shutdown.
Superior Huntingdon Composites LLC	Superior Huntingdon Composites LLC/Huntingdon	Pennsylvania	No furnace emission unit listed in permit. Mat lines and ovens are described in the permit.	No furnace or glass melting requirements (glass melting not present, only mat production). No listed emissdion limits or control for chromium or chromium compounds.

Emission Level Comparison - Regulations, Permits

	Regualtory Agency or Facility	Facility Comparator	Facility Comparator Units	Contaminant	OC Guelph Equivalent Value	OC Guelph Equivalent Value Units
Regulatory Agencies	European Commission - BAT-AEL	<0.9-4.5 x 10^-3	Kg/tonne melted glass	∑ (As, Co, Ni, Cd, Se, CrVI)	6.54E-05	kg hex chrome per tonne glass (furnace only)
	European Commission - BAT-AEL	<4.5 – 13.5 x 10^-3	Kg/tonne melted glass	∑ (As, Co, Ni, Cd, Se, CrVI, Sb, Pb, CrIII, Cu, Mn, V, Sn)	6.54E-05	kg hex chrome per tonne glass (furnace only)
	Glass Manufacturing NESHAP	0.01	g/kg of glass produced	Metal HAP (total of arsenic, cadmium, chromium, lead, manganese, and nickel)	0.0001	g total chrome per kg glass (furnace only)
	NESHAP for Mineral Wool Production and Wool Fiberglass Manufacturing	0.00025	lb pollutant/ton glass pulled	Chromium compounds	0.00027	lb total chrome per ton glass (furnace only)
	Memorandum - Determination of GACT for Glass Manufacturing Furnaces	0.02	lb/ton	Metal HAP (total of arsenic, cadmium, chromium, lead, manganese, and nickel)	0.00027	lb total chrome per ton glass (furnace only)
	TCEQ Hexavalent Chromium Development Support Document	0.0043	ug/m3	CrVI (long term)	0.00133	ug/m3
	TCEQ Hexavalent Chromium Development Support Document	0.39	ug/m3	CrVI (short term/24h)	0.00567	ug/m3
	Owens Corning Composite Materials, Starr Plant	0.001-0.007	lb/hr	Total chromium	0.0005	lb/hr
	Electric Glass Fiber America, LLC - Lexington	0.0058	lb/hr	Total chromium	0.0005	lb/hr
	Electric Glass Fiber America, LLC - Lexington	0.00092	lb/hr	Total chromium	0.00071	lb/hr
	Electric Glass Fiber America, LLC - Lexington	0.0068	lb/hr	Total chromium	0.0005	lb/hr

	Regualtory Agency or Facility	Facility Comparator	Facility Comparator Units	Contaminant	OC Guelph Equivalent Value	OC Guelph Equivalent Value Units
Facility Permits	Electric Glass Fiber America, LLC - Lexington	0.0011	lb/hr	Total chromium	0.0007	lb/hr
	Electric Glass Fiber America, LLC - Lexington	0.0142	lb/hr	Total chromium	0.0005	lb/hr
	Electric Glass Fiber America, LLC - Lexington	0.0058	lb/hr	Total chromium	0.0007	lb/hr
	Electric Glass Fiber America, LLC - Lexington	0.0254	lb/hr	Total chromium	0.0005	lb/hr
	Electric Glass Fiber America, LLC - Lexington	0.0087	lb/hr	Total chromium	0.00071	lb/hr
	MW/MB, LLC.	9.6	tons/12 month period	Any individual HAP	0.007	tons total chrome/year
	MW/MB, LLC.	24.9	tons/12 month period	Combination of HAPs	16.2	tons in 2023

Juridsictional Review - Summary of Pollution Control Options

Category	Technique	Description	Resource	Industry	Part of the Process	Contaminant	Required or Mentioned	Conclusion	Applicable?
Add on controls	Filter systems to reduce dust emissions to below 5mg/Nm3	"in most modern processes, silos and mixing vessels are fitted with filter systems which reduce dust emissions to below 5 mg/Nm3"	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Continuous filament glass fibre	Silos and mixing vessels	Dust - general	Mentioned	Not applicable, there is no hexavalent chromium and only trace amounts of chromium present at the raw material stage	N
	Bag filter systems	"Dust abatement techniques, particularly **bag filter systems** and electrostatic precipitators**.** Where emissions contain significant metal concentration, up to 70 – 80 % of total dust (i.e. lead crystal glass production), high efficiency dust abatement systems can generally reduce both dust and metal emissions."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	Metal emissions either within dust or as gaseous components	Mentioned as an approach - primary techniques	No metal additives are used. Metallic content is <1%. Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N
	Bag filters	"Bag filters are highly efficient dust collection devices and a collection efficiency of 95 – 99 % would be expected. Particulate emissions of between 0.5 and 5 mg/Nm3 can be achieved and levels below 5 mg/Nm3 could be expected in many applications. This generally equates to significantly less than 0.008 kg per tonne of glass melted and less than 0.02 kg/t glass in some specific cases, such as borosilicate glasses or modified soda-lime glasses."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	Particulate matter	Mentioned as a technique	Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N
	Filtration system (bag filter)	"The technique is generally applicable for the treatment of waste gases from cutting and milling operations of the products"	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Continuous filament glass fibre	Downstream processes	Combined emissions (solid + gaseous) Dust	Mentioned as a technique	Does not apply as it's not associated with the hot end.	N
	Filter system for dust	"Dust emissions from any downstream process (for example, cutting, milling) should be controlled by extraction to a filter system."	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Continuous filament glass fibre	Downstream processes	Dust	BAT - expected to be followed by the regulator	Does not apply as it's not associated with the hot end.	N
	Filter systems	"Dust emissions arising from cutting and milling can be readily treated by extraction to a filter system. This is the standard technique used throughout the sector and emissions in the range of 1 – 5 mg/Nm3 can be achieved."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Continuous filament glass fibre	Cutting and milling	Dust	Mentioned as a technique	Does not apply as it's not associated with the hot end.	N
	Fabric filter	Fabric filter mentioned as a control device option. For example: "If an existing affected glass furnace is controlled with a fabric filter, must monitor the filter inlet temperature continuously and record the results at least once every 8 hours"	Glass Manufacturing NESHAP	Glass manufacturing	Furnace	Particulate matter Metal HAP	Mentioned	Metal HAPs are not used as raw materials beyond trace amounts in mined materials	N
	High temperature filter media	"The most common high-temperature filters used in other industries are ceramic or high-temperature wool candles for the removal of dust. These filters are made of aluminium-silicate materials and can be applied to temperatures up to 1000 °C. Dust concentrations of <10 mg/Nm3 have been reported with the application of high temperature ceramic filters" Filter efficiency of up to 99.9%	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	Particulate matter	Mentioned as a technique	Not applicable as this is related to batch dust. Hexavalent chromium is <2% of particulate from process sources.	N

Category	Technique	Description	Resource	Industry	Part of the Process	Contaminant	Required or Mentioned	Conclusion	Applicable?
	Mechanical collectors	Cyclones, gravity settlers, baffle chambers, louvers "These techniques have poor collection efficiencies for small particles, in particular with diameters smaller than 10 um, and due to the low particle size of most dusts encountered in the glass industry, they are rarely used." The exception for this is that cyclones are often used as a pretreatment stage for other techniques. Cyclones are not considered effective for furnace emissions. "Cyclones are widely used in many industries and are particularly suitable for collecting particles with diameters greater than 10 µm. Depending on design, medium/high efficiency cyclones give collection efficiencies of 45 – 90 % at 10 µm, and 5 – 30 % at 1 µm."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	Particulate matter	Mentioned as a technique	Does not apply for the furnace/melting due to the small particle size expected.	N
	ESP or bag filter with dry or semi-dry acid gas scrubbing	"For dust abatement, BAT is considered to be an Electrostatic Precipitator (EP) or bag filter with dry or semi-dry acid gas scrubbing. The Operator should provide full justification where other techniques are used"	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Continuous filament glass fibre	Melting	Dust	BAT - expected to be followed by the regulator	Technical feasibility assessment to date indicates EPs and bag filters are not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan. Waste gases do not contain significant acid gas warranting acid gas scrubbing.	N
	Ventilation and extraction systems	"Ventilation and extraction systems are often used on the forehearth channels in order to discharge solid and gaseous emissions externally."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Continuous filament glass fibre	Fugitive emissions - Forehearth channels	Solid and gaseous emissions	Mentioned	Extraction and ventilation is occuring through the forehearth stack and GV's.	Y - no action required
	Electrostatic precipitators	ESPs are the most commonly used device for controlling emissions of PM or metal HAP from glass furnaces ~35% of furnaces that produce glass using compounds of metal HAP as raw materials use ESPs	Memorandum – Determination of GACT for Glass Manufacturing Furnaces	Glass manufacturing	Furnace	Particulate matter Metal HAP	Mentioned	Metal HAP are not used as raw materials beyond trace amounts in mined materials Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N
	Electrostatic precipitators	ESP mentioned as a control device option. For example: "If an existing affected glass furnace is controlled with an electrostatic precipitator (ESP), must monitor the secondary voltage and secondary electrical current to each field of the ESP continuously and record the results at least once every 8 hours"	Glass Manufacturing NESHAP	Glass manufacturing	Furnace	Particulate matter Metal HAP	Mentioned	Metal HAP are not used as raw materials beyond trace amounts in mined materials Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N
	Electrostatic precipitators	"Dust abatement techniques, particularly bag filter systems and **electrostatic precipitators.** Where emissions contain significant metal concentration, up to 70 – 80 % of total dust (i.e. lead crystal glass production), high efficiency dust abatement systems can generally reduce both dust and metal emissions."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	Metal emissions either within dust or as gaseous components	Mentioned as an approach - primary techniques	Metal HAP are not used as raw materials beyond trace amounts in mined materials Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N

Category	Technique	Description	Resource	Industry	Part of the Process	Contaminant	Required or Mentioned	Conclusion	Applicable?
	Electrostatic precipitators	"ESPs are very effective in collecting dust in the range of 0.1 to 10 µm, and overall collection efficiency can be 95 – 99 % (depending on inlet concentration and ESP size). the presence of heavy metals in the flue-gas which may require higher levels of abatement to be achieved. A high performance filter can considerably reduce metal emissions, including boron." Often used with a dry scrubber before the filter	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	Particulate matter	Mentioned as a technique	Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan. No boron ingredients in use.	N
	Wet electrostatic precipitator	"generally applicable for the treatment of waste gases from the forming process (application of the coating to the fibres) or secondary processes which involve the use of binder that must be cured or dried"	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Continuous filament glass fibre	Downstream processes	Combined emissions (solid + gaseous)	Mentioned as a technique	Does not apply as it's not associated with the hot end.	N
	Wet scrubbers	"Wet scrubbing systems can be used to control both gaseous and particulate emissions; although their application is, in general, more efficient for the removal of gaseous pollutants" "In some applications venturi scrubbers may be considered. These systems have a high-pressure drop and consequently they have high power consumption and operating costs. Although good removal efficiencies can be achieved with venturi scrubbers, this technique is considered both technically and economically impracticable in most cases, due to the size of the glass processes."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	Particulate matter	Mentioned as a technique	"A very limited number of wet scrubber applications are in operation in the glass industry, particularly in the domestic glass and continuous filament glass fibre sectors." Wet scrubbers have been assessed for technical feasibility.	Y - not technically feasible
	Water scrubbing systems	"In most cases, the extracted cooling air is treated by water scrubbing systems prior to release or partial recycling into the forming area." More relevant for VOCs - not particulate/metals	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Continuous filament glass fibre	Downstream activities - cooling air	VOCs	Mentioned	VOC reduction is not the subject of this application.	N
	Wet scrubbing systems	"generally applicable for the treatment of waste gases from the forming process (application of the coating to the fibres) or secondary processes which involve the use of binder that must be cured or dried"	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Continuous filament glass fibre	Downstream processes	Combined emissions (solid + gaseous)	Mentioned as a technique	Does not apply as it's not associated with the hot end.	N
	Primary measures or acid gas scrubbing combined with dust abatement - metals	"For other emissions, chlorides and metals, BAT is considered to be primary measures or acid gas scrubbing combined with dust abatement."	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Continuous filament glass fibre	Melting	"Other emissions, chlorides and metals"	BAT - expected to be followed by the regulator	Dry scrubbing is not applicable to most metals and not applicable to the contaminant that is the subject of this application.	N
	Steam plume elimination - for wet scrubbers only	"Releases from wet scrubber vents should be hot enough to avoid visible plume formation in the vicinity of the vent. This is to prevent the condensation or adsorption of environmentally harmful substances by the condensing water vapour. Exhaust gases from a wet scrubber can be heated by the use of waste heat to raise the temperature of the exhaust gases and prevent immediate condensation on the exit from the vent."	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Point sources	Not specified	BAT - expected to be followed by the regulator	Not applicable unless there is a wet scrubber. Wet scrubbers have been assessed for technical feasibility.	N
	Dust abatement techniques	"Emissions of metals, either within the dust or as gaseous components, should be controlled by: • Dust abatement techniques"	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Point sources	Particulate matter - metals	BAT - expected to be followed by the regulator	Batch conveying system is all covered and pneumatic. All are done or not applicable.	Y - no action required

Category	Technique	Description	Resource	Industry	Part of the Process	Contaminant	Required or Mentioned	Conclusion	Applicable?
	For gaseous emissions, use of dry or semi-dry scrubbing with dust abatement	"Emissions of metals, either within the dust or as gaseous components, should be controlled by: • For gaseous emissions, use of dry or semi-dry scrubbing techniques in combination with dust abatement"	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Point sources	Particulate matter	BAT - expected to be followed by the regulator	Batch conveying system is all covered and pneumatic. All are done or not applicable. Dry scrubbing is not applicable to most metals and not applicable to the contaminant that is the subject of this application.	N
Material Substitution	Raw material selection	"Raw material selection to minimise contamination and where practicable to use alternative additives. Raw material selection includes specifications on cullet quality. Where only internal cullet is used due to the limited availability of external cullet, emissions of metals may be much easier to control."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	Metal emissions either within dust or as gaseous components	Mentioned as an approach	To the extent practical, the recipe of the glass is modified. There are no additives of chromium. Cullet is not used or even recycled into its own furnace.	N
	Raw material modifications	"Sodium chloride can be a significant factor in emissions of dust and chlorides Natural soda ash is available which is virtually NaCl-free"	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Melting	Particulate matter	Mentioned Primary technique - BAT	Soda ash was removed and sodium chloride is not used as an additive.	N
	Material selection	Appears to be related to VOCs - not particulate	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Continuous filament glass fibre	Non-melting activities (application of coating to fibres, cake drying, cutting/milling, secondary processing)	VOCs	Mentioned as a technique for the industry	VOC reduction is not the subject of this application.	N
	Raw material modifications	"Raw material modifications – consumption of boron containing materials should be minimised where practicable. Where this is not possible, secondary abatement is required."	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Point sources	Particulate matter	BAT - expected to be followed by the regulator	Guelph uses a modified E glass (ECR glass) which does not contain boron.	Y - no action required
	Raw material selection to minimize contamination and use alternative additives	"Emissions of metals, either within the dust or as gaseous components, should be controlled by: • raw material selection to minimise contamination and where practicable to use alternative additives. Raw material selection includes cullet sourcing and sorting"	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Point sources	Particulate matter - Metals	BAT - expected to be followed by the regulator	To the extent practical, the recipe of the glass is modified. There are no additives of chromium. Cullet is not used or even recycled into its own furnace.	N
	Low-boron or boron-free batch formulations	"The primary techniques applied for the reduction of dust emissions consist of low-boron or boron-free batch formulations. With the use of boron-free formulations and a good control of batch carryover, emission values for particulate matter below 0.14 kg/tonne melted glass may be achieved with oxy-fuel fired furnaces."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Continuous filament glass fibre	Batch material	Dust - general	Primary technique - BAT (EU)	Guelph uses a modified E glass (ECR glass) which does not contain boron.	Y - no action required
	Formulations without fluorine	"Formulations without added fluorine have been developed and, where effective, dust emissions below 50 mg/Nm3 and HF emissions in the range 10 - 50 mg/Nm3 have been achieved." "Fluoride additions to the batch should be minimised wherever possible by: • Development and use of non-fluorine batch formulation;"	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Continuous filament glass fibre	Batch, melting	Unclear (dust, HF)	BAT - expected to be followed by the regulator	The Guelph batch formulation does not contain fluorine.	N
	Coating materials with low organic solvents	Appears to be related to VOCs - not particulate	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)			VOCs		VOC reduction is not the subject of this application.	N
	Coating materials with low VOCs	Appears to be related to VOCs - not particulate	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)			VOCs		VOC reduction is not the subject of this application.	N
Process Changes	Electric melting	"The actual emissions achieved will depend greatly on the batch formulation, and due to the low waste gas flows, a comparison of emission concentrations can be misleading. However, as a broad indication, overall **direct emissions are reduced by a factor of between 10 and 100** compared to a conventional air-fuel-fired furnace of comparable pull rate." However, the environmental impacts of power generation can offset these advantages	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	"all emissions"	Mentioned as a technique for the industry	The use of full electric melting is not done in the continuous filament glass fibre sector. Current expected limit of electric melting is 80% (OC). Other sectors can use full electric melting as their glass melt temperatures and glass conductivity are different.	N

Category	Technique	Description	Resource	Industry	Part of the Process	Contaminant	Required or Mentioned	Conclusion	Applicable?
	Temperature reduction at the melt surface 1) Furnace design and geometry to improve convective currents and heat transfer 2) Use of electric boost 3) Increased use of cullet	"A correlation between crown temperature, the glass melt surface temperature and particulate formation has been shown in soda-lime furnaces. Measures which have the greatest effect in reducing dust emissions per tonne of glass are those which improve the energy efficiency and particularly the heat transfer to the glass."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	Particulate matter	Mentioned Primary technique - BAT	1) & 2) 2022 furnace design incorporated new geometry and burner design, including eboost 3) Not applicable due to the ASTM standard and specifications for the glass at Guelph.	Y - no action required
	Burner positioning	"Progress has been made with burner positioning to **optimise combustion air velocity and direction, and fuel velocity and direction.** When changing the positioning of the burners, it is important to avoid reducing flames touching the melt, since this would increase dust emissions and would promote refractory attack in the superstructure, with possible effects on the glass quality."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	Particulate matter	Mentioned Primary technique - BAT	Burner positioning in the melter was also redesigned and optimized in the melter in 2022. Burner positioning for forehearth was evaluated as part of tech benchmarking.	Y
	Burner positioning to optimize combustion air velocity and direction and fuel velocity and direction	"Burners should be positioned to optimise combustion air velocity and direction and fuel velocity and direction. Consideration should be given to combining these changes with modifications to furnace width and the length of the unfired portion of the blanket. This should be expected to be included in an agreed improvement programme for implementation at furnace rebuild."	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Point sources	Particulate matter	BAT - expected to be followed by the regulator	Burner positioning for forehearth was evaluated as part of tech benchmarking. Melter design, including burner positioning, was optimized in the 2022 melter rebuild.	Y
	Conversion to gas firing	"Conversion from fuel oil firing to natural gas firing may give substantial reductions in dust emissions. The reasons for this are probably the particular condensation reactions for particulates with gas firing than with oil, although in some cases the reduced SOX levels might also be a factor. the flat glass sector has reported dust emission reductions in excess of 25 % for the conversion from oil to gas firing."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Glass manufacturing	Melting	Particulate matter	Mentioned Primary technique - BAT	Facility does not use fuel oil - does not apply	N
	Conversion from fuel oil to natural gas firing	"Where an acceptable supply of natural gas is available, conversion from fuel oil firing to natural gas firing should be implemented, taking into account the costs of prevailing fuel prices."	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Point sources	Particulate matter - Metals	BAT - expected to be followed by the regulator	Facility does not use fuel oil - does not apply	N
	Control batch blanket coverage, particle size, gas velocity, and burner positioning	"Emissions from carry over of batch materials should be minimised by: - Controlling the batch blanket coverage, particle size, **gas velocity and burner positioning."**	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Point sources	Particulate matter	BAT - expected to be followed by the regulator	Burner positioning in the melter was also redesigned and optimized in the melter in 2022. Burner positioning for forehearth was evaluated as part of tech benchmarking.	Y
	Keep batch charging area closed as much as possible	"The sector uses very fine raw materials due to requirements of batch and glass homogeneity. Nonetheless, the batch charging area is normally kept closed as much as possible and the potential emissions from batch carryover and combustion gases are expected to be very low."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Continuous filament glass fibre	Batch charging	Dust - general Fugitive emissions	Mentioned in description of typical fugitive emissions from the sector	Any chromium present in batch is ppm trace amounts and not in the hexavalent form.	N
	Operation of an EMS	"The Regulators strongly support the operation of environmental management systems (EMSs)" "The Regulators recommend that the ISO 14001 standard be used as the basis for an environmental management system. Certification to this standard and/or registration under the EC Eco Management and Audit Scheme (EMAS), (Official Journal OJ L168, 10.7.93) are also strongly supported by the Regulator."	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Management techniques	Not specified	Required "The operator should have a management system in place for the activities which delivers the requirements given in column 1."	The facility current has an EMS in place (ISO 14001)	Y

Category	Technique	Description	Resource	Industry	Part of the Process	Contaminant	Required or Mentioned	Conclusion	Applicable?
	Waste minimization	"The Operator should analyse the use of raw materials, assess the opportunities for reductions and provide an action plan for improvements using the following three essential steps: i) process mapping; ii) raw materials mass balance; iii) action plan."	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Raw materials	Not specified	BAT - expected to be followed by the regulator	Not applicable - not creating waste with hex chrome	N
	Maintain a level of moisture in raw materials	"Emissions from carry over of batch materials should be minimised by: - Maintaining a level of moisture in the raw materials"	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Point sources	Particulate matter	BAT - expected to be followed by the regulator	Any chromium present in batch is ppm trace amounts and not in the hexavalent form.	N
	Furnace crown temp should be controlled to minimize particulate formation	"Furnace crown temperature should be adequately controlled to minimise particulate formation. Reductions of furnace temperature must be balanced with glass quality and the productivity of the furnace. The main points are: • Furnace design and geometry; • Use of electric boost; • Increased use of cullet."	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	Glass manufacturing	Point sources	Particulate matter	BAT - expected to be followed by the regulator	1) & 2) 2022 furnace design incorporated new geometry and burner design, including eboost 3) Not applicable due to the ASTM standard and specifications for the glass at Guelph.	Y - no action required
	Raw material handling	Raw material handling activities are enclosed and conducted within a structure	Glass Association of North America – Raw Materials Best Management Practices (Letter)	Glass manufacturing	Raw materials	Not specified - general best practices	Mentioned	No raw materials containing hex chrome which is the focus of the jurisdictional review.	N
	Wetting of the raw materials	Wetting of the raw materials to minimize the potential for dusting	Glass Association of North America – Raw Materials Best Management Practices (Letter)	Glass manufacturing	Raw materials	Not specified - general best practices	Mentioned	No raw materials containing hex chrome which is the focus of the jurisdictional review.	N
	Housekeeping activities	Regularly defined, scheduled and implemented housekeeping activities (vacuuming, sweeping, etc.)	Glass Association of North America – Raw Materials Best Management Practices (Letter)	Glass manufacturing	Raw materials	Not specified - general best practices	Mentioned	No raw materials containing hex chrome which is the focus of the jurisdictional review.	N
	General ventilation dust control devices	General ventilation dust control devices	Glass Association of North America – Raw Materials Best Management Practices (Letter)	Glass manufacturing	Raw materials	Not specified - general best practices	Mentioned	No raw materials containing hex chrome which is the focus of the jurisdictional review.	N
	Shrouds or other physical entrainment devices	Shrouds or other physical entrainment devices	Glass Association of North America – Raw Materials Best Management Practices (Letter)	Glass manufacturing	Raw materials	Not specified - general best practices	Mentioned	No raw materials containing hex chrome which is the focus of the jurisdictional review.	N

Category	Technique	Description	Resource	Industry	Part of the Process	Contaminant	Required or Mentioned	Conclusion	Applicable?
	Written O&M plan for the equipment and operations	Written O&M plan for the equipment and operations	Glass Association of North America – Raw Materials Best Management Practices (Letter)	Glass manufacturing	Raw materials	Not specified - general best practices	Mentioned	No raw materials containing hex chrome which is the focus of the jurisdictional review.	N
	Dust control devices associated with particular raw material handling operations	Dust control devices associated with particular raw material handling operations	Glass Association of North America – Raw Materials Best Management Practices (Letter)	Glass manufacturing	Raw materials	Not specified - general best practices	Mentioned	No raw materials containing hex chrome which is the focus of the jurisdictional review.	N

Jurisdiction	Document/Reference	Comments
UK	Guidance for the Glass Manufacturing Sector (A1 processes) (Draft Version)	"To gain a Permit, Operators will have to show that they have systematically developed proposals to apply the Best Available Techniques (BAT) and meet certain other requirements, taking account of relevant local factors."
EU	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	
US	Memorandum – Determination of GACT for Glass Manufacturing Furnaces	This document is a letter to the US EPA from a research institute (RTI International)
North America	Glass Association of North America – Raw Materials Best Management Practices	This document is a letter to the US EPA from the Glass Association of North America
US EPA	Glass Manufacturing NESHAP	

Juridsictional Review - Summary of Pollution Control Options for Technology Transfer

Category	Technique	Description	Resource	Industry	Type of Source Being Controlled	Contaminant	Required or Mentioned	Comments / Conclusions	Applicable?
Add on controls	Capture system that collects gases and fumes	Facilities that are subject to the NESHAP "must operate a capture system that collects the gases and fumes released during the operation of each emissions source listed in Table 1 of this subpart and conveys the collected gas stream to a particulate matter (PM) control device"	NESHAP for Chemical Manufacturing - Chromium Compounds	Chemical manufacturing - chromium compounds	Mills, dryers, rotary kilns, tanks, melter used to produce chromic acid, crystillization unit, grinding unit, etc.	Gases that contain PM	Mentioned	This is specific to particulate matter, not hexavalent chromium. Specific to chromium manufacturing processes, not glass melting furnaces.	N
	Baghouse	Mentioned as a control option in the NESHAP. Has requirements listed for this equipment type under "Initial control device inspection".	NESHAP for Chemical Manufacturing - Chromium Compounds	Chemical manufacturing - chromium compounds	Mills, dryers, rotary kilns, tanks, melter used to produce chromic acid, crystillization unit, grinding unit, etc.	Gases that contain PM	Mentioned	Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N
	Dry electrostatic precipitator	Mentioned as a control option in the NESHAP. Has requirements listed for this equipment type under "Initial control device inspection".	NESHAP for Chemical Manufacturing - Chromium Compounds	Chemical manufacturing - chromium compounds	Mills, dryers, rotary kilns, tanks, melter used to produce chromic acid, crystillization unit, grinding unit, etc.	Gases that contain PM	Mentioned	Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N
	Wet electrostatic precipitator	Mentioned as a control option in the NESHAP. Has requirements listed for this equipment type under "Initial control device inspection".	NESHAP for Chemical Manufacturing - Chromium Compounds	Chemical manufacturing - chromium compounds	Mills, dryers, rotary kilns, tanks, melter used to produce chromic acid, crystillization unit, grinding unit, etc.	Gases that contain PM	Mentioned	Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N
	Wet scrubber	Mentioned as a control option in the NESHAP. Has requirements listed for this equipment type under "Initial control device inspection".	NESHAP for Chemical Manufacturing - Chromium Compounds	Chemical manufacturing - chromium compounds	Mills, dryers, rotary kilns, tanks, melter used to produce chromic acid, crystillization unit, grinding unit, etc.	Gases that contain PM	Mentioned	Wet scrubbers have been reviewed as part of technology benchmarking. This option has been deemed not technically feasible - see TBR for details.	N
	Caustic scrubber on DESP outlet	Mentioned as a potential chromium reduction measure for furnaces - was found as part of EPA's technology review	NESHAP for Mineral wool production and wool fiberglass manufacturing	Mineral wool production and wool fiberglass manufacturing	Furnaces	Chromium	Mentioned	Various types of scrubbers and DESPs have been evaluated as part of technology benchmarking. Scrubbers are not technically feasible for the sources at this facility.	N
	Baghouse	"Sources may use whatever means they choose to meet the limits, such as more frequent furnace rebuilds, using nonchromium or low chromium refractories in furnace rebuilds, **enhanced baghouse operation**, improved maintenance and alternative controls, and furnace design features, changes in raw material, or scrubbers."	NESHAP for Mineral wool production and wool fiberglass manufacturing	Mineral wool production and wool fiberglass manufacturing	Furnaces	Chromium	Mentioned	Technical feasibility assessment to date indicates baghouses are not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N
	Scrubbers	"Sources may use whatever means they choose to meet the limits, such as more frequent furnace rebuilds, using nonchromium or low chromium refractories in furnace rebuilds, enhanced baghouse operation, improved maintenance and alternative controls, and furnace design features, changes in raw material, or **scrubbers**."	NESHAP for Mineral wool production and wool fiberglass manufacturing	Mineral wool production and wool fiberglass manufacturing	Furnaces	Chromium	Mentioned	Various types of scrubbers have been evaluated as part of technology benchmarking. These options have been deemed not technically feasible - see TBR for details.	N
	Filter systems	"In most modern glass wool processes, silos and mixing vessels are fitted with filter systems which reduce dust emissions to below 5 mg/Nm3."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool manufacturing	Silos and mixing vessels	Dust	Mentioned	Silos and mixing vessels are not the sources of interest for this application.	N
	Electrostatic precipitator	"BAT is to reduce dust emissions from the waste gases of the melting furnace by applying an **electrostatic precipitator** or a bag filter system"	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool manufacturing	Melting furnaces	Dust	Mentioned as BAT	Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N
	Bag filter	"BAT is to reduce dust emissions from the waste gases of the melting furnace by applying an electrostatic precipitator or a **bag filter system"**	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool manufacturing	Melting furnaces	Dust	Mentioned as BAT	Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N

Category	Technique	Description	Resource	Industry	Type of Source Being Controlled	Contaminant	Required or Mentioned	Comments / Conclusions	Applicable?
Add on controls	Filtration system	"BAT is to reduce metal emissions from the melting furnace by using one or a combination of the following techniques: ii. Application of a filtration system" "Dust abatement systems (bag filter and electrostatic precipitator) can reduce both dust and metal emissions since the emissions to air of metals from glass melting processes are largely contained in particulate form. However, for some metals presenting extremely volatile compounds (e.g. selenium) the removal efficiency may vary significantly with the filtration temperature."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool manufacturing	Melting furnaces	Metals	Mentioned as BAT	Technical feasibility assessment to date indicates this is not technically feasible. However, further research on feasibility and effectiveness will be conducted as part of the Action Plan.	N
	Impact jets and cyclones	"The technique is based on the removal of particles and droplets from waste gases by impaction/impingement, as well as gaseous substances by partial absorption with water. Process water is normally used for impact jets. The recycling process water is filtered before it is reapplied" Generally applicable to the mineral wool sector, in particular the forming area emissions, in particular to glass wool processes for the treatment of emissions from the forming area (application of the coating to the fibres). Limited applicability to stone wool processes since it could adversely affect other abatement techniques being used."	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool manufacturing	Downstream processes	Unclear	Mentioned as BAT	Low pressure cyclones have been reviewed as part of technology benchmarking. This option has been deemed not technically feasible - see TBR for details. Forming areas are not the source of interest for this application	N
	Wet scrubbers	Generally applicable for waste gases from the forming process or combined waste gases	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool manufacturing	Downstream processes	Unclear	Mentioned as BAT	This option is for forming (downstream processes). These are not the sources of interest.	N
	Wet electrostatic precipitators	Generally applicable for waste gases from the forming process, curing ovens, or combined waste gases	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool manufacturing	Downstream processes	Unclear	Mentioned as BAT	This option is for forming and ovens (downstream processes). These are not the sources of interest.	N
	Stone wool filters	"It consists of a steel or concrete structure in which stone wool slabs are mounted and act as a filter medium. The filtering medium needs to be cleaned or exchanged periodically. This filter is suitable for waste gases with a high moisture content and particulate matter with an adhesive nature" Applicability is mainly limited to stone wool processes for waste gases from forming and/or curing ovens	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool manufacturing	Downstream processes	Unclear	Mentioned as BAT	This option is for forming and ovens (downstream processes). These are not the sources of interest.	N
	Waste gas incineration	"The technique is generally applicable for the treatment of waste gases from curing ovens, in particular in the stone wool processes. The application to combined waste gases (forming plus curing) is not economically viable because of the high volume, low concentration, low temperature of the waste gases"	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool manufacturing	Downstream processes	Unclear	Mentioned as BAT	This option is for forming and ovens (downstream processes). These are not the sources of interest.	N
	Packed bed scrubber with or without a HEPA filter	" If the metal finishing tank mentioned in subsection (1) is in a new metal finishing facility or is a metal finishing tank added or replaced as part of a facility expansion, the air pollution control device mentioned in paragraph 1 of subsection (1) shall be one of the following devices:"	MECP Metal Finishers Industry Standard	Coating, Engraving, Heat Treating, and Allied Activities (NAICS code 332810)	Metal finishing tank	Chromium compounds	Required (choose from a list of options)	Packed bed scrubbers and HEPA filters have been reviewed as part of technology benchmarking and deemed not technically feasible - see TBR for details. Metal finishing tanks are not the source of interest for this application.	N
	Composite mesh pad scrubber with or without a HEPA filter	" If the metal finishing tank mentioned in subsection (1) is in a new metal finishing facility or is a metal finishing tank added or replaced as part of a facility expansion, the air pollution control device mentioned in paragraph 1 of subsection (1) shall be one of the following devices:"	MECP Metal Finishers Industry Standard	Coating, Engraving, Heat Treating, and Allied Activities (NAICS code 332810)	Metal finishing tank	Chromium compounds	Required (choose from a list of options)	Scrubbers and HEPA filters have been reviewed as part of the technology benchmarking and are not technically feasible. Metal finishing tanks are not the source of interest for this application.	N

Category	Technique	Description	Resource	Industry	Type of Source Being Controlled	Contaminant	Required or Mentioned	Comments / Conclusions	Applicable?
Material Substitution	Raw material substitution	"Sources may use whatever means they choose to meet the limits, such as more frequent furnace rebuilds, using nonchromium or low chromium refractories in furnace rebuilds, enhanced baghouse operation, improved maintenance and alternative controls, and furnace design features, **changes in raw material**, or scrubbers."	NESHAP for Mineral wool production and wool fiberglass manufacturing	Mineral wool production and wool fiberglass manufacturing	Furnaces	Chromium	Mentioned	To the extent practical, the recipe of the glass is modified. There are no additives to the glass ingredients that are directly related to emissions of hex chrome. Purchased and plant cullet is not used or recycled into the furnace.	N
	Using non-chromium or low chromium refractories in furnace rebuilds	"Sources may use whatever means they choose to meet the limits, such as more frequent furnace rebuilds, **using nonchromium or low chromium refractories in furnace rebuilds**, enhanced baghouse operation, improved maintenance and alternative controls, and furnace design features, changes in raw material, or scrubbers."	NESHAP for Mineral wool production and wool fiberglass manufacturing	Mineral wool production and wool fiberglass manufacturing	Furnaces	Chromium	Mentioned	This option is being considered as part of technical benchmarking	Y
	Raw material selection	"Selection of raw materials for the batch formulation with a low content of metals"	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool manufacturing	Melting furnaces	Metals	Mentioned as BAT	This is already implemented with the current glass formulation. Any metals present in batch are trace amounts.	Y - no action required
Process Changes	More frequent furnace rebuilds	"Sources may use whatever means they choose to meet the limits, such as **more frequent furnace rebuilds**, using nonchromium or low chromium refractories in furnace rebuilds, enhanced baghouse operation, improved maintenance and alternative controls, and furnace design features, changes in raw material, or scrubbers."	NESHAP for Mineral wool production and wool fiberglass manufacturing	Mineral wool production and wool fiberglass manufacturing	Furnaces	Chromium	Mentioned	Historical testing at the Guelph facility did not indicate any trends of increasing chrome emissions with furnace age. 8 years of ambient monitoring data showed a decreasing trend with furnace age. Many variables (furnace design, temperatures, raw materials) affect hex chrome emission generation. The Guelph facility does not have chrome bearing refractory above the glass line other than the small section of freeboard area. This may be a significant difference in furnace design (from other facilities that are the basis of this methodology) resulting in lower chrome emissions from Guelph. Chrome bearing refractory wear below the glass line results in chromium entering the molten glass, and is not expected to influence air emissions.	N
	Improved maintenance and alternative controls	"Sources may use whatever means they choose to meet the limits, such as more frequent furnace rebuilds, using nonchromium or low chromium refractories in furnace rebuilds, enhanced baghouse operation, **improved maintenance and alternative controls**, and furnace design features, changes in raw material, or scrubbers."	NESHAP for Mineral wool production and wool fiberglass manufacturing Similar techniques are referenced in the Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool production and wool fiberglass manufacturing	Furnaces	Chromium	Mentioned	For facilities where this rule applies (USA) wool fiberglass manufacturing furnaces, no specific controls/methods are dictated to comply with the chromium limits. The Guelph facility has implemented many improved maintenance and operational controls to reduce the generation of hexavalent chromium. (See European Commission BAT summary)	Y - no action required
	Furnace design features	"Sources may use whatever means they choose to meet the limits, such as more frequent furnace rebuilds, using nonchromium or low chromium refractories in furnace rebuilds, enhanced baghouse operation, improved maintenance and alternative controls, and **furnace design features**, changes in raw material, or scrubbers."	NESHAP for Mineral wool production and wool fiberglass manufacturing Similar techniques are referenced in the Best Available Techniques (BAT) Reference Document for the Manufacture of Glass	Mineral wool production and wool fiberglass manufacturing	Furnaces	Chromium	Mentioned	For facilities where this rule applies (USA) wool fiberglass manufacturing furnaces, no specific controls/methods are dictated to comply with the chromium limits. The Guelph facility has implemented many improved furnace design features to reduce the generation of hexavalent chromium including fuel usage reduction, e-boost, burner positioning as well as others.	Y

Jurisdiction	Document/Reference
European Commission	Best Available Techniques (BAT) Reference Document for the Manufacture of Glass
US EPA	NESHAP for Chemical Manufacturing - Chromium Compounds
US EPA	NESHAP for Mineral wool production and wool fiberglass manufacturing
Ontario MECP	MECP Metal Finishers Industry Standard

APPENDIX C
Confidential Information

Attachment 4
Public Consultation Report

Public Consultation Report
Site-Specific Air Concentration Standard Request
Owens Corning Composite Materials Canada LP
Guelph Plant

Prepared for: Owens Corning Composite Materials Canada LP

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1.0 INTRODUCTION

This Public Consultation Report by the Owens Corning Guelph Glass Plant (Plant) documents the company's efforts to inform the public regarding its request to the Ontario Ministry of the Environment, Conservation and Parks (Ministry) for an updated site-specific air standard for hexavalent chromium as an allowable compliance approach according to Section 32 of O. Reg. 419/05.

Owens Corning has reviewed the public consultation requirements in O. Reg. 419/05 and the Ministry guidance for Site Specific Standards. A summary of our understanding of the requirements is outlined below.

Section 34 of O. Reg. 419/05 indicates a facility making a request for a site-specific standard may make the request without holding a public meeting if the Director has previously set a site-specific standard for the same contaminant at the same facility. The Ministry has the discretion (per Section 34.1) to request a public meeting or information session regarding a site-specific standard renewal on a case-by-case basis.

The Guideline for the Implementation of Air Standards in Ontario identifies key stakeholders for public input as community groups, existing local environmental groups, Ministry / Public Health Units, municipalities, and other levels of government. This aligns with the stakeholders identified in Section 34 (2) of the regulation with the addition of residents within 500m of the facility.

Under the terms and conditions of the 2016 Amended Environmental Compliance Approval (ECA Number 4548-AA3QXU) for the Plant, a Public Liaison Committee (PLC) was established in 2017 for the exchange of information between the Plant and the local community. Establishing and participating in the PLC is part of the Owens Corning commitment to maintaining a positive two-way dialogue with our host community of Guelph.

The combination of the PLC meetings, proactive outreach to local government, and maintenance and promotion of a plant website focused on the site-specific standard meet the intent of public consultation in a transparent manner. PLC discussions have been robust, and members have commended the process as a means for keeping the public informed. Owens Corning is committed to a transparent process and plans to continue to proactively inform and respond to inquiries regarding this request.

2.0 PUBLIC LIAISON COMMITTEE (PLC) OVERVIEW

The Owens Corning Guelph Glass Plant Public Liaison Committee (PLC) is the facility's primary means for receiving information from and conveying information to the public. It was established in 2017, following an organizing meeting held in November 2016. Representatives from a broad cross-section of the community were invited to learn more about the PLC, its mission and requirements, and asked to consider participating as a member or recommending an organization or individual who might better serve the community as a PLC member. (Table 3 provides a list of PLC members.)

2.1 The Terms of Reference (TOR)

The Terms of Reference were reviewed at the organizing meeting and finalized by the PLC in January 2017 at the first PLC meeting. It was submitted to and approved by the District Manager of the Ministry.

The recommended composition of the PLC membership in accordance with the Terms of Reference includes, at a minimum, the following:

- Three (3) community members from the neighbourhoods near the facility
- One (1) representative from academia
- One (1) public health representative
- One (1) representative of the Owens Corning Guelph Glass Plant
- One (1) non-government organization

2.2 Standing Agenda

Since 2017, Owens Corning has held four (4) meetings annually with the PLC. During the COVID-19 pandemic, meetings were held virtually. All other meetings were in person. A standing agenda has been used at all PLC meetings. The agenda covers, at minimum:

- A plant update on community, health & safety, and operations;
- An update on Regulatory Reporting; and
- Community hot topics.

As part of the Regulatory Reporting agenda topic, PLC members were regularly briefed on actions taken through the Site-Specific Action Plan, emissions summaries, the Environmental Compliance Approvals Annual Written Summary, and the National Pollutant Release Inventory, as well as other regulatory actions.

The www.ocguelph.com website has been regularly updated each quarter with the agenda for the next PLC meeting.

2.3 Summary of Discussion

The Owens Corning's community liaison drafts a summary of each PLC meeting that is shared with PLC members at or shortly before the next meeting. Once approved by the PLC members, it is uploaded to the www.ocguelph.com website. This allows interested residents and officials to review all materials presented at the PLC.

3.0 PLC MEMBERSHIP

The PLC has enjoyed both continuity and change in its membership. Since 2017, the PLC has continued to attract new members as past members move to other areas of employment or retire. The following organizations have been represented since the PLC's formation:

- Wellington-Dufferin-Guelph Public Health
- City of Guelph Water Works Department
- Guelph Chamber of Commerce
- University of Guelph
- Sacred Heart Catholic Elementary School
- Two Rivers Neighbourhood Group
- Community members.

The longest serving PLC member, a representative from the community, has been with the PLC since its first organization meeting in 2016. In October 2024, the PLC welcomed four new members representing the University of Guelph, the Guelph Chamber of Commerce, Wellington-Dufferin-Guelph Public Health, and Sacred Heart School.

All new members have been provided with background on the facility, the site-specific standard for hexavalent chromium, and the plans to renew the site-specific standard. All PLC members have been provided an overview of the technical benchmarking conducted to determine which potential upgrades to the facility are technically feasible and which are not.

The current PLC members are provided below in **Table 1** and guest or occasional members are provided in **Table 2.** **Table 3** lists former PLC members.

Table 1: Current PLC Membership

Name	Affiliation
Tyler Black	Wellington-Dufferin-Guelph Public Health - Environmental Health Specialist
Caroline Forsyth	City of Guelph Water Works Department, 29 Waterworks Place
Calvin Hyde	Guelph Chamber of Commerce - Membership Sales/Engagement Specialist,
John Kinkead	Community Member, Ontario Street, Guelph
Lorraine Pagnan	Community Member, Ontario Street, Guelph
Melanie Lamb	Two Rivers Neighbourhood Group, Ontario St & Community Member
Stefanie Nadalin	Principal, Sacred Heart Catholic Elementary School, 125 Huron St, Guelph
Marcel Schlaf, Ph.D.	University of Guelph - Department of Chemistry
Jeff Taylor	Owens Corning Guelph Facility - Plant Leader
Brett Arnold	Owens Corning Guelph Facility - Operations Leader
Kate Stanley	Owens Corning Guelph Facility - Community Liaison

Table 2: PLC Guest or Occasional Participants

Name	Affiliation
Patrick Drabicki	Owens Corning Guelph Facility - Environmental Health & Safety Leader
Mark Vanderlaan	Owens Corning Guelph Facility – Senior Engineering Leader
Megan Moore	Owens Corning Guelph Facility – Former Environment & Safety Lead
Penny McInnis	Montrose Environmental Solutions Canada
Danielle Agar	Montrose Environmental Solutions Canada
Jacqueline Lamport	Ministry of Environment, Conservation & Parks, Guelph
Kevin Noll	Provincial Officer, Ministry
Clarissa Whitelaw	Area Supervisor, Ministry

Table 3: Former PLC Members

Name	Affiliation
Shawn Zentner	Wellington-Dufferin-Guelph Public Health– 2017-2019
Bo Cheyne	Wellington-Dufferin-Guelph Public Health – 2017-2021
Doug Auld	Wellington-Dufferin-Guelph Public Health -2017
Rob Meyers	Wellington-Dufferin-Guelph Public Health – 2018-2019
Alisha Arnold	Two Rivers Neighbourhood Group & Community Member – 2017-2018
Sam Cino	Two Rivers Neighbourhood Group & Community Member – 2021
Diane Sudds	Guelph Water Works & Community Member -2017-2022
Paul Allen	Guelph Water Works & Community Member - 2022
Victoria Sheehan	Sacred Heart Catholic Elementary School – 2021-2022,
Anne-Marie McGeragle	Sacred Heart Catholic Elementary School – 2017-2018
Nicole DeFrancesco	Sacred Heart Catholic Elementary School – 2017-2021
Beverley Hale	University of Guelph – 2018-2024
Peter Smith	University of Guelph -2020-2024
Kithio Mwanzia	Guelph Chamber of Commerce – 2017-2018
Shakiba Shayani	Guelph Chamber of Commerce – 2020-2024
Craig Vallesi	Guelph Chamber of Commerce – 2019
Amy Kendall	Guelph Chamber of Commerce - 2019
Mark Mayo	Guelph Chamber of Commerce & Community Member - 2023
Calvin Hyde	Guelph Chamber of Commerce - 2024
Steve Gazzola	Italian-Canadian Club – 2017
Rob Nixon	Owens Corning Guelph Facility – 2017-2022

4.0 PLC CONSULTATION FOR THE REAPPLICATION

As part of the Plant's standing agenda to review its operations and regulatory requirements, Plant representatives have consulted with the PLC since April 2024 about the intent and details associated with the site-specific standard renewal application. The details of the presentations and discussions with the PLC members have included increasing detail as the application developed and evolved.

During this same timeframe, Owens Corning met regularly with the Ministry to provide updates on its application process. Often the presentations provided to the PLC covered information shared with the Ministry and also reflected the Ministry's observations and input. Ministry Manager of Local Air Quality Jeff Burdon attended the January 2025 PLC meeting, at the invitation of the Plant. Members actively engaged him with questions.

The PLC members are encouraged to both share details about the application with the community and bring any questions or concerns regarding the facility's plans to the meeting.

Presentations covering the application and shared with the PLC at its 2024 meetings on April 23, 16, and October 22, and the 2025 meetings on January 21 and March 25 are attached as part of this public consultation report.

4.1 Site-Specific Standard Discussions

The Owens Corning Guelph PLC has been discussing the Plant's efforts to comply with its 2016-2026 site-specific standard for hexavalent chromium since its first meeting January 31, 2017. During that first meeting, the PLC was briefed on the Ministry's regulations for hexavalent chromium, its decision to approve a site-specific standard for Owens Corning Guelph, how hexavalent chromium was produced as a byproduct of the manufacturing process, the primary sources of emissions at the plant, facility upgrades since the site-specific standard was granted and the 2016 source testing report.

Through the years, the PLC was updated at every meeting about the facility's efforts and progress to meet its site-specific standard, including updates to the furnace and actions taken both the interior and exterior of the plant to mitigate emissions.

The PLC also was briefed on the Ambient Air Monitoring program implemented by the Plant. The program was as a requirement for approval of the 2016-2026 site-specific standard but is not a factor of compliance in meeting the standard. Before data was submitted to the Ministry, Owens Corning briefed the PLC on the quarterly air monitoring program measurements from air monitors placed at the Tytler Public School, city WaterWorks, and Lyon Park.

Site-specific action milestones were achieved starting with the furnace rebuild in 2016. PLC members were shown how hexavalent chromium emissions were reduced through combustion controls, alkali reduction, stack shrouds, stack extensions, test validation and changes to the furnace to introduce electric melting. Since at least 2020, both measured and modelled emissions have been significantly below the site-specific standard.

4.2 Discussions Focused on the Proposed New SSS

At the April 23, 2024 PLC meeting, the members were first briefed about the plan to renew the 10-year site-specific standard in effect through June 30, 2026. PLC members were told the renewal application needed to be submitted in March 2025, 15 months in advance, to meet the Ministry requirements.

The first round of source testing, which was conducted in February 2024, was discussed with the results showing a significant reduction in emissions. Since the original point of impingement concentrations were modelled in 2015, the model showed 97 percent reduction in hexavalent chromium by February 2024.

At the July 2024 meeting, PLC members were provided results of the second round of source testing, which was conducted in June 2024. Although the results were slightly higher than source testing conducted in winter (February 2024), the results were significantly lower than source testing conducted in 2019 at the furnace, forehearth and at general exhausts.

At the October 2024 meeting, in recognition of the four new PLC members, Owens Corning provided a refresher on the background of hexavalent chromium, sources of emissions, the results of the 2017-2023 air monitoring program, the process for applying for a site-specific standard, the Plant's schedule for submitting its application, the current action plan and those actions evaluated but not found feasible.

At the January 2025 meeting, PLC members were provided details of the technical benchmarking review, the "final" proposed actions deemed technically feasible, and proposed target reductions to emissions. The discussions identified a proposed site-specific standard of 1.33 ng/m^3 for the new application and two additional milestones for improvements based on implementing the proposed action plan. Additionally, the plant agreed to continue to evaluate additional emission reducing opportunities while its application is in review, in response to information provided by the Ministry.

Owens Corning moved the regularly scheduled May 2025 meeting to March 2025, to provide PLC members with further details before the application is submitted March 31, 2025.

At the March 2025 meeting, PLC members were provided updated information regarding the site-specific standard renewal application, which will be submitted to the Ministry on March 31, 2025. The group reviewed documents and fact sheets related to the plant's site-specific standard request. The documents summarized the facts about the site-specific standard request and the plant's action plan to continue reducing its emissions. The PLC also reviewed an update of the Plant Fact Sheet providing an overview of the facility and what products it manufactures. As at the January 2025 PLC meeting, the discussions revolved around the proposed site-specific standard and the milestones for improvements based on implementing the proposed action plan.

4.2.1 Questions and Answers

A listing of questions asked and answers provided specific to this application at the PLC meetings listed above is provided in Appendix E.

4.3 Supporting Documents

As with the 2016 application, Owens Corning developed and made supporting documents available to the public via distribution to the PLC and local government officials before submitting its application. The information package included:

Fact Sheets produced by Owens Corning

- Executive summaries of the:
  - Site Specific Standard Request,
  - Proposed Action Plan,
  - Technical Benchmarking Report, and
  - ESDMR.
- A glossary of terms.

Fact Sheets produced by the Ministry

- Ontario local air quality regulation.
- Framework for managing risk.
- Air standards.
- Site Specific Standards.

A hard copy of the entirety of the application was also made available for review, including a draft of this Public Consultation Report.

5.0 ADDITIONAL PUBLIC COMMUNICATIONS

Since its first application for a site-specific standard in 2015, Owens Corning created three communications mechanisms that are regularly monitored and maintained. They include:

- A website, www.ocguelph.com;
- A dedicated toll-free phone number (866-639-6557); and
- A dedicated email address.

Once the PLC was created in 2017, the www.ocguelph.com website has been regularly updated each quarter with the agenda for the next PLC meeting and a summary of each PLC meeting once it has been approved by the PLC members. This allows interested residents and officials to review all materials presented at the PLC and includes all information provided at the 2015 public meetings, as well as the notification letter and public notice from 2015.

The toll-free number and dedicated email address allow residents and officials to contact Owens Corning directly with their questions about the site-specific standard or any other topic.

Since establishing these vehicles, Owens Corning has responded to numerous calls and emails from individuals and reached out to others identified to the Plant by a ward councillor in office as constituents with concerns or someone interested in moving into the area and had questions.

All interactions are shared with the PLC as part of the standing community engagement portion of the agenda.

5.1 Tours of the Facility

Over the 8 years of the PLC, members have occasionally been provided with tours of the facility to learn more about its operations and provide context to what they learn during the PLC meetings. The last tour for the PLC members was on April 25, 2023.

Members of the Ministry were invited on a tour of the facility in September 2024.

5.2 Ward Councillors

Owens Corning has a history of reaching out to the local ward councillors to ensure they are informed of the activities at the facility and any upcoming permitting items that may become of public interest.

Councillors Rodrigo Goller and Carly Klassen, like their predecessors Councillors Gibson and Bell, were given a tour of the facility. The October 25, 2023 briefing provided at their visit included an overview of Owens Corning’s current site-specific standard and related history, including the status of the then operational ambient air monitoring program and regular meeting of the PLC. They will be updated on the upcoming renewal application prior to our submission and invited to ask questions and communicate any concerns.

On March 27, 2025, at Owens Corning's invitation, Ward 2 Councillor Rodrigo Goller and Guelph Senior Economic Development Officer Bill Bond attended a meeting at the facility and were given a tour of the facility. The briefing provided at their visit included an overview of the operations, the current site-specific standard, the improvements that have been made and the upcoming renewal application. Owens Corning shared fact sheets and information regarding the history of the facility and the renewal application and the plant's action plan to continue reducing emissions.

6.0 CONCLUSION

The combination of the PLC meetings, proactive outreach to Councillors, maintenance and promotion of the website and a track record of responsiveness to all public inquiries meet the intent of public consultation and provide the necessary transparency.

The Owens Corning Guelph Glass Plant has maintained all the communication channels established during the first public consultation period in 2015, has satisfied the Ministry's public consultation requirements and gone beyond those requirements by committing to maintain the PLC beyond the application process to ensure a continuation of open communications and transparency.

It continues to:

- Maintain a project website (www.ocguelph.com) updated quarterly with details of the site-specific standard and details of the PLC meetings.
- Maintain the PLC to ensure ongoing feedback between the community and the Owens Corning facility.
- Respond to inquiries made through its dedicated toll free number and email.

Owens Corning is committed to maintaining a transparent process. We will continue our efforts to both proactively inform the public about our achievement of key compliance milestones and respond to inquiries regarding this request and about operations in general.

Owens Corning is also committed to the principles of environmental sustainability, product stewardship and to continuing to operate in the City of Guelph in compliance with the Ministry's regulations and in a manner that safeguards the health of our employees and the community.

APPENDIX A

TERMS OF REFERENCE

OWENS CORNING GUELPH GLASS PLANT
PUBLIC LIAISON COMMITTEE

[Subject to revision under terms of the Environmental Compliance Approval]

1. BACKGROUND

1.1. Establishment of the Public Liaison Committee

Under the terms and conditions of the Amended Environmental Compliance Approval (ECA Number 4548-AA3QXU) for the Owens Corning Guelph Glass Plant (“Facility”), a Public Liaison Committee (PLC) is to be established for the exchange of information between Owens Corning (“Company”) and the local community.

Establishing and participating in the PLC is part of the Owens Corning’s commitment to maintaining a positive two-way dialogue with our host community of Guelph.

1.2 Establishment and Review of the Terms of Reference

The Terms of Reference (TOR) will be reviewed at the organizing meeting for the PLC and finalized by the PLC not later than three (3) months from the initial PLC meeting. The initial TOR and any future amendments will be reviewed by and discussed with the PLC before its review and approval by the District Manager of the Ministry for the Environment and Climate Change.

2. NAME OF COMMITTEE

The PLC will be officially named the “Owens Corning Guelph Glass Plant Public Liaison Committee.”

3. PLC MANDATE

3.1 Mission

The mission of the Owens Corning Guelph Glass Plant PLC is to enable and maintain regular, constructive dialogue between the Facility and community representatives for the mutual benefit of the community and the company.

3.2 PLC Purpose

The purpose of the PLC is to:

(a) Keep the community informed about the operations of the Facility.
(b) Keep the Company informed of any community concerns about the operations of the Facility.
(c) Serve as a forum for the dissemination, review and exchange of information related to the Facility.

The PLC shall not exercise any supervisory, regulatory or approval roles with respect to the operation of the Facility.

3.3 PLC Objectives

The objectives of the PLC are to:

- Review and finalize these Terms of Reference not later than three (3) months from the organizing meeting.
- Review and discuss Facility operations related to Ministry approval of the Environmental Compliance Approval, including but not limited to, environmental concerns, offsite community impacts (e.g., noise, odor, etc.) , and any other issues of relevance identified and agreed upon by PLC consensus.
- Review all draft "Written Summary Forms" and the draft quarterly and annual reports on the Facility's ambient air monitoring results before they are submitted to the Ministry.
- Review all future amendments to the ECA or Facility operations before the application is submitted to the Ministry.
- Act as a catalyst and resource for bringing information and concerns to the PLC and for providing the community with information gained through the PLC meetings.
- Identify opportunities of mutual benefit for improved community relations and/or understanding of the Facility, its benefits and value to the community.
- Support the Company's efforts to establish and maintain a PLC membership that represents a broad and balanced cross-section of the community.

4.0 MEMBERSHIP

4.1 Composition of PLC

The membership of the PLC is intended to represent a cross section of the community at large.

The Company will seek to create and maintain a PLC composition of eight (8) to twelve (12) members including, at a minimum, the following:

- Three (3) community members from the neighbourhoods near the facility.
- One (1) representative from academia.
- One (1) public health representative.
- One (1) representative of the Owens Corning Guelph Glass Plant.
- One (1) non-government organization.

Community representatives attending the organizing meeting will determine through consensus the individuals to fill the permanent member positions on the PLC.

Other Company and Facility representatives and technical resources or consultants may be invited to attend or participate in meetings on an as-needed basis.

The Ministry of the Environment and Climate Change (MOECC) will be actively engaged in the PLC. However, representatives of the MOECC will serve in an advisory role and may not attend every meeting.

4.2 Terms of Membership

Members are requested to serve a minimum obligation of one (1) year and may continue for an indefinite term as long as the participation requirements are met.

Participation Requirements: For the purposes of group effectiveness and continuity, members are expected to attend regularly scheduled meetings or designate an approved alternate to attend on their behalf. If a member (and the designated alternate) misses two consecutive meetings, the Facilitator may contact him or her to determine their interest in continuing. The Facilitator will report to the PLC for a decision on appropriate action.

4.3 Compensation

PLC membership is voluntary and is not compensated.

5. MEETINGS OF THE PLC

5.1 Meeting Schedule

A. Organizing and Initial Meetings - The organizing meeting will be held by November 30, 2016. The date of the initial PLC meeting will be scheduled at the organizing meeting. Dates and times for the remainder of 2017 meetings will be scheduled at the initial meeting.

B. Regular Meetings - A minimum of four (4) meetings will be held each year. If additional meetings are required or desired to meet PLC objectives, a schedule change along with the associated meeting date will be determined by consensus.

Between meetings the PLC will be provided with information necessary to fulfill its Mission, Purpose and Objectives, and be notified of any significant events, including but not limited to process upsets, failure of equipment that may affect air or noise emission, including failure of any air pollution control equipment, in the Facility.

5.2 Meeting Location

Meetings will be held at the Owens Corning Guelph Glass Plant.

5.3 Notice of Meetings

PLC members will receive notice of meetings and a proposed agenda before each meeting by email.

Prior to a meeting, the meeting date and draft agenda will be posted to the Owens Corning Guelph Glass Plant website, ocguelph.com. Meeting summaries will be posted following their review and approval by PLC members at the subsequent quarterly meeting.

5.4 Public Reporting

Meetings will be closed to the public. Members of the public are invited to submit their questions or concerns directly to one of the committee members to act on their behalf.

The PLC may elect to issue an annual summary report on the committee’s work and progress over the year as a means to report out to the community.

5.5 Media Attendance

To encourage full and candid discussion between PLC members, regular meetings will be closed to the media. Additionally, members will be asked to make an honor commitment not to use social media during a meeting to report out on the meeting while discussion is underway.

Members, including the Company, are not authorized to speak to the media *on behalf of the PLC*. If a member does speak to the media, they should inform the Facilitator so that she may inform the rest of the PLC of the contact.

5.6 Items for Discussion

The Facilitator will work with the PLC to frame out draft agendas for achieving the PLC objectives.

These draft agendas will be reviewed and revised as needed prior to each meeting. PLC members can suggest additional agenda items up to one month before the meeting to allow proper preparation.

5.7 Role of the Facilitator

The Facilitator will work with Owens Corning to:

- Assist the PLC in organizing its work and keeping its focus.
- Keep discussions moving and on target during meetings.
- Prepare an agenda based on PLC input.
- Ensure all viewpoints are heard.
- Assist the PLC to reach consensus where possible as a means for decision-making and facilitate solution-oriented discussion when consensus isn't possible.

5.8 Role of the Chairperson

The Role of PLC Chairperson will be filled by the Facilitator in the first year and by an Owens Corning designated representative in the following years. The Chairperson will work to:

- Set the times and locations for the meetings.
- Preside over the meetings.
- Appoint members to subcommittees.
- Sign off on all correspondence and media releases for the PLC.
- Act as the spokesperson for the group to the media and the public.

5.9 Role of PLC Members

The PLC is neither an advisory group nor a decision-making body.

- Members are expected to participate in discussions and encouraged to make constructive suggestions to Owens Corning on how to minimize the potential community impacts of its operations and best address questions and concerns raised by neighbours.
- Members are expected to treat each other with respect and accept that there will be times when consensus won't be reached and members must agree to disagree.
- While some participants serve as designated representatives of their organization or constituency while others serve as individuals, all members are encouraged to voice personal viewpoints as long as they are clearly identified as personal or representing a larger community interest.
- Members are expected to bring to the group any issues, concerns, and questions raised to them by the community.
- No one is expected to defend, endorse or support the actions of Owens Corning or the PLC as a whole.

5.10 Role of the Company

- While the company is not required to act on PLC recommendations, Owens Corning is required to provide an open forum to discuss all relevant issues, listen to and consider all suggestions, and strive to act on recommendations when practical and feasible.
- Make logistical arrangements, as necessary.
- Engage and invite technical experts to attend PLC meetings, as needed, to help educate the PLC on technical issues and/or respond to technical questions.
- Prepare and distribute a meeting summary.
- Post final meeting summaries to the website.
- Distribute correspondence, news releases and other information to the public on behalf of the PLC.

6. ADMINISTRATIVE COSTS

Owens Corning will provide for the reasonable administrative costs of operating the PLC, including supplying a suitable location as a meeting place, refreshments and suitable notice of meetings, preparation and distribution of meeting summaries; and preparation of reports about the PLC's activities. If the PLC wishes to incur any exceptional one-time costs from time to time, the PLC shall submit the cost proposals to Owens Corning for approval.

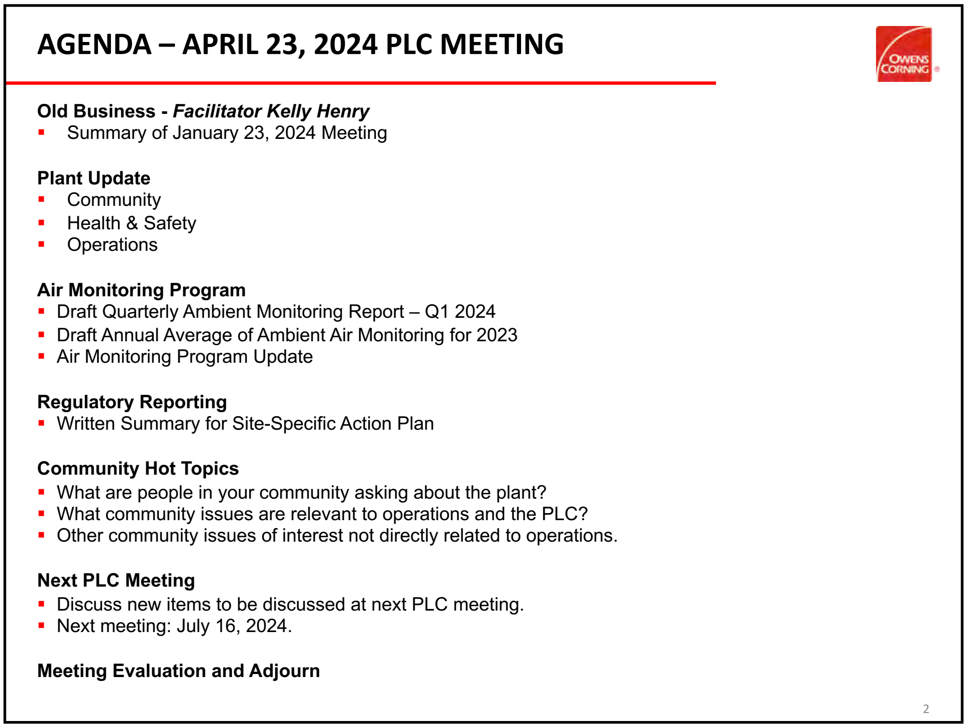
APPENDIX B

Presentations from PLC Meetings:

- April 23, 2024
- July 16, 2024
- October 22, 2024
- January 21, 2025
- March 25, 2025

OWENS CORNING GUELPH PLC MEETING

APRIL 23, 2024



AGENDA – APRIL 23, 2024 PLC MEETING

Old Business - *Facilitator Kelly Henry*
- Summary of January 23, 2024 Meeting

Plant Update
- Community
- Health & Safety
- Operations

Air Monitoring Program
- Draft Quarterly Ambient Monitoring Report – Q1 2024
- Draft Annual Average of Ambient Air Monitoring for 2023
- Air Monitoring Program Update

Regulatory Reporting
- Written Summary for Site-Specific Action Plan

Community Hot Topics
- What are people in your community asking about the plant?
- What community issues are relevant to operations and the PLC?
- Other community issues of interest not directly related to operations.

Next PLC Meeting
- Discuss new items to be discussed at next PLC meeting.
- Next meeting: July 16, 2024.

Meeting Evaluation and Adjourn

COMMUNITY UPDATE

Owens Corning: Pilot Project of Portable Pack

This past March we partnered with local business Owens Corning Guelph and Volunteer Canada to run our first ever "Portable Pack". Owens Corning donated $7,500 to cover the weekly cost of providing a weekend foodbag to 500 students. We then set up a pack at their site, allowing for all of their shift workers to have a chance to help pack the weekend foodbags. Staff then delivered the bins of bags back to our location, so we could add fresh fruits and vegetables before they were then sent to our schools. We extend our deepest gratitude to Owens Corning for their outstanding commitment to community welfare. Their volunteer efforts in feeding kids have had an immeasurable impact, providing nourishment and hope to those in need.

Food4Kids Guelph - Home

COMMUNITY UPDATE

- Raising awareness with "**Dress in Blue**" days March 13/14
- Providing $2,500 donation on behalf of Christina Schwartz who helped organize our awareness campaign.

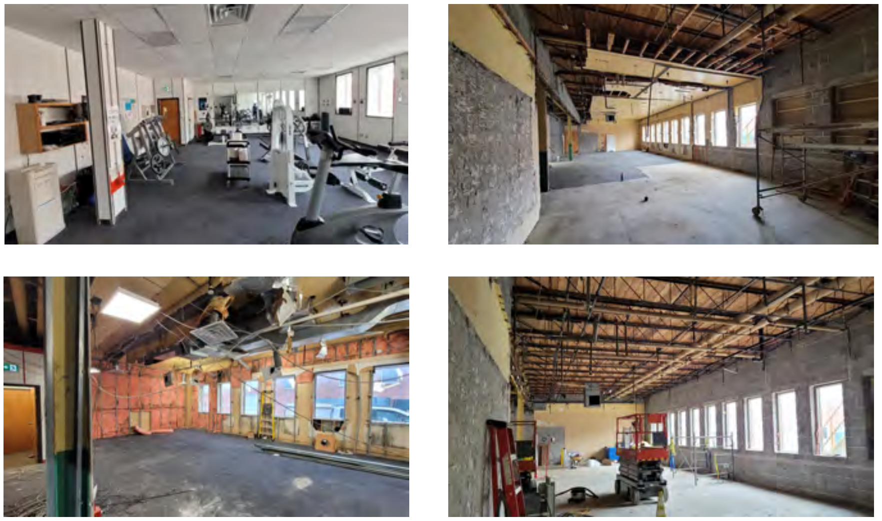
HEALTH & SAFETY

- Capital project for improved machine guarding 70% complete.

Ethan Lee Drabicki
April 16th – 5:41am
8 lbs 0 oz.

OPERATIONS

- Progressing on office and fitness center renovations



BUSINESS UPDATE

On February 9th, Owens Corning made two significant announcements.

- Acquisition of Masonite International Corporation.
- Review strategic alternatives for its global glass reinforcements (GR) business.

These choices are consistent with Owens Corning strategy to focus on building and construction materials.

The glass reinforcements (GR) supplies a wide variety of glass fiber products for applications in wind energy, infrastructure, industrial, transportation, and consumer markets.

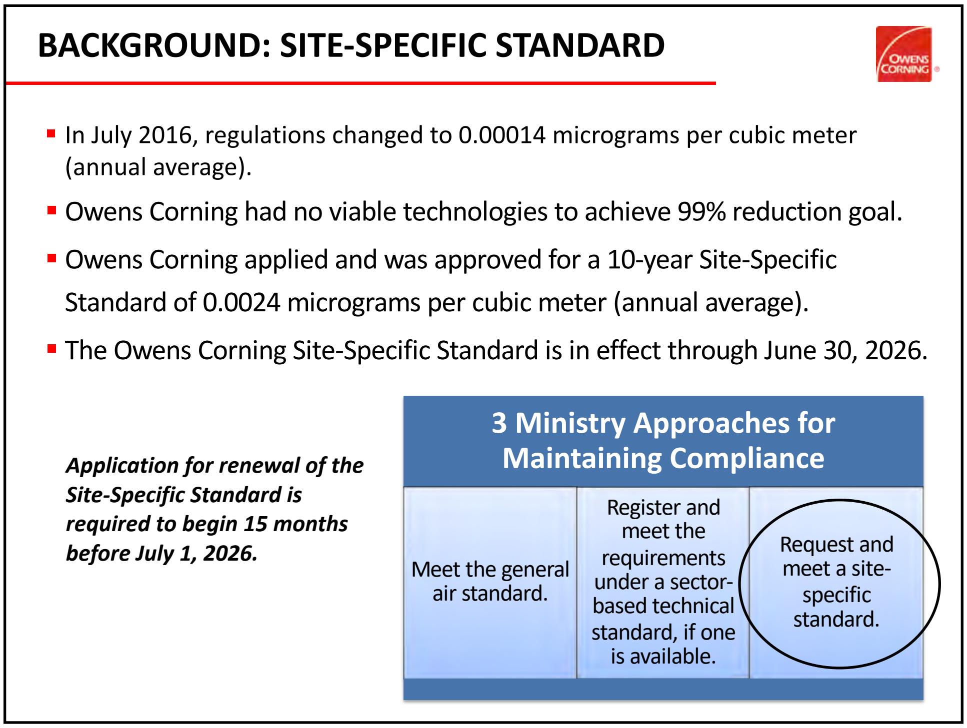
- Generates annual revenue of approximately $1.3 billion
- Operations in 11 countries, with 18 manufacturing facilities.
- Guelph Plant is part of the glass reinforcements (GR) business

> *“We have built market-leading positions in key regions and applications, including renewable energy, which creates the opportunity to operate as a core business within another company or as a stand-alone entity focused more on industrial end markets. Throughout our review, we are committed to maintaining our strong customer relationships with the same high standards and close collaboration.”* **Brian Chamber, CEO**

MASONITE
DOORS THAT DO MORE

WRITTEN SUMMARY FOR SITE SPECIFIC ACTION PLAN
SUBMITTED: MARCH 27, 2024

ACTIONS	TIMING AND STATUS
Actions to Date All items in the original Action Plan from 2016 have been completed.	2016 - present
Additional Actions Identified and Implemented In addition to the items identified in the original action plan, several other opportunities for reductions were identified over the years and implemented on an ongoing basis. These include: • Adding electric heat to the melter • Modifying alkali content of the raw material mixture • Improving emission capture (shroud improvements)	2018 - 2022
Source Testing The facility is conducting source testing to: • demonstrate ongoing compliance with the current site specific standard; • support the development of emission rates for the renewal of the site specific standard; and • as a condition of wrapping up the ambient monitoring program	February 2024 – complete June 2024 - planned
Site Specific Standard Renewal The SSS for hexavalent chromium expires on June 30, 2026; the renewal application is intended to be submitted between December 2024 and March 2025.	Planned



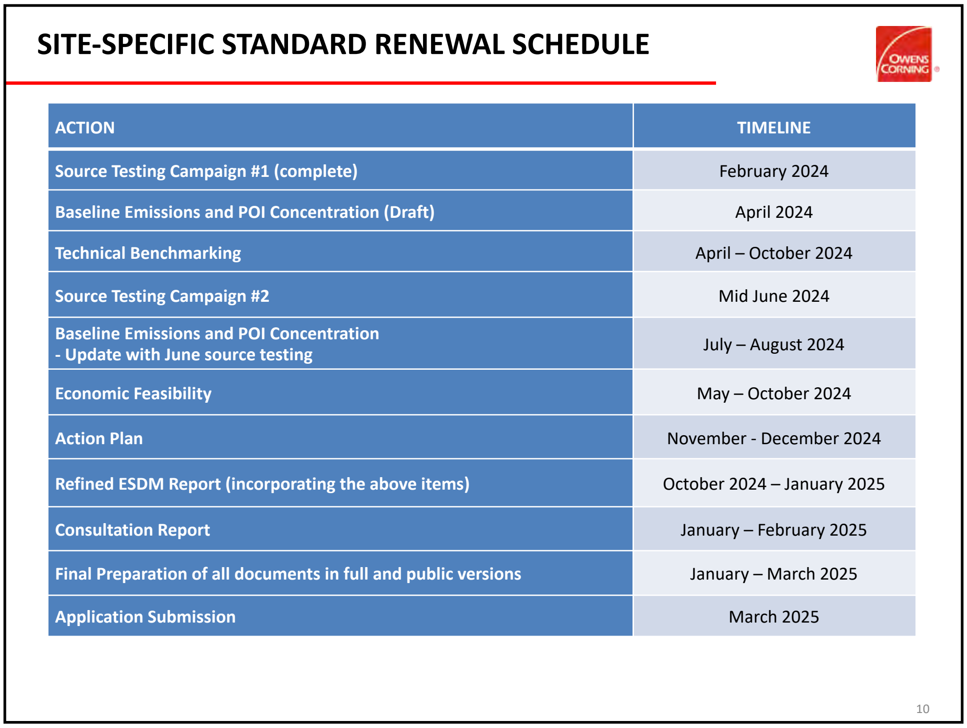
BACKGROUND: SITE-SPECIFIC STANDARD

- In July 2016, regulations changed to 0.00014 micrograms per cubic meter (annual average).
- Owens Corning had no viable technologies to achieve 99% reduction goal.
- Owens Corning applied and was approved for a 10-year Site-Specific Standard of 0.0024 micrograms per cubic meter (annual average).
- The Owens Corning Site-Specific Standard is in effect through June 30, 2026.

Application for renewal of the Site-Specific Standard is required to begin 15 months before July 1, 2026.

3 Ministry Approaches for Maintaining Compliance

Meet the general air standard.	Register and meet the requirements under a sector-based technical standard, if one is available.	Request and meet a site-specific standard.



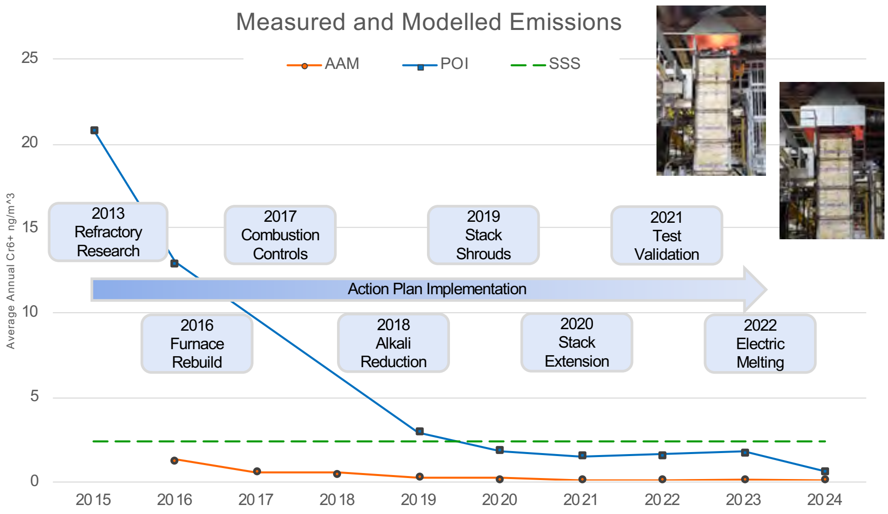
SITE-SPECIFIC STANDARD RENEWAL SCHEDULE

ACTION	TIMELINE
Source Testing Campaign #1 (complete)	February 2024
Baseline Emissions and POI Concentration (Draft)	April 2024
Technical Benchmarking	April – October 2024
Source Testing Campaign #2	Mid June 2024
Baseline Emissions and POI Concentration - Update with June source testing	July – August 2024
Economic Feasibility	May – October 2024
Action Plan	November - December 2024
Refined ESDM Report (incorporating the above items)	October 2024 – January 2025
Consultation Report	January – February 2025
Final Preparation of all documents in full and public versions	January – March 2025
Application Submission	March 2025

MECP MEETING SUMMARY

- Met with MECP March 27, 2024 to initiate the Site-Specific Standard renewal application process.
- Plan MECP site visit to introduce new officials to the plant.
- Holding regular monthly meetings with MECP.
- Continue to communicate to MECP regarding any public concerns.

SSS ACTION PLAN MILESTONES



2013 Refractory Research

2016 Furnace Rebuild

2017 Combustion Controls

2018 Alkali Reduction

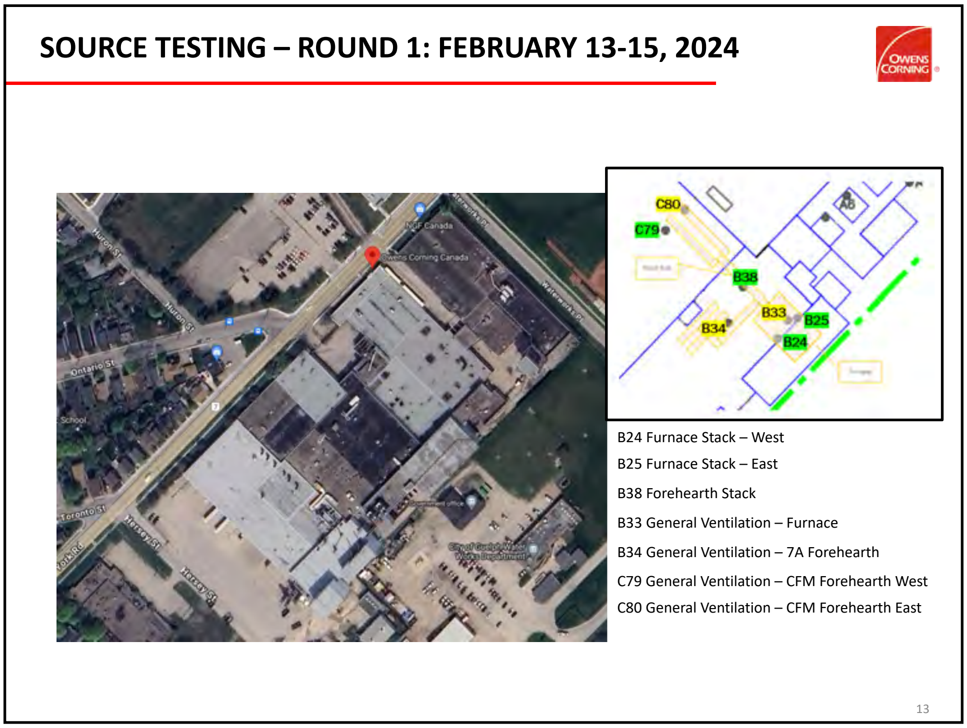
2019 Stack Shrouds

2020 Stack Extension

2021 Test Validation

2022 Electric Melting

Action Plan Implementation



SOURCE TESTING – ROUND 1: FEBRUARY 13-15, 2024

B24 Furnace Stack – West

B25 Furnace Stack – East

B38 Forehearth Stack

B33 General Ventilation – Furnace

B34 General Ventilation – 7A Forehearth

C79 General Ventilation – CFM Forehearth West

C80 General Ventilation – CFM Forehearth East

SOURCE TESTING – ROUND 1: FEBRUARY 13-15, 2024

SOURCE TESTING – ROUND 1: FEBRUARY 13-15, 2024

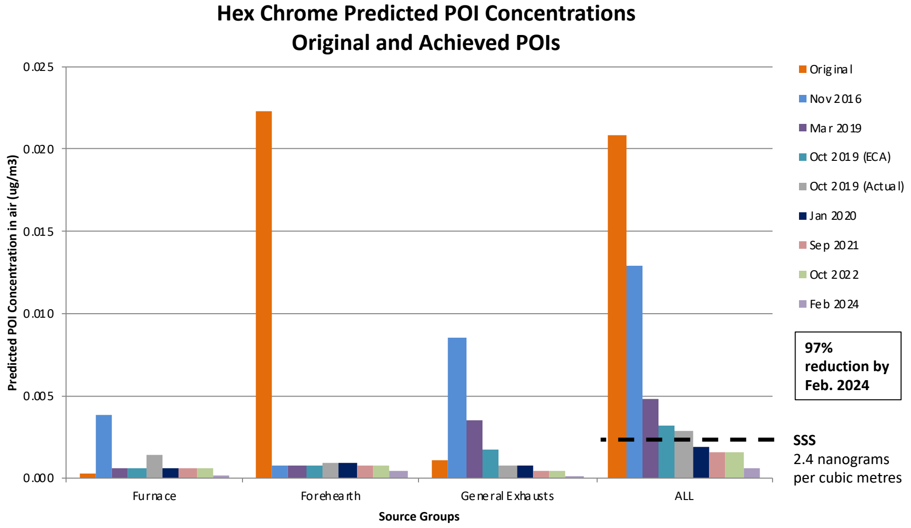
- February source testing program results.

Source Group	Emission Rate (g/s)	Annual Facility MAX GLC (ng/m³)	% of SSS
Furnace	1.52E-05	0.05	2%
Forehearth	6.67E-05	0.49	20%
Roof Vents	4.15E-06	0.17	7%
Facility Total	8.60E-05	0.64	27%

GLC = Ground Level Concentration

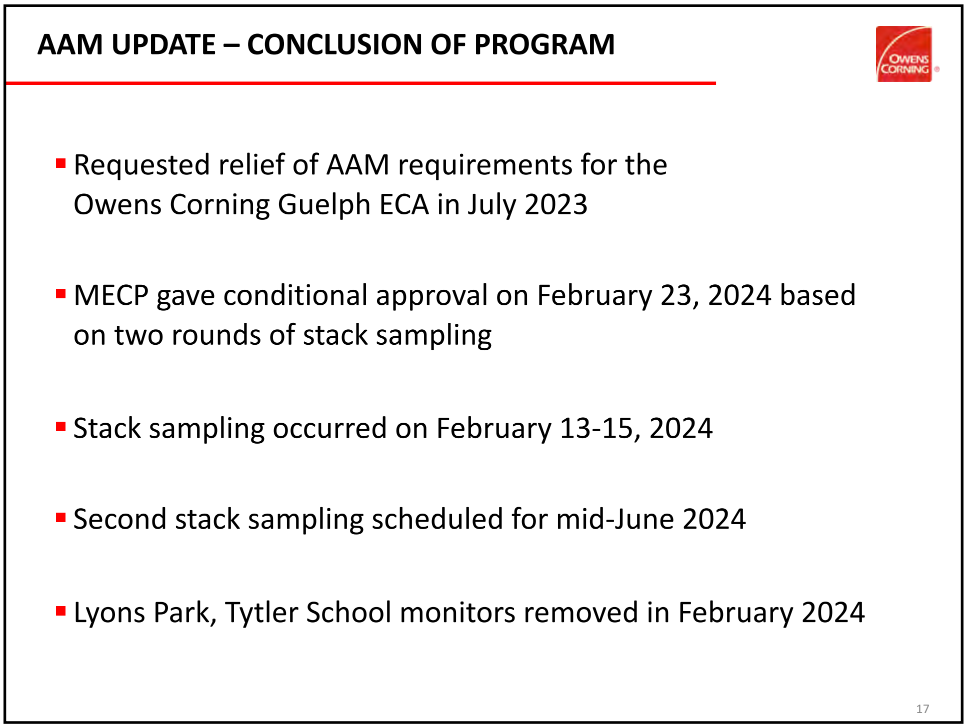
- Second round scheduled for mid-June to assess general ventilation operating conditions in summer.

MODELLED REDUCTIONS ACHIEVED TO FEBRUARY 2024



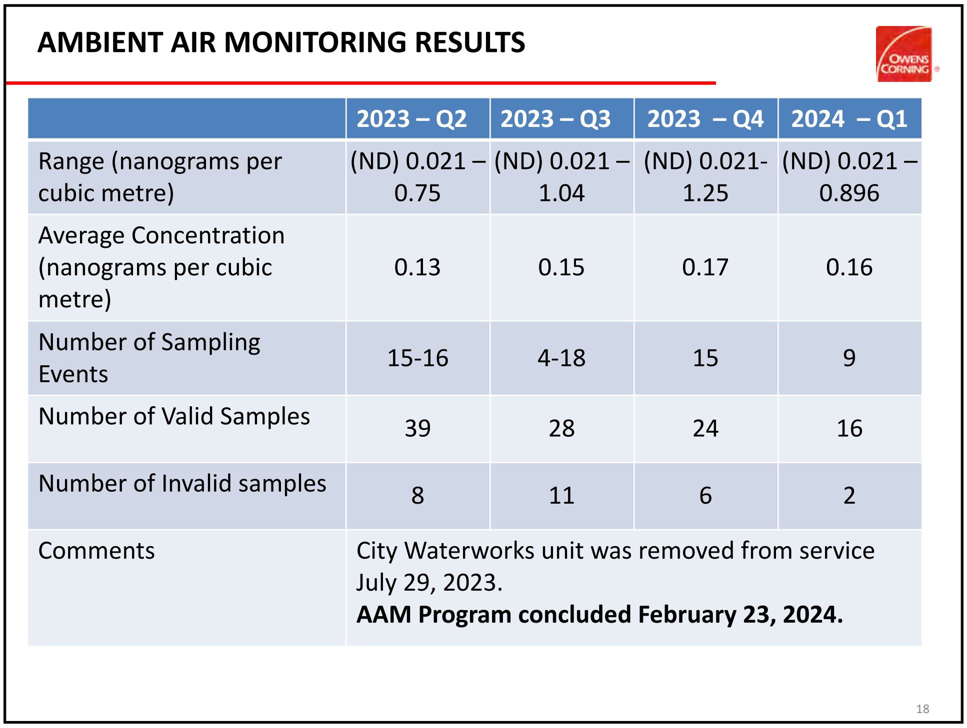
97% reduction by Feb. 2024

SSS
2.4 nanograms per cubic metres



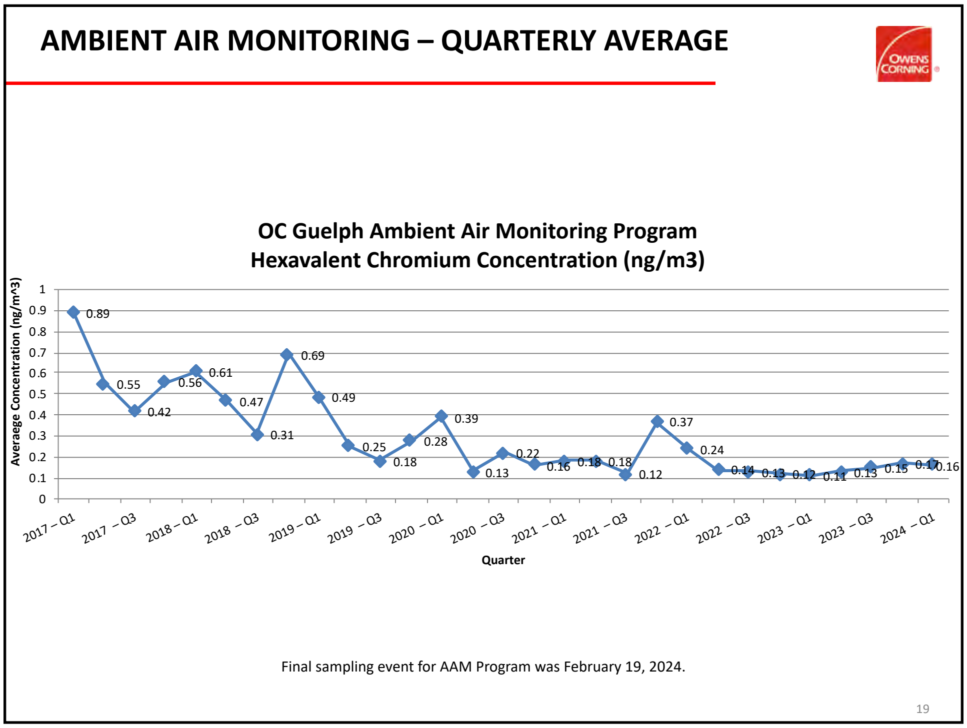
AAM UPDATE – CONCLUSION OF PROGRAM

- Requested relief of AAM requirements for the Owens Corning Guelph ECA in July 2023
- MECP gave conditional approval on February 23, 2024 based on two rounds of stack sampling
- Stack sampling occurred on February 13-15, 2024
- Second stack sampling scheduled for mid-June 2024
- Lyons Park, Tytler School monitors removed in February 2024



AMBIENT AIR MONITORING RESULTS

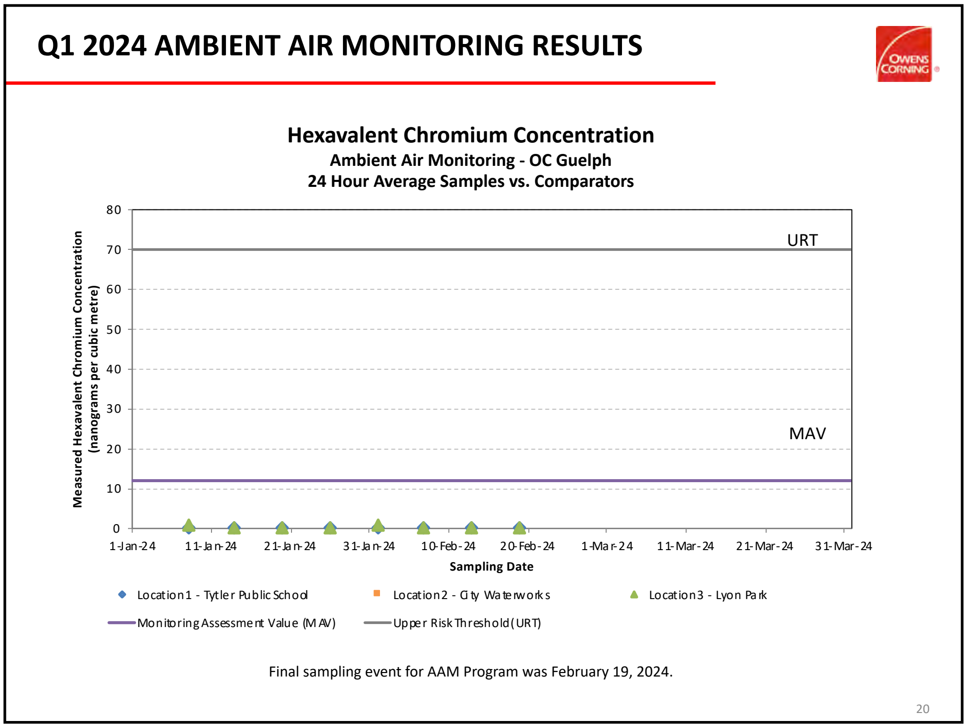
	2023 – Q2	2023 – Q3	2023 – Q4	2024 – Q1
Range (nanograms per cubic metre)	(ND) 0.021 – 0.75	(ND) 0.021 – 1.04	(ND) 0.021- 1.25	(ND) 0.021 – 0.896
Average Concentration (nanograms per cubic metre)	0.13	0.15	0.17	0.16
Number of Sampling Events	15-16	4-18	15	9
Number of Valid Samples	39	28	24	16
Number of Invalid samples	8	11	6	2
Comments	City Waterworks unit was removed from service July 29, 2023. **AAM Program concluded February 23, 2024.**			



AMBIENT AIR MONITORING – QUARTERLY AVERAGE

OC Guelph Ambient Air Monitoring Program
Hexavalent Chromium Concentration (ng/m3)

Final sampling event for AAM Program was February 19, 2024.

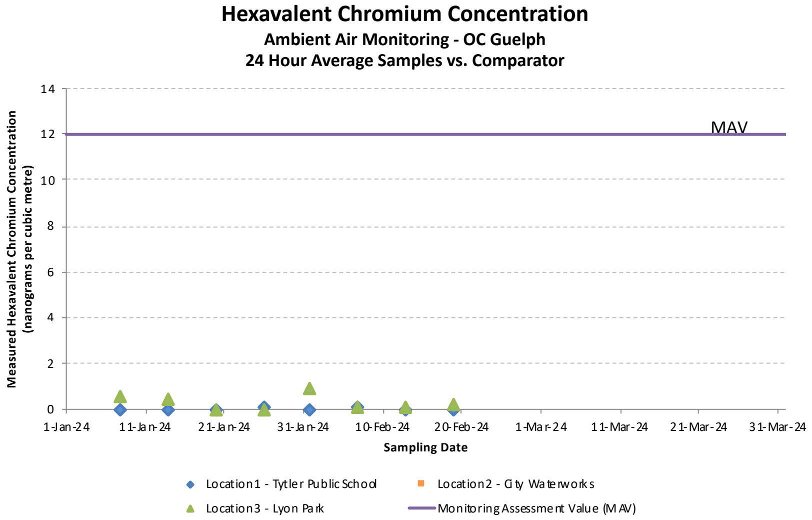


Q1 2024 AMBIENT AIR MONITORING RESULTS

Hexavalent Chromium Concentration
Ambient Air Monitoring - OC Guelph
24 Hour Average Samples vs. Comparators

Final sampling event for AAM Program was February 19, 2024.

Q1 2024 AMBIENT AIR MONITORING RESULTS



Final sampling event for AAM Program was February 19, 2024.

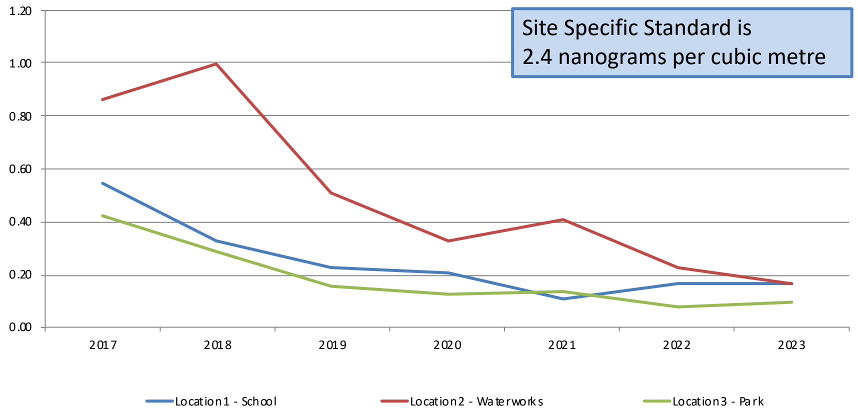
AMBIENT AIR MONITORING – ANNUAL AVERAGES

2017-2023 Annual Average Hexavalent Chromium Concentrations

Annual Average Measured Concentrations (ng/m³)							
Monitoring Location	2017	2018	2019	2020	2021	2022	2023 (prelim)
Location 1 - School	0.55	0.32	0.23	0.21	0.11	0.17	0.17
Location 2 - Waterworks	0.87	1.00	0.51	0.33	0.40	0.23	0.17
Location 3 - Park	0.42	0.29	0.16	0.12	0.13	0.08	0.09
Notes:	Site Specific Standard is 2.4 nanograms per cubic meter Final sampling event for City Waterworks was July 12, 2023						
All non detectable results were reported as 1/2 the detection limit.							

ANNUAL AVERAGE COMPARISONS

Annual Average Measured Concentrations (ng/m^3)



Site Specific Standard is
2.4 nanograms per cubic metre

Final sampling event for City Waterworks was July 12, 2023. The 2023 chart data point for the City Waterworks monitor represents the annual average value for the data obtained while this monitor was active.

MECP 2024 OTHER REPORTING REQUIREMENTS

- Quarterly Ambient Air Monitoring Reports
  Submitted: February 14 (Q4 2023)
  - Due May 15 (Q1 2024) - final quarterly AAM report
- Written Summary for Site Specific Action Plan
  Submitted: March 27, 2024
- Annual Ambient Air Monitoring Report
  Due: May 15, 2024 – final annual AAM report
- National Pollutant Release Inventory
  Due: June 1, 2024
- Emission Summary and Dispersion Modelling Report Update
  Due: June 30, 2024
- Acoustic Assessment Report
  Due: June 30, 2024
- ECA Annual Written Summary
  Due: August 31, 2024

TOPICS FOR DISCUSSION

- Community Hot Topics
- Topics to discuss at next PLC meeting
- Evaluation

THANK YOU

OWENS CORNING GUELPH PLC MEETING

JULY 16, 2024

AGENDA – JULY 16, 2024 PLC MEETING

Old Business - *Facilitator Kelly Henry*
- Finalize Summary of 4/23/24 Meeting

Plant Update
- Community
- Health & Safety
- Operations

Air Monitoring Program
- Final Annual Ambient Air Monitoring Report

Regulatory Reporting
- Site-Specific Standard Renewal Application
- Accoustic Assessment Report
- Emission Summary and Dispersion Modelling Report Update
- National Pollutant Release Inventory
- ECA Annual Written Summary

Community Hot Topics
- What are people in your community asking about the plant?
- What community issues are relevant to operations and the PLC?
- Other community issues of interest not directly related to operations.

Next PLC Meeting
- Discuss new items to be discussed at next PLC meeting.
- Next meeting: October 22, 2024.

Meeting Evaluation and Adjourn

COMMUNITY UPDATE

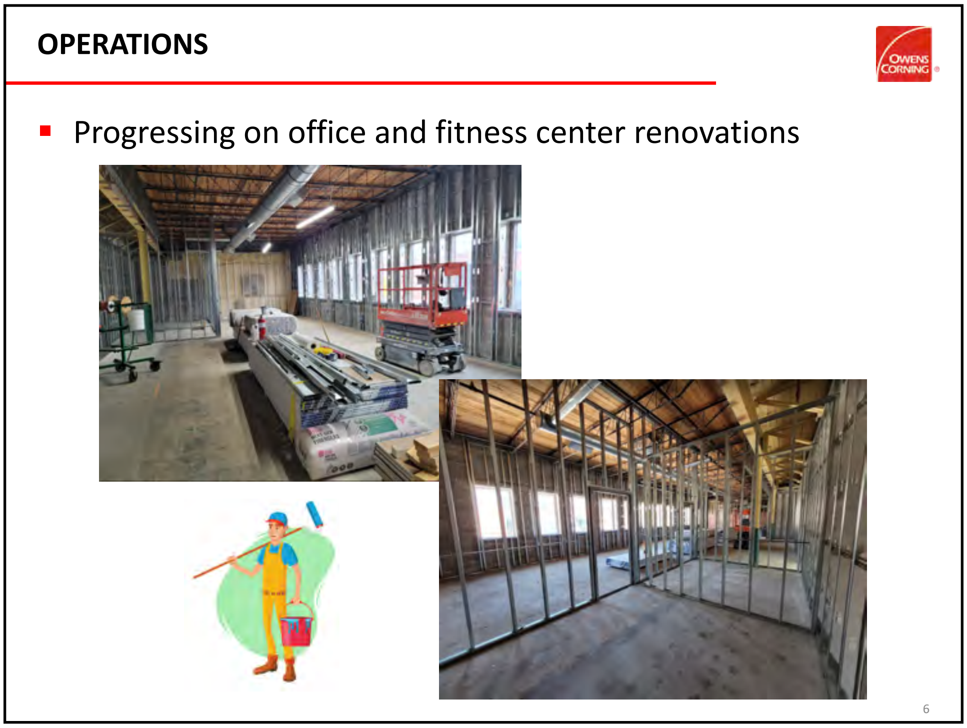
HEALTH & SAFETY

- Capital project for improved machine guarding completed.

HEALTH & SAFETY

- Mistake proofing, or its Japanese equivalent *poka-yoke* (pronounced PO-ka yo-KAY), is the use of any automatic device or method that either makes it impossible for an error to occur or makes the error immediately obvious once it has occurred.

The diameter of the fuel fill doesn't allow leaded fuel nozzles to be inserted

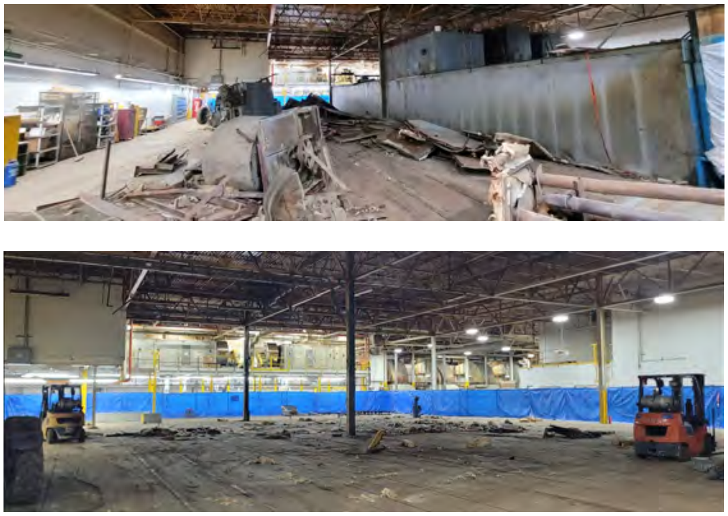


OPERATIONS

- Progressing on office and fitness center renovations

OPERATIONS

- Removing obsolete equipment for warehouse space



BACKGROUND: SITE-SPECIFIC STANDARD

- In July 2016, regulations changed to 0.00014 micrograms per cubic meter (annual average).
- Owens Corning had no viable technologies to achieve 99% reduction goal.
- Owens Corning applied and was approved for a 10-year Site-Specific Standard of 0.0024 micrograms per cubic meter (annual average).
- The Owens Corning Site-Specific Standard is in effect through June 30, 2026.

Application for renewal of the Site-Specific Standard is required to begin 15 months before July 1, 2026.

3 Ministry Approaches for Maintaining Compliance

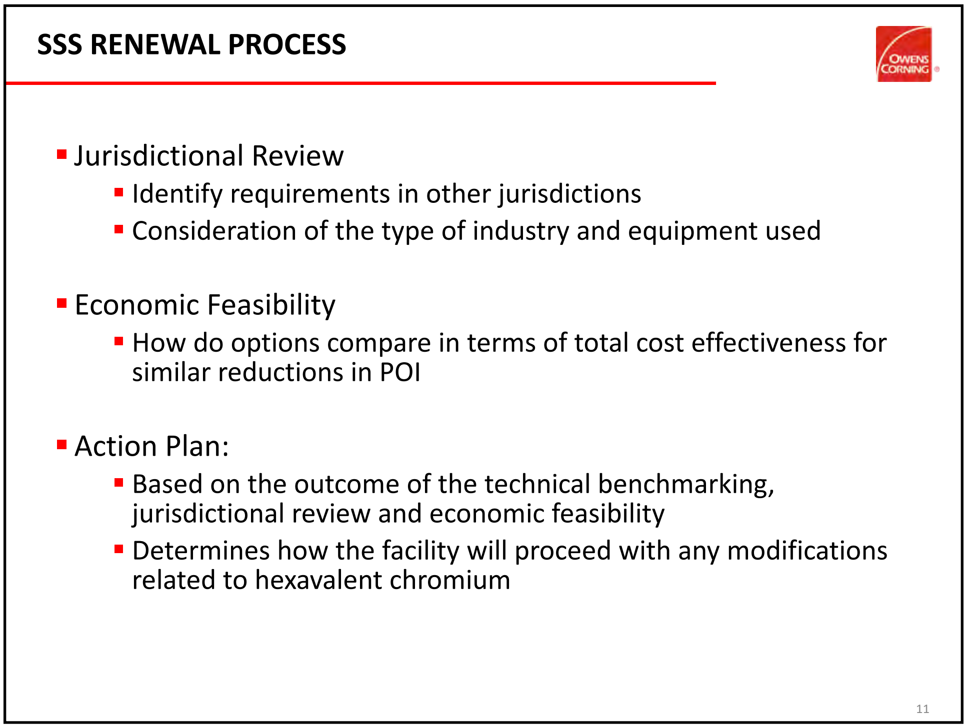
Meet the general air standard.	Register and meet the requirements under a sector-based technical standard, if one is available.	Request and meet a site-specific standard.

SITE-SPECIFIC STANDARD RENEWAL SCHEDULE

ACTION	TIMELINE
✓ Source Testing Campaign #1 (complete)	February 2024 - COMPLETE
✓ Baseline Emissions and POI Concentration (Draft)	April 2024 - COMPLETE
Technical Benchmarking	April – October 2024
✓ Source Testing Campaign #2	Mid June 2024 - COMPLETE
Baseline Emissions and POI Concentration - Update with June source testing	July – August 2024
Economic Feasibility	May – October 2024
Action Plan	November - December 2024
Refined ESDM Report (incorporating the above items)	October 2024 – January 2025
Consultation Report	January – February 2025
Final Preparation of all documents in full and public versions	January – March 2025
Application Submission	March 2025

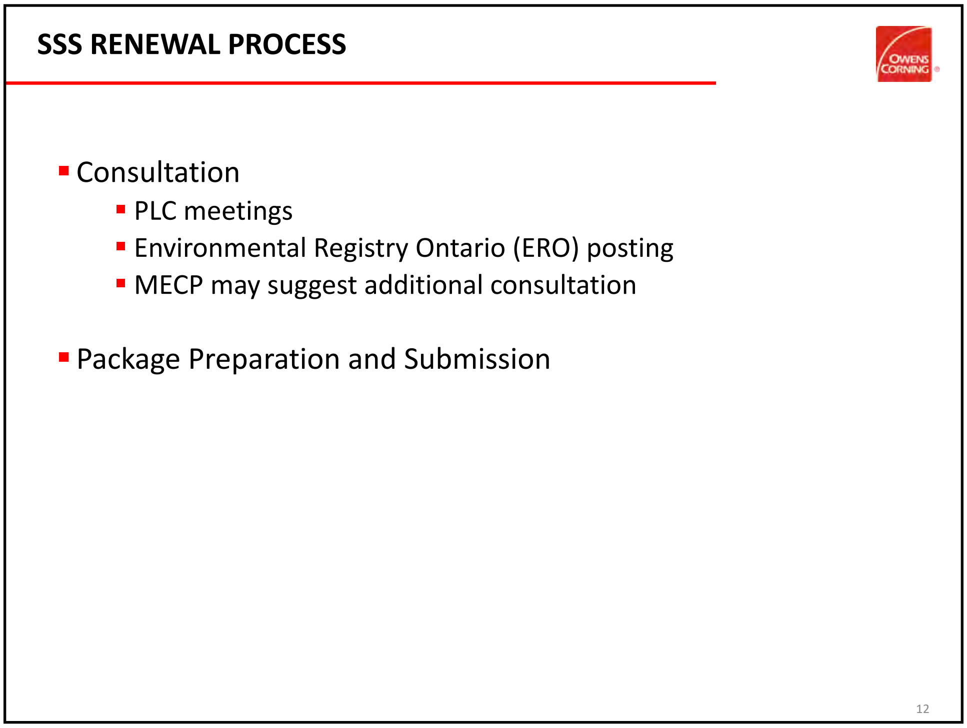
SSS RENEWAL PROCESS

- Develop an estimate of current emissions while considering normal testing variability and uncertainty
- Model maximum operating scenario and previous year operating scenario
- Technical benchmarking to identify options in several categories:
  - Process changes
  - Material substitutions
  - Add on controls
  - Re-engineering for improved dispersion
  - Typically excludes items in the R&D stage



SSS RENEWAL PROCESS

- Jurisdictional Review
  - Identify requirements in other jurisdictions
  - Consideration of the type of industry and equipment used
- Economic Feasibility
  - How do options compare in terms of total cost effectiveness for similar reductions in POI
- Action Plan:
  - Based on the outcome of the technical benchmarking, jurisdictional review and economic feasibility
  - Determines how the facility will proceed with any modifications related to hexavalent chromium



SSS RENEWAL PROCESS

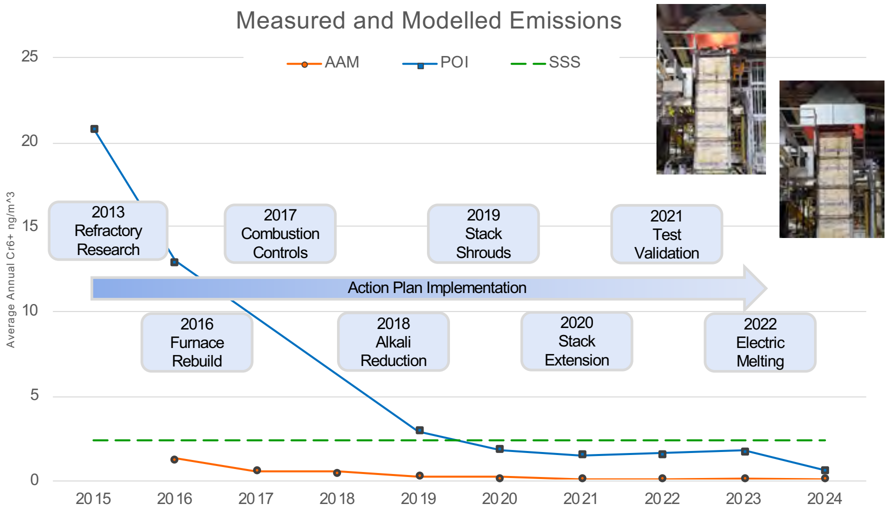
- Consultation
  - PLC meetings
  - Environmental Registry Ontario (ERO) posting
  - MECP may suggest additional consultation
- Package Preparation and Submission

MECP MEETING SUMMARY

- Met with MECP in March, April and May, 2024 to initiate the Site-Specific Standard renewal application process and keep them informed.
- Holding regular monthly meetings with MECP.
- Plan MECP site visit to introduce new officials to the plant.
- Continue to communicate to MECP regarding any public concerns.

SSS ACTION PLAN MILESTONES

Measured and Modelled Emissions



2013 Refractory Research

2016 Furnace Rebuild

2017 Combustion Controls

2018 Alkali Reduction

2019 Stack Shrouds

2020 Stack Extension

2021 Test Validation

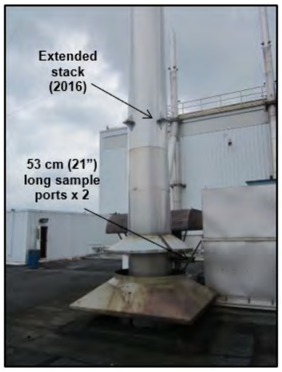
2022 Electric Melting

Results of June 2024 testing not yet included

SOURCE TESTING – ROUND 2: JUNE 18 - 21, 2024

- B24 Furnace Stack – West
- B25 Furnace Stack – East
- B38 Forehearth Stack
- B33 General Ventilation – Furnace
- B34 General Ventilation – 7A Forehearth
- C79 General Ventilation – CFM Forehearth West
- C80 General Ventilation – CFM Forehearth East

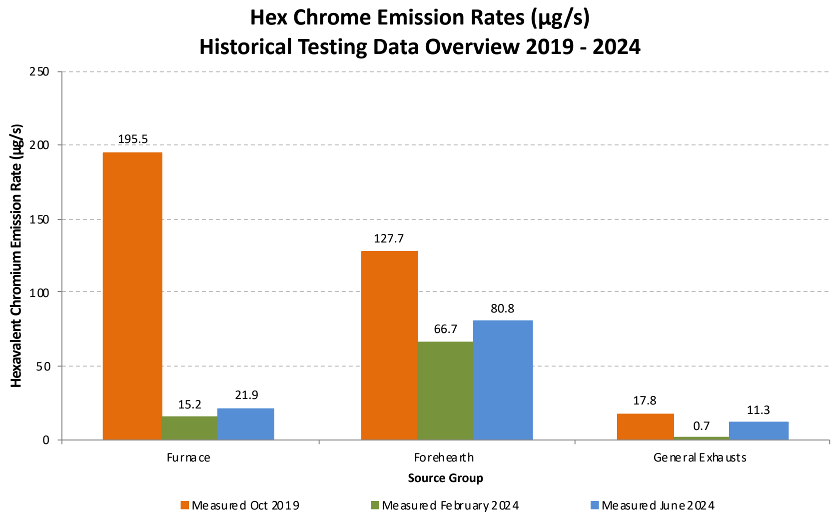
SOURCE TESTING – ROUND 2: JUNE 18 - 21, 2024



SOURCE TESTING – ROUND 2: JUNE 18 - 21, 2024

- June 2024 data are lower than October 2019
- June 2024 data are higher than the February 2024 data
- Continuing to review and analyze the June testing results
- Facility is in compliance with the Site-Specific Standard

RECENT TESTING SUMMARY



Hex Chrome Emission Rates (µg/s)
Historical Testing Data Overview 2019 - 2024

AMBIENT AIR MONITORING – ANNUAL AVERAGES

2017-2023 Annual Average Hexavalent Chromium Concentrations

Annual Average Measured Concentrations (ng/m³)

Monitoring Location	2017	2018	2019	2020	2021	2022	2023
Location 1 - School	0.55	0.32	0.23	0.21	0.11	0.17	0.17
Location 2 - Waterworks	0.87	1.00	0.51	0.33	0.40	0.23	0.17
Location 3 - Park	0.42	0.29	0.16	0.12	0.13	0.08	0.09

Site Specific Standard is 2.4 nanograms per cubic meter
Final sampling event for City Waterworks was July 12, 2023
All non-detects were assigned a value of ½ detection limit.

WRITTEN SUMMARY OF COMPLIANCE

- Owens Corning submits an Annual Written Summary to the Ministry in accordance with its approval:
  - Environmental Compliance Approvals (Air & Noise)
- A Written Summary of modifications in 2023 will be submitted by Aug. 31st, 2024.
- Identifies modifications made to the facility related to compliance with permits and emissions of air and noise.
- Must be reviewed by the PLC in advance of submission to the Ministry.
- All modifications are compliant with air and noise limits.

OVERVIEW OF MODIFICATIONS

- Updated emission rates for chromium compounds using February 2024 data
- Updated stack temperatures and velocities using February 2024 data
- No modifications affecting noise

EMISSION SUMMARY AND DISPERSION MODELLING REPORT

- Completed June 28, 2024
- Modelling indicates Owens Corning is in compliance with all criteria including the site specific standard for hexavalent chromium.

EMISSION SUMMARY AND DISPERSION MODELLING REPORT

Contaminant	CAS #	Avg Time	Emission Rate (g/s)	Facility MAX GLC (ug/m³)	POI Criteria (ug/m³)	Schedule	Limiting Effect	% of Criteria
NITROGEN OXIDES (EXPRESSED AS NO2)	10102-44-0	1 hour	1.16E+00	6.61E+01	400	Schedule 3	Health	16.5%
SULPHUR DIOXIDE	7446-09-05	1 hour	6.15E-01	3.91E+01	100	Schedule 3	Health & Vegetation	39.1%
PM - PARTICULATE MATTER	N/A - M08	24 hour	4.52E-01	8.59E+01	120	Schedule 3	Visibility	71.6%
HYDROGEN FLUORIDE - GASEOUS-GROWING SEASON GS [1]	7664-39-3	24 hour	6.41E-03	1.97E-01	0.86	Schedule 3	Vegetation	22.9%
NITROGEN OXIDES (EXPRESSED AS NO2)	10102-44-0	24 hour	1.16E+00	3.79E+01	200	Schedule 3	Health	18.9%
Chromium Compounds (Di-,Tri-,metallic)	7440-47-3	24 hour	4.61E-04	5.79E-02	0.5	Schedule 3	Health	11.6%
ZINC (AND ITS COMPOUNDS)	7440-66-6	24 hour	2.70E-02	8.30E-01	120	Schedule 3	Particulate	0.7%
HYDROGEN CHLORIDE	7647-01-0	24 hour	4.01E-03	1.23E-01	20	Schedule 3	Health	0.6%
CHROMIUM (VI) COMPOUNDS	18540-29-9	24 hour	9.68E-05	5.71E-03	0.07	URT	Health	<URT
BENZOYL PEROXIDE	94-36-0	24 hour	3.84E-03	7.39E-01	25	Screening Level	Health	<Screening Level
MAGNESIUM NITRATE	10377-60-3	24 hour	3.33E-03	4.20E-01	2	Screening Level	Health	<Screening Level
5-Chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	24 hour	1.18E-03	1.58E-01	0.5	Screening Level	Health	<Screening Level
5-Chloro-2-methyl-2H-isothiazol-3-one	55965-84-9	24 hour	2.34E-03	3.20E-01	1.35	Screening Level	Health	<Screening Level
2-Methyl-4-Isothiazolin-3-one	2682-20-4	24 hour	1.18E-03	1.58E-01	0.5	Screening Level	Health	<Screening Level
Sodium acetate	127-09-3	24 hour	8.02E-03	1.05E+00	15	Screening Level	Health & Particulate	<Screening Level
3-(Triethoxysilyl)propylamine	919-30-2	24 hour	1.95E-02	2.54E+00	80	Screening Level	Health	<Screening Level
Diallyl Phthalate	131-17-9	24 hour	4.57E-03	5.52E-01	5	Screening Level	Health	<Screening Level
Dibromoacetonitrile	3252-43-5	24 hour	1.38E-03	3.27E-01	1.65	Screening Level	Health	<Screening Level

EMISSION SUMMARY AND DISPERSION MODELLING REPORT

Contaminant	CAS #	Avg Time	Emission Rate (g/s)	Facility MAX GLC (ug/m³)	POI Criteria (ug/m³)	Schedule	Limiting Effect	% of Criteria
Sodium Bromide	7647-15-6	24 hour	4.81E-02	4.91E+00	120	Screening Level	Health & Particulate	<Screening Level
1-Propanol, 3-(trimethoxysilyl)-, methacrylate	2530-85-0	24 hour	5.51E-04	5.59E-02	0.5	Screening Level	Health	<Screening Level
Polyethylene glycol	25322-68-3	24 hour	1.73E-02	1.75E+00	40	Screening Level	Health	<Screening Level
2,2-dibromo-3-nitrilopropionamide	10222-01-2	24 hour	5.75E-03	5.84E-01	1	Screening Level	Health	<Screening Level
Benzenamine, N-[3-(trimethoxysilyl)propyl]-	3068-76-6	24 hour	6.72E-03	8.75E-01	1.114	FL/APOIC	-	<FL/APOIC
Acid Solubilized Fatty Acid Amide (Prop1)	NA	24 hour	2.26E-02	8.22E+00	8.261	FL/APOIC	-	<FL/APOIC
Acid Solubilized Fatty Acid Amide (Prop2)	NA	24 hour	1.01E-02	3.65E+00	3.672	FL/APOIC	-	<FL/APOIC
HYDROGEN FLUORIDE - GASEOUS-GROWING SEASON GS	7664-39-3	30 day	6.41E-03	7.687E-02	0.34	Schedule 3	Health	22.6%
CHROMIUM (VI) COMPOUNDS	18540-29-9	Annual	8.60E-05	6.44E-04	2.40E-03	SSS	Health	26.8%
SULPHUR DIOXIDE	7446-09-05	Annual	6.15E-01	2.18E+00	10	Schedule 3	Health & Vegetation	21.8%

SL = Screening Level
APOIC = Approved Point of Impingement Concentration

MECP 2024 OTHER REPORTING REQUIREMENTS

- Written Summary for Site Specific Action Plan
  Submitted: March 27, 2024
- Quarterly Ambient Air Monitoring Reports
  Submitted May 15 (Q1 2024) - final quarterly AAM report
- Annual Ambient Air Monitoring Report
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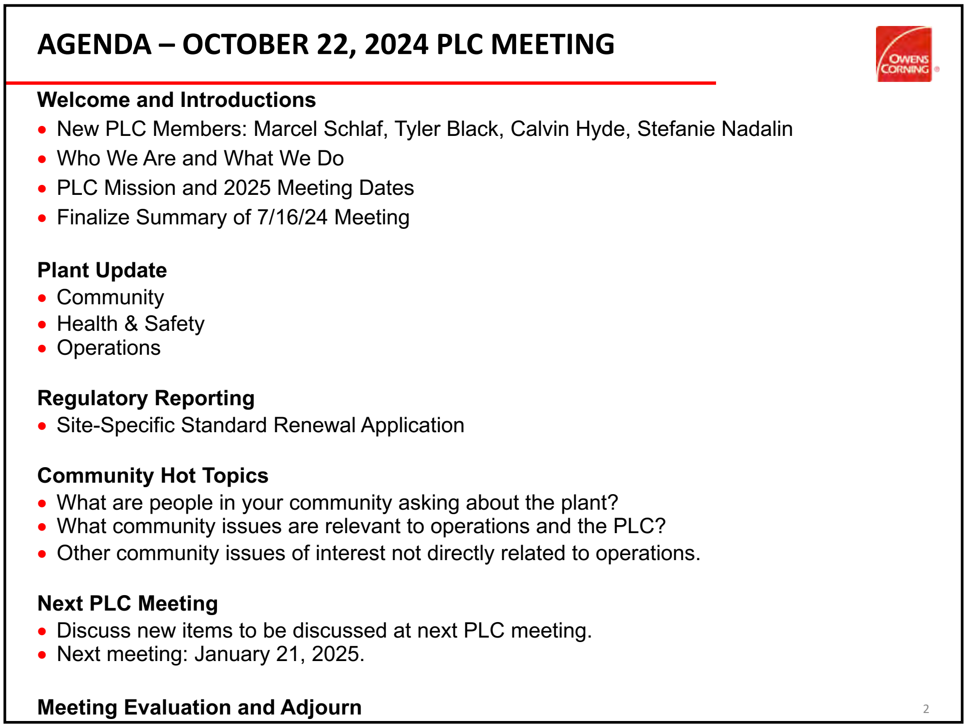
- National Pollutant Release Inventory
  Submitted: June 1, 2024
- Emission Summary and Dispersion Modelling Report Update
  Completed: June 28, 2024
- Acoustic Assessment Report Update
  No updates needed
- ECA Annual Written Summary
  Due: August 31, 2024

THANK YOU

OWENS CORNING GUELPH PLC MEETING

OCTOBER 22, 2024



AGENDA – OCTOBER 22, 2024 PLC MEETING

Welcome and Introductions
- New PLC Members: Marcel Schlaf, Tyler Black, Calvin Hyde, Stefanie Nadalin
- Who We Are and What We Do
- PLC Mission and 2025 Meeting Dates
- Finalize Summary of 7/16/24 Meeting

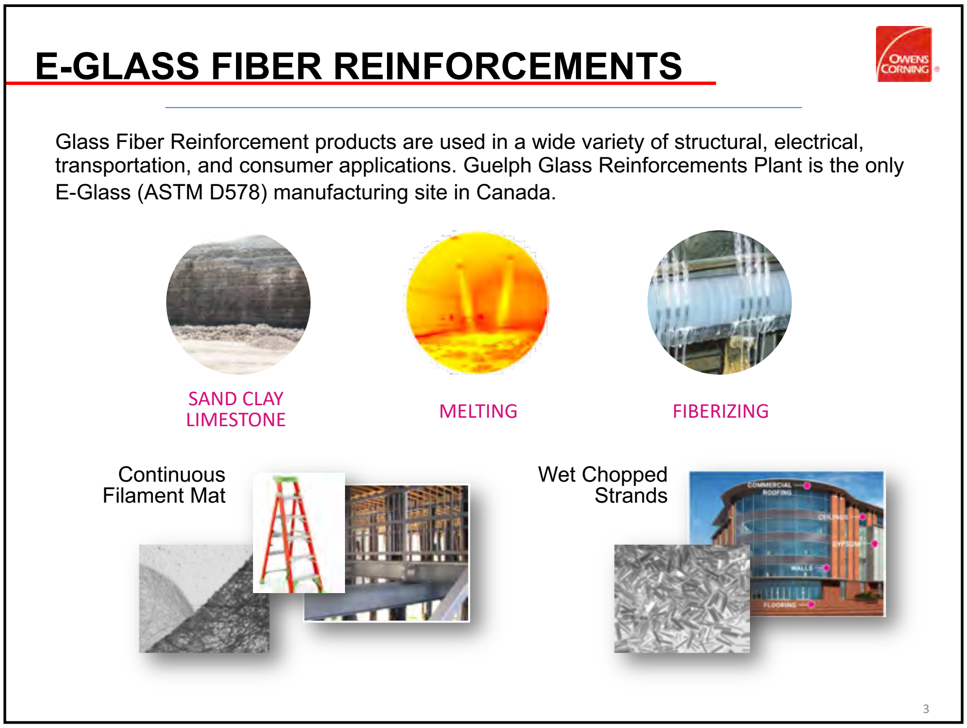
Plant Update
- Community
- Health & Safety
- Operations

Regulatory Reporting
- Site-Specific Standard Renewal Application

Community Hot Topics
- What are people in your community asking about the plant?
- What community issues are relevant to operations and the PLC?
- Other community issues of interest not directly related to operations.

Next PLC Meeting
- Discuss new items to be discussed at next PLC meeting.
- Next meeting: January 21, 2025.

Meeting Evaluation and Adjourn



E-GLASS FIBER REINFORCEMENTS

Glass Fiber Reinforcement products are used in a wide variety of structural, electrical, transportation, and consumer applications. Guelph Glass Reinforcements Plant is the only E-Glass (ASTM D578) manufacturing site in Canada.

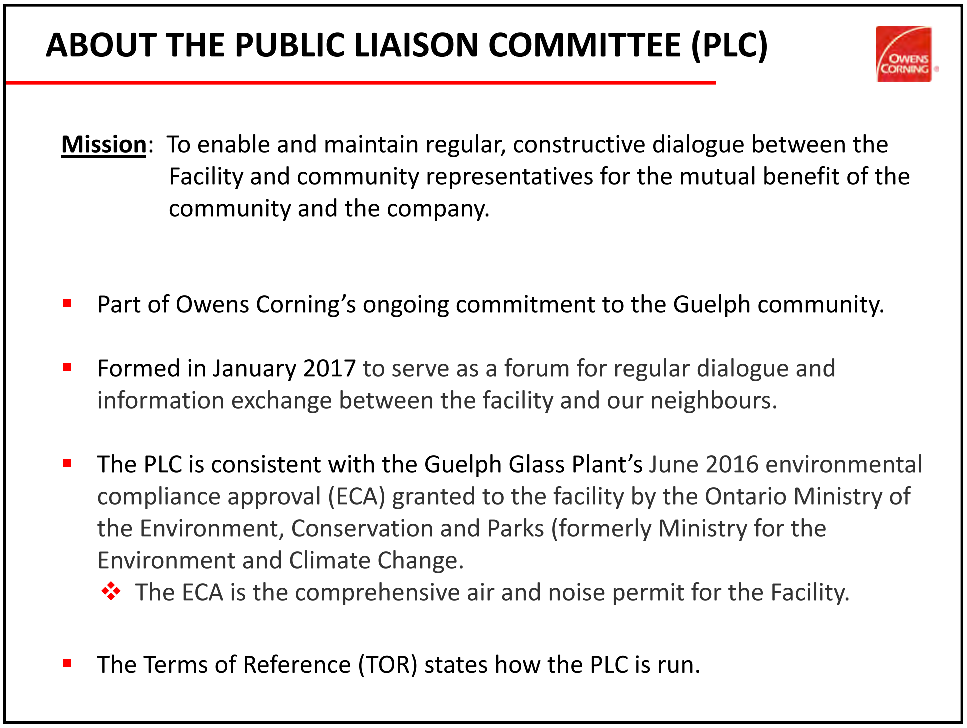
SAND CLAY
LIMESTONE

MELTING

FIBERIZING

Continuous
Filament Mat

Wet Chopped
Strands



ABOUT THE PUBLIC LIAISON COMMITTEE (PLC)

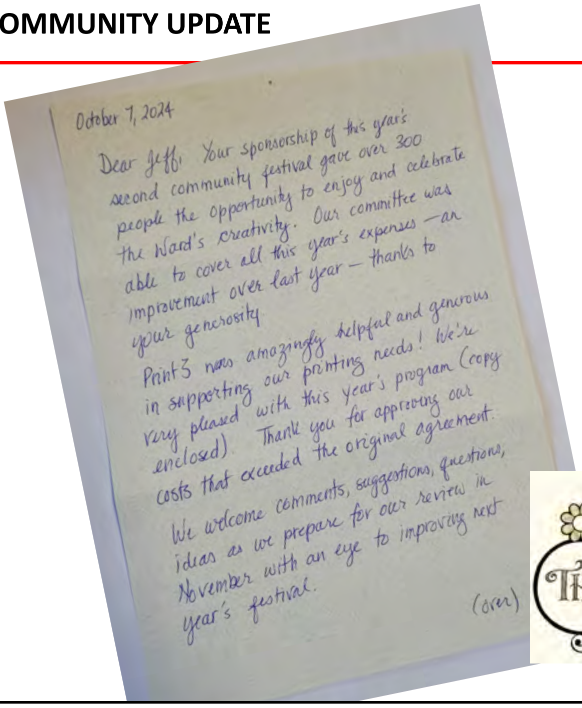
Mission: To enable and maintain regular, constructive dialogue between the Facility and community representatives for the mutual benefit of the community and the company.

- Part of Owens Corning's ongoing commitment to the Guelph community.
- Formed in January 2017 to serve as a forum for regular dialogue and information exchange between the facility and our neighbours.
- The PLC is consistent with the Guelph Glass Plant's June 2016 environmental compliance approval (ECA) granted to the facility by the Ontario Ministry of the Environment, Conservation and Parks (formerly Ministry for the Environment and Climate Change.
  - ❖ The ECA is the comprehensive air and noise permit for the Facility.
- The Terms of Reference (TOR) states how the PLC is run.

PROPOSED PLC SCHEDULE FOR 2025

- January 21
- March 25
- July 15
- October 21

COMMUNITY UPDATE



October 7, 2024

Dear Jeff, Your sponsorship of this year's second community festival gave over 300 people the opportunity to enjoy and celebrate the Ward's creativity. Our committee was able to cover all this year's expenses — an improvement over last year — thanks to your generosity

Print3 was amazingly helpful and generous in supporting our printing needs! We're very pleased with this year's program (copy enclosed). Thank you for approving our costs that exceeded the original agreement.

We welcome comments, suggestions, questions, ideas as we prepare for our review in November with an eye to improving next year's festival.

(over)

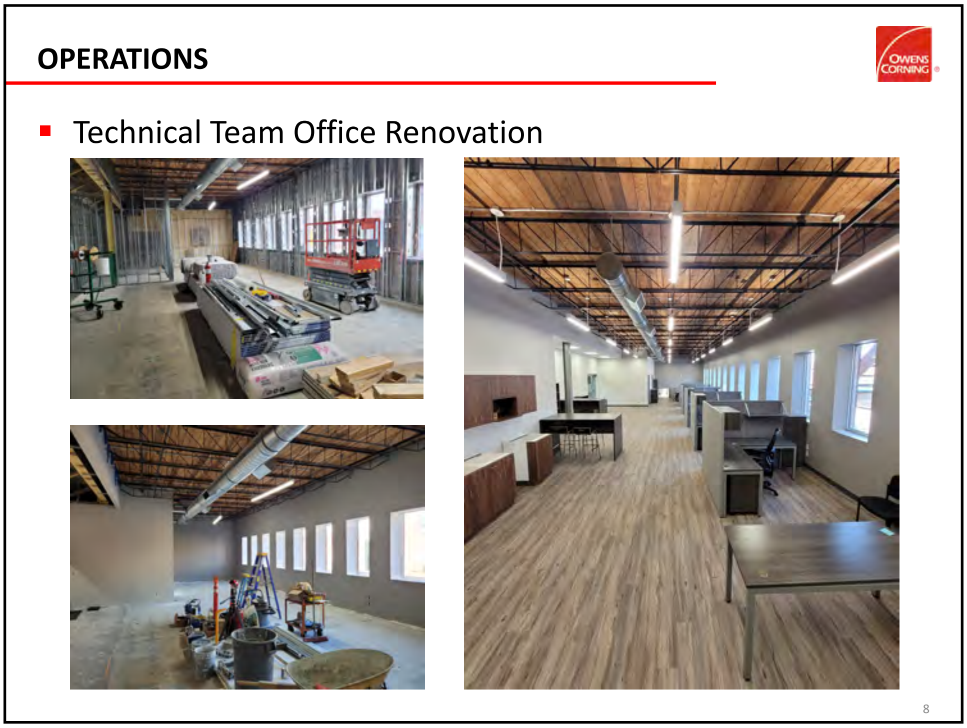
HEALTH & SAFETY

September – October- Audit Season

Sept 24-26
3 Day ISO audit reviewing OC's Health and Safety, Environmental and Quality Systems.
0 nonconformities identified

Cross Audits –
Sept 30- Oct 4
Travelled to Amarillo Texas to audit a sister plant. Good learnings and observations.

Oct 8-9
HSE Leader from Jackson Tennessee visited to audit the Guelph Plant. Found many good takeaways from the audit.

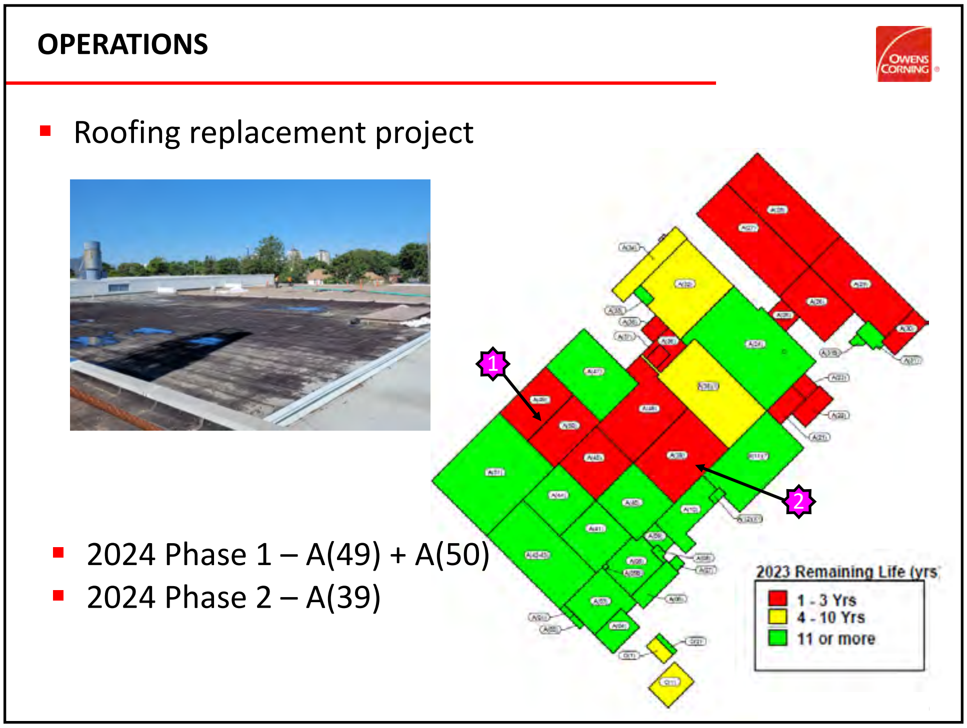


OPERATIONS

- Technical Team Office Renovation

OPERATIONS

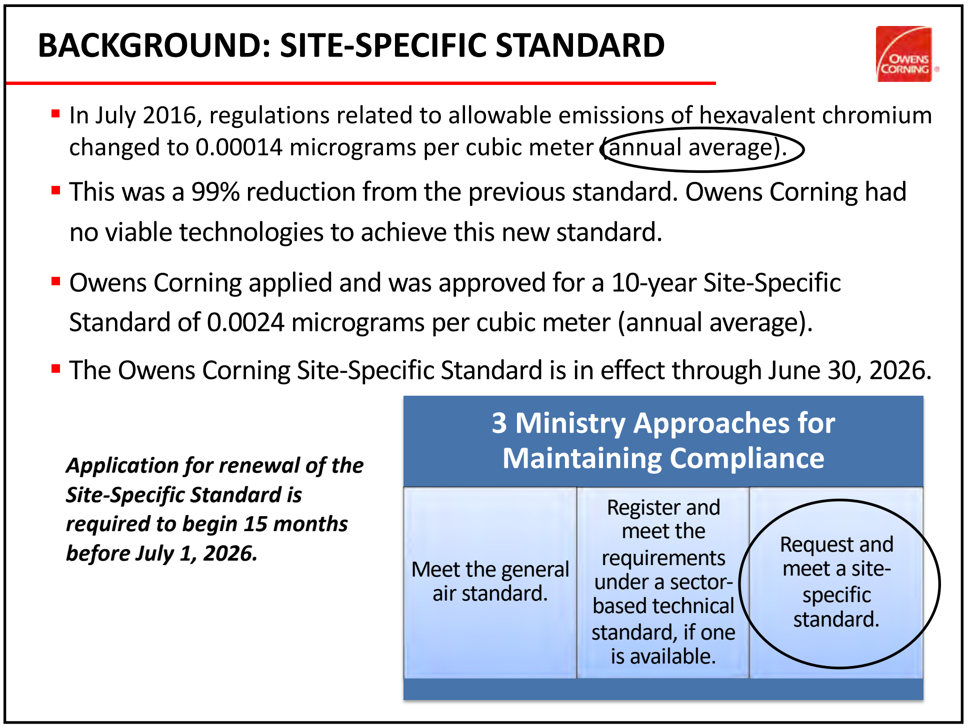
- Internal Warehouse



OPERATIONS

- Roofing replacement project

- 2024 Phase 1 – A(49) + A(50)
- 2024 Phase 2 – A(39)

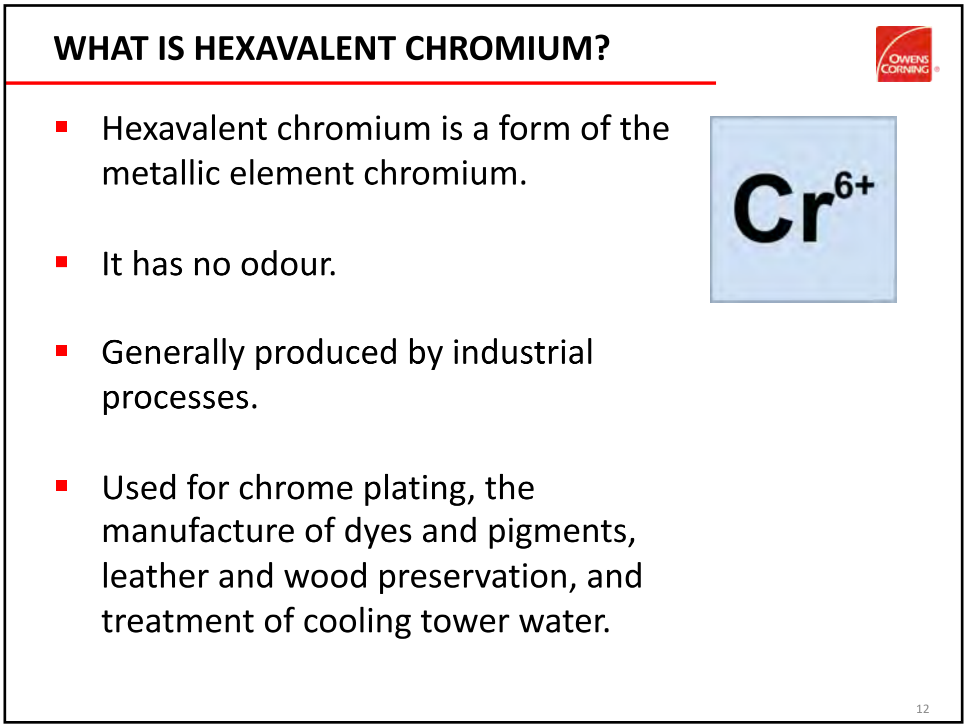


BACKGROUND: SITE-SPECIFIC STANDARD

- In July 2016, regulations related to allowable emissions of hexavalent chromium changed to 0.00014 micrograms per cubic meter (annual average).
- This was a 99% reduction from the previous standard. Owens Corning had no viable technologies to achieve this new standard.
- Owens Corning applied and was approved for a 10-year Site-Specific Standard of 0.0024 micrograms per cubic meter (annual average).
- The Owens Corning Site-Specific Standard is in effect through June 30, 2026.

Application for renewal of the Site-Specific Standard is required to begin 15 months before July 1, 2026.

3 Ministry Approaches for Maintaining Compliance		
Meet the general air standard.	Register and meet the requirements under a sector-based technical standard, if one is available.	Request and meet a site-specific standard.



WHAT IS HEXAVALENT CHROMIUM?

- Hexavalent chromium is a form of the metallic element chromium.
- It has no odour.
- Generally produced by industrial processes.
- Used for chrome plating, the manufacture of dyes and pigments, leather and wood preservation, and treatment of cooling tower water.

Cr^{6+}

INDICATORS OF COMPLIANCE

- **Air Standard (based on modeling)**
  - 0.00014 micrograms per cubic meter (annual average)

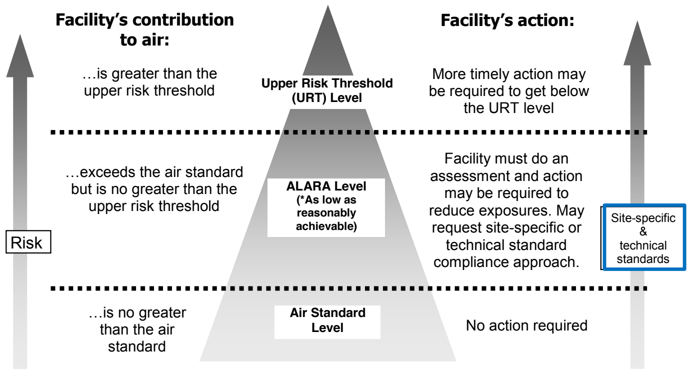
➢ **Approved Site-Specific Standard (based on modeling)**
  - 0.0024 micrograms per cubic meter (annual average)
  - 88 percent reduction from 2015 level

- **Upper Risk Threshold (URT) (based on modeling and actual measurements)**
  - A concentration of a contaminant in air, used by the Ministry to manage and assess effects-based health risks
  - 0.07 micrograms per cubic meter (24 hour URT)
  - Came into effect in 2011

HOW COMPLIANCE INDICATORS ARE RELATED

Framework for managing risk

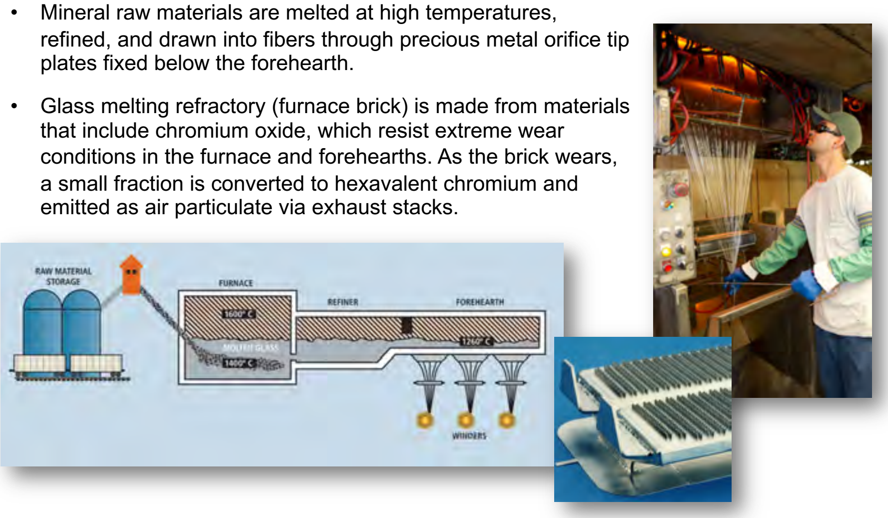
The framework helps manage risks to local communities from a facility's emissions of a contaminant to air. The maximum level of a contaminant around a facility as a result of its emissions is defined within three ranges listed below. More timely actions to reduce exposures are required to be taken as contributions increase.



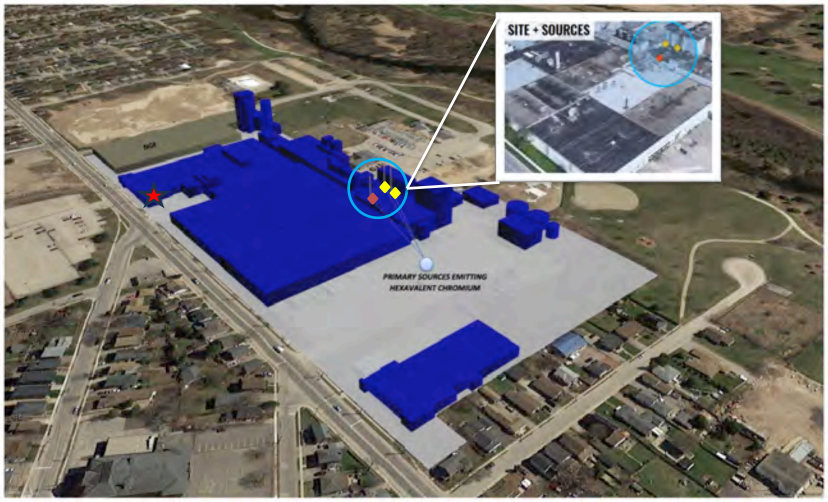
Source: Ministry Fact Sheet "Framework for Managing Risk"

E-GLASS MANUFACTURING OPERATIONS

- Owens Corning does not manufacture hexavalent chromium. It is a byproduct of the manufacturing process.
- Mineral raw materials are melted at high temperatures, refined, and drawn into fibers through precious metal orifice tip plates fixed below the forehearth.
- Glass melting refractory (furnace brick) is made from materials that include chromium oxide, which resist extreme wear conditions in the furnace and forehearths. As the brick wears, a small fraction is converted to hexavalent chromium and emitted as air particulate via exhaust stacks.



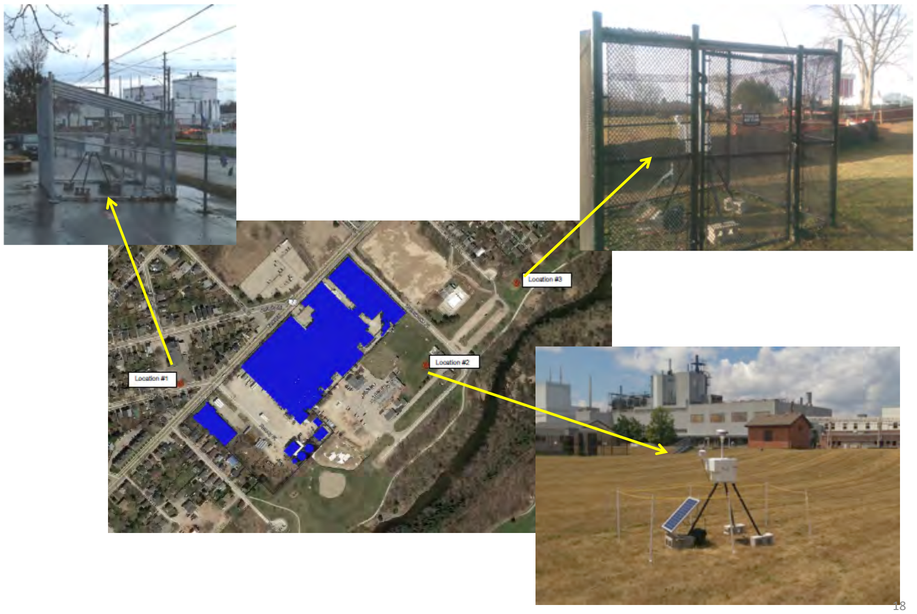
PRIMARY SOURCES - HEXAVALENT CHROMIUM EMISSIONS

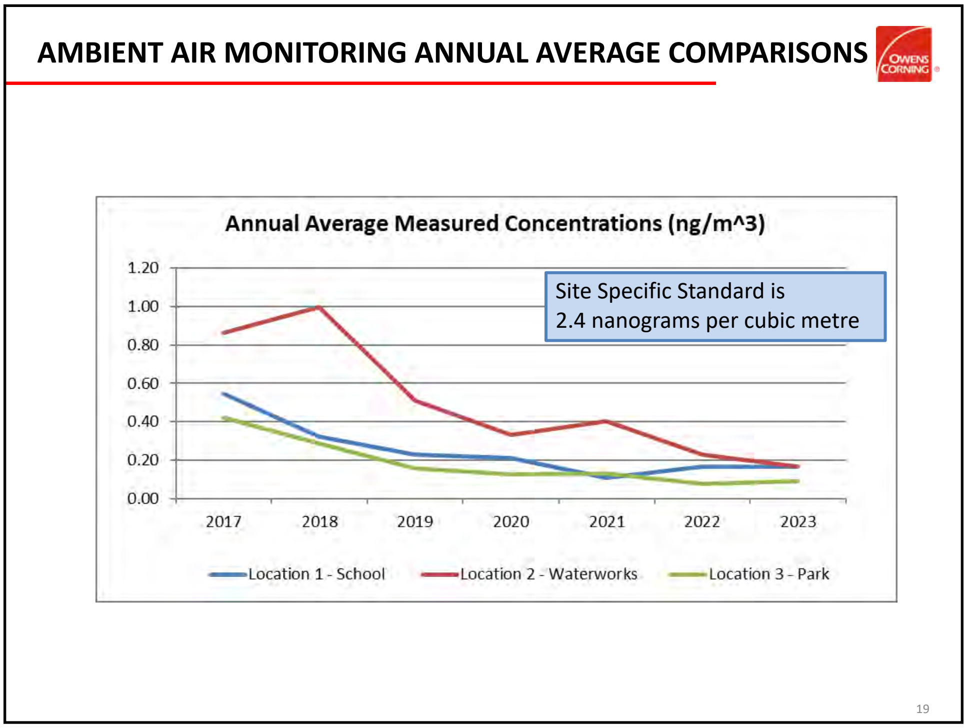


ABOUT THE AIR MONITORING PROGRAM

- Ambient Air Monitoring was a requirement of the ECA granted to the facility on June 22, 2016.
- Purpose: To show actual existing regional levels while plant is operating.
- Conducted Q4 2016 through Q4 2023.
  - August 2023, air monitor at Water Works removed at their request to enable property development.
- Quarterly and annual reports were shared with the PLC before being submitted to the Ministry.
- Modelling of February 2024 and June 2024 stack sampling data confirmed Owens Corning is in compliance with all criteria including the site-specific standard for hexavalent chromium.
- Ministry agreed to discontinuation of program.

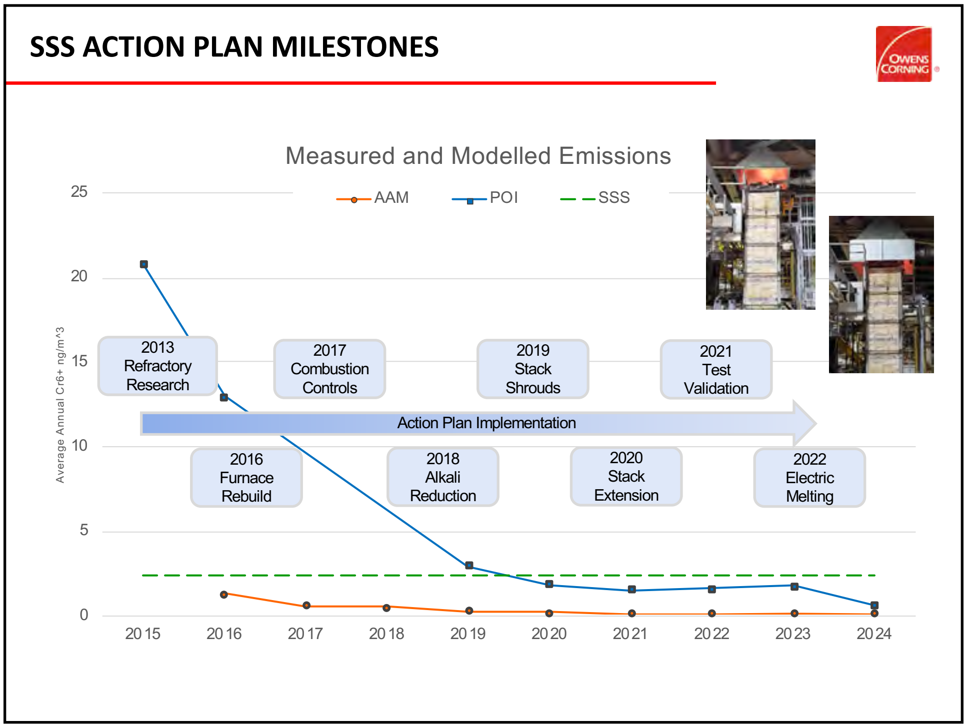
AMBIENT AIR MONITOR - LOCATIONS





AMBIENT AIR MONITORING ANNUAL AVERAGE COMPARISONS

Site Specific Standard is
2.4 nanograms per cubic metre



SSS ACTION PLAN MILESTONES

- 2013 Refractory Research
- 2016 Furnace Rebuild
- 2017 Combustion Controls
- 2018 Alkali Reduction
- 2019 Stack Shrouds
- 2020 Stack Extension
- 2021 Test Validation
- 2022 Electric Melting

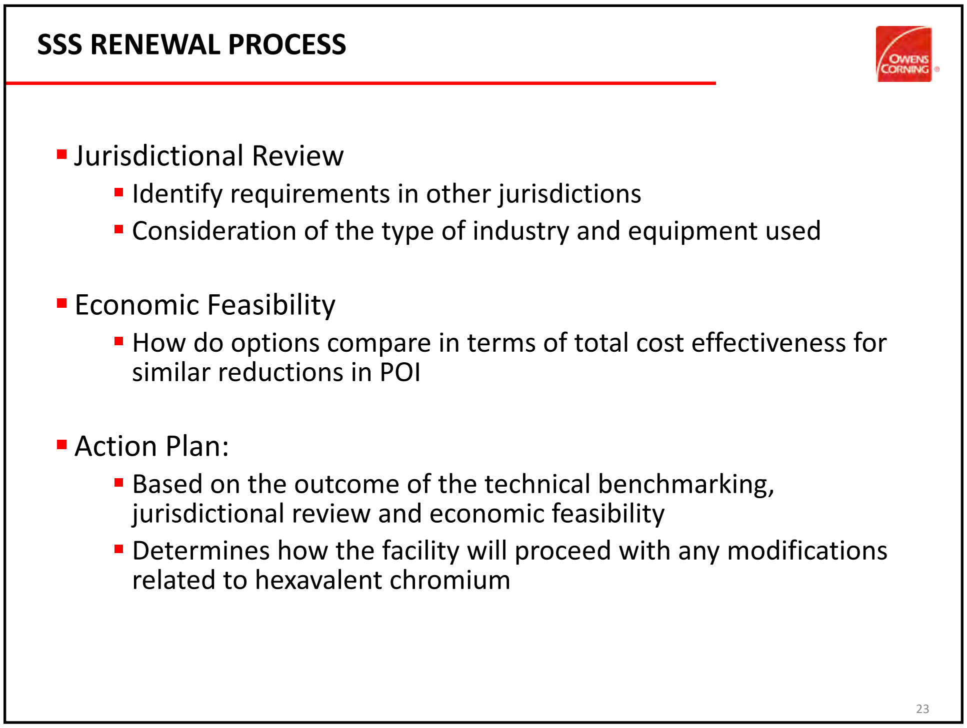
Action Plan Implementation

SITE-SPECIFIC STANDARD RENEWAL SCHEDULE

ACTION	TIMELINE
✓Source Testing Campaign #1 (complete)	February 2024 - COMPLETE
✓Baseline Emissions and POI Concentration (submitted)	April 2024 - COMPLETE
Technical Benchmarking	April – December 2024
✓Source Testing Campaign #2 (complete)	Mid June 2024 - COMPLETE
✓Baseline Emissions and POI Concentration - Update with June source testing	July – August 2024 - COMPLETE
Economic Feasibility	May – December 2024
Action Plan	December 2024
Refined ESDM Report (incorporating the above items)	November 2024 – January 2025
Consultation Report	January – February 2025
Final Preparation of all documents in full and public versions	January – March 2025
Application Submission	March 2025

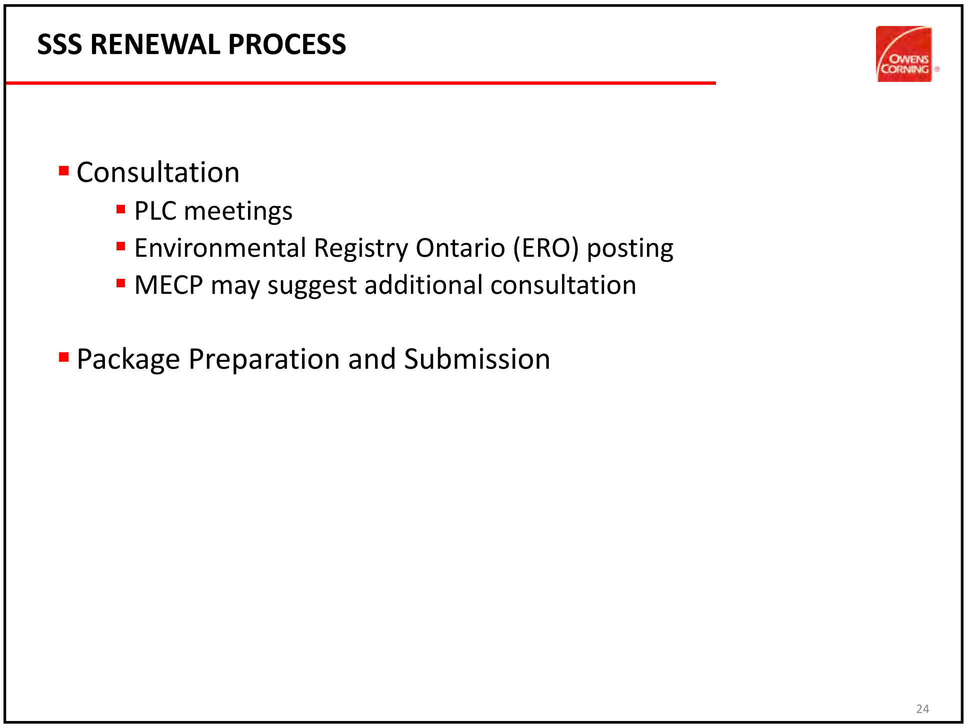
SSS RENEWAL PROCESS

- Develop an estimate of current emissions while considering normal testing variability and uncertainty
- Model maximum operating scenario and previous year operating scenario
- Technical Benchmarking to identify options in several categories:
  - Process changes
  - Material substitutions
  - Add on controls
  - Re-engineering for improved dispersion
  - Typically excludes items in the R&D stage



SSS RENEWAL PROCESS

- Jurisdictional Review
  - Identify requirements in other jurisdictions
  - Consideration of the type of industry and equipment used
- Economic Feasibility
  - How do options compare in terms of total cost effectiveness for similar reductions in POI
- Action Plan:
  - Based on the outcome of the technical benchmarking, jurisdictional review and economic feasibility
  - Determines how the facility will proceed with any modifications related to hexavalent chromium



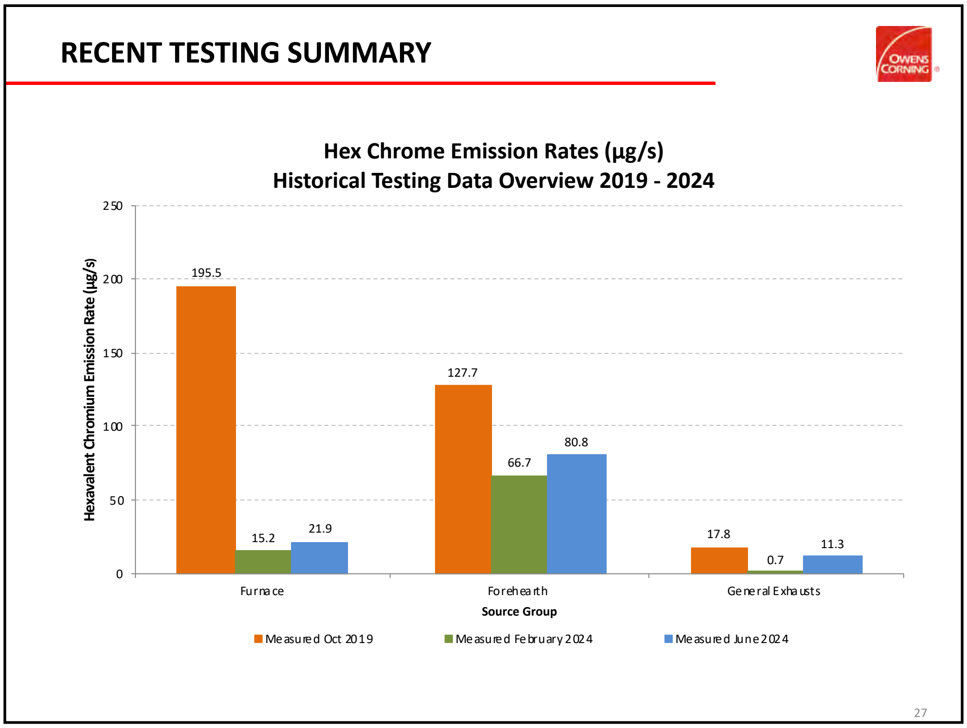
SSS RENEWAL PROCESS

- Consultation
  - PLC meetings
  - Environmental Registry Ontario (ERO) posting
  - MECP may suggest additional consultation
- Package Preparation and Submission

MECP MEETING SUMMARY

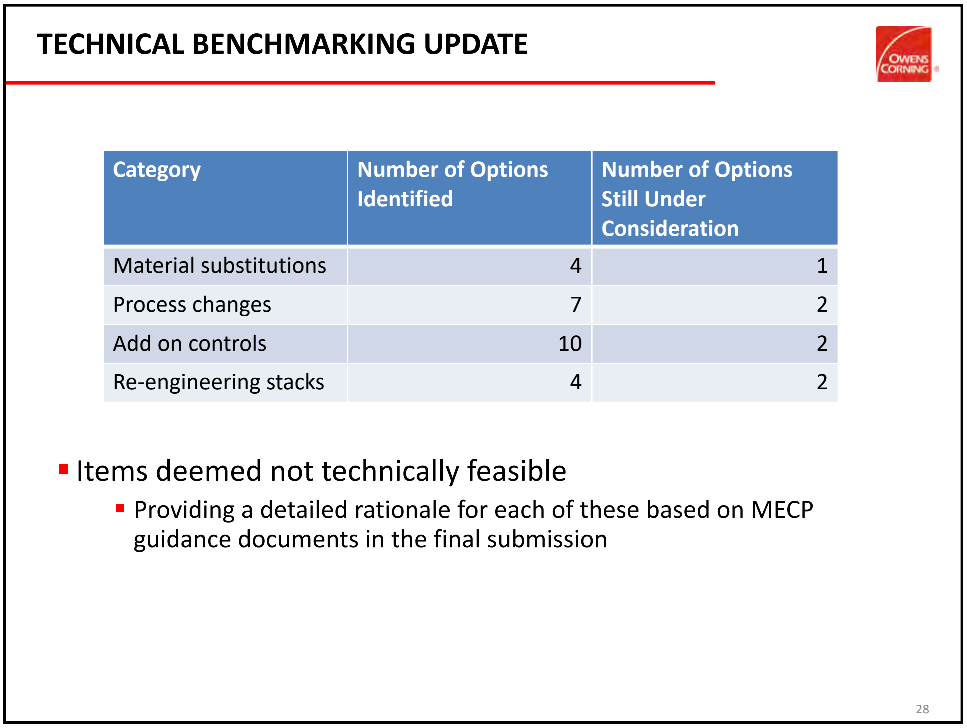
- Started meeting regularly (~ monthly) with MECP since March to discuss the Site-Specific Standard renewal application process and keep them informed.
    - Held 5 meetings with Ministry to date.
- Conducted a site tour with MECP as part of the September meeting.
- Next meeting October 23rd.
- Continue to communicate to MECP regarding any public concerns.

SOURCE TESTING – ROUND 2: JUNE 18 - 21, 2024



RECENT TESTING SUMMARY

Hex Chrome Emission Rates (µg/s)
Historical Testing Data Overview 2019 - 2024



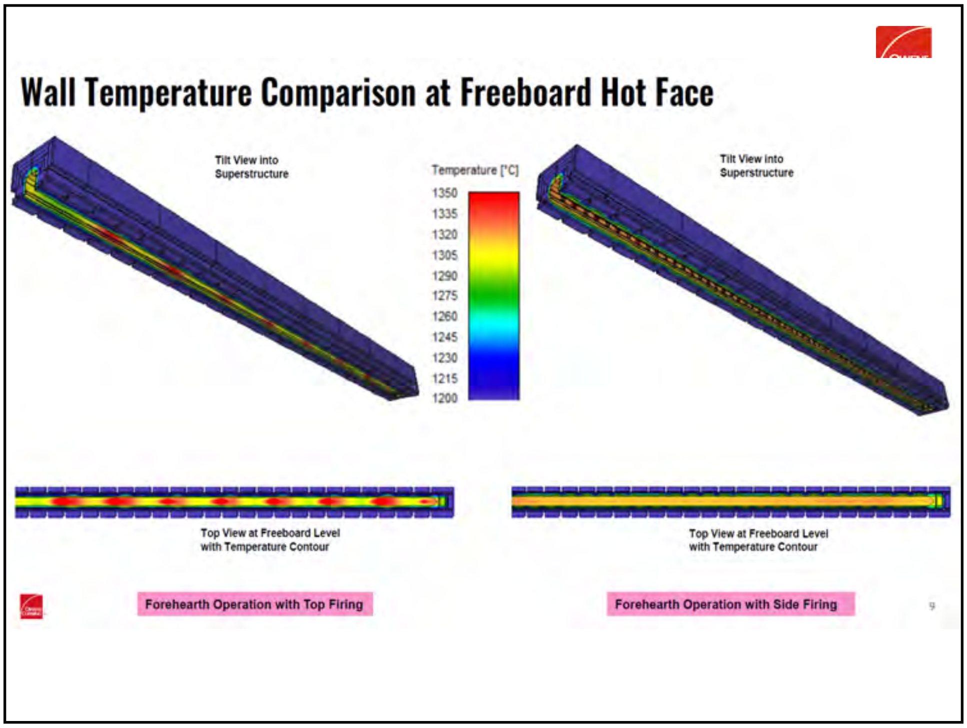
TECHNICAL BENCHMARKING UPDATE

Category	Number of Options Identified	Number of Options Still Under Consideration
Material substitutions	4	1
Process changes	7	2
Add on controls	10	2
Re-engineering stacks	4	2

- Items deemed not technically feasible
  - Providing a detailed rationale for each of these based on MECP guidance documents in the final submission

TECHNICAL BENCHMARKING – FOREHEARTH

	Material Substitution	Technically Feasible?	Feasibility Rationale
PC6	Front end freeboard minimization	maybe	Still assessing.
PC7	Horizontal burner firing (design change)	maybe	Positive indications with R&D to date. Still assessing.
MS2	Substituting with Low Sublimation Chromium Refractory	maybe	Limited data shows no statistically significant difference in emissions. OC considering implementation but reduction estimate would be zero.
AO1	Electrostatic precipitator	maybe	Still assessing.
AO2	Dust Collector	maybe	Still assessing.



Wall Temperature Comparison at Freeboard Hot Face

TECHNICAL BENCHMARKING - FURNACE

	Material Substitution	Technically Feasible?	Feasibility Rationale
MS2	Substituting with Low Sublimation Chromium Refractory	maybe	Limited data shows no statistically significant difference in emissions. OC considering implementation but reduction estimate would be zero.

TECHNICAL BENCHMARKING – GENERAL VENTILATION

- Material substitution and process changes considered for process sources may indirectly impact general ventilation emissions
- There are no add on control options that are technically feasible for the roof vent sources

TECHNICAL BENCHMARKING – DISPERSION OPTIONS

Engineering considerations for stack improvements
Stack height increase
Stack velocity increase (coning)

TECHNICAL BENCHMARKING – FOREHEARTH

OPTIONS ELIMINATED

	Material Substitution	Technically Feasible?	Feasibility Rationale
MS1	Replacing chromic oxide containing refractory with Zircon or other non-chrome containing refractory	×	Cannot make product due to stoning issues.
MS3	Glass recipe modifications	×	Already completed to the extent possible.
MS4	Fused zirconia siderails (XiLEC) for forehearth and channels	×	Cannot make product due to stoning issues.

TECHNICAL BENCHMARKING – FOREHEARTH

OPTIONS ELIMINATED

	Process Changes	Technically Feasible?	Feasibility Rationale
PC1	Use of radiant electric heat.	×	Material incompatibility with bushings.
PC2	Using Substoichiometric combustion ratio	×	Will cause asset damage.
PC3	Add eboost	×	Electrical interference with forehearth bushings.
PC4	Convert front end to air/gas combustion vs. oxygen/gas combustion.	×	Cannot quantify a reduction.

TECHNICAL BENCHMARKING – FOREHEARTH

OPTIONS ELIMINATED

	Add on Controls	Technically Feasible?	Feasibility Rationale
AO3	Low pressure cyclone	×	Not recommended or deemed effective for small particles.
AO4	HEPA Filter	×	Stream concentration is outside the recommended range for this technology.
AO5 – AO9, AO11	Wet Scrubbers (venturi, liquid bed, spray chambers, packed beds)	×	Wet technologies are not applicable to hot dry sources.

TECHNICAL BENCHMARKING – FURNACE

OPTIONS ELIMINATED

	Material Substitution	Technically Feasible?	Feasibility Rationale
MS1	Replacing chromic oxide containing refractory with Zircon or other non-chrome containing refractory	×	Cannot make product due to stoning issues.
MS2	Substituting with Low Sublimation Chromium Refractory	maybe	Limited data shows no statistically significant difference in emissions. Reduction estimate would be zero.
MS3	Glass recipe modifications	×	Already completed to the extent possible.

TECHNICAL BENCHMARKING – FURNACE

OPTIONS ELIMINATED

	Process Changes	Technically Feasible?	Feasibility Rationale
PC1	Use of radiant electric heat.	×	Material incompatibility with bushings.
PC2	Using Substoichiometric combustion ratio	×	Will cause asset damage.
PC4	Convert furnace to air/gas combustion vs. oxygen/gas combustion.	×	Cannot quantify a reduction.
PC7	Horizontal burner firing (design change)	×	Burners repositioned in the 2022 furnace rebuild to the extent possible.

TECHNICAL BENCHMARKING – FURNACE

OPTIONS ELIMINATED

	Add on Controls	Technically Feasible?	Feasibility Rationale
AO1	Electrostatic precipitator	✗	Furnace emissions comply with Schedule 3 standard.
AO2	Dust Collector	✗	Furnace emissions comply with Schedule 3 standard.
AO3	Low pressure cyclone	✗	Not recommended or deemed effective for small particles.
AO4	HEPA Filter	✗	Stream concentration is outside the recommended range for this technology.
AO5 – AO9, AO11	Wet Scrubbers (venturi, liquid bed, spray chambers, packed beds)	✗	Wet technologies are not applicable to hot dry sources.

TECHNICAL BENCHMARKING – GENERAL VENTILATION

OPTIONS ELIMINATED

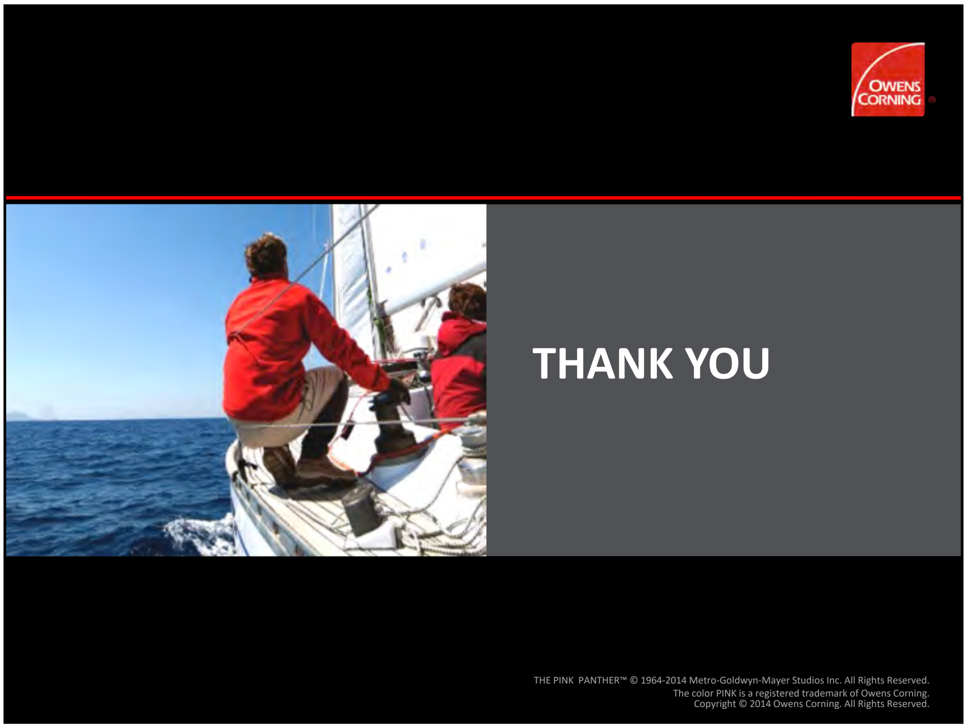
	Add on Controls	Technically Feasible?	Feasibility Rationale
AO1	Electrostatic precipitator	✗	Inlet concentration is less than a manufacturer would guarantee for an outlet concentration.
AO2	Dust Collector	✗	Stream concentration is outside the recommended range for this technology.
AO3	Low pressure cyclone	✗	Not recommended or deemed effective for small particles.
AO4	HEPA Filter	✗	Exhaust flowrate outside of upper range of practical design applications of this technology.
AO5, AO8	Wet scrubbers (spray chamber, LP venturi)	✗	Not recommended or deemed effective for small particles.
AO6, AO7, AO9, AO11	Wet Scrubbers (HP venturi, liquid bed, packed bed)	✗	Inlet concentrations are near analytical detection limits. Removal guarantees would not be available.

JURISDICTIONAL REVIEW UPDATE

- Reviewed guidance documents, regulations, and permits from several jurisdictions
  - Various US jurisdictions, European Commission, United Kingdom
- Identified pollution control options related to metals, dust, and particulate matter
  - The majority are not applicable to the Guelph facility
  - Various options are being considered as part of technical benchmarking
  - Some options already implemented at the Guelph facility
- Analysis of the collected information is ongoing

MECP 2025 REPORTING REQUIREMENTS

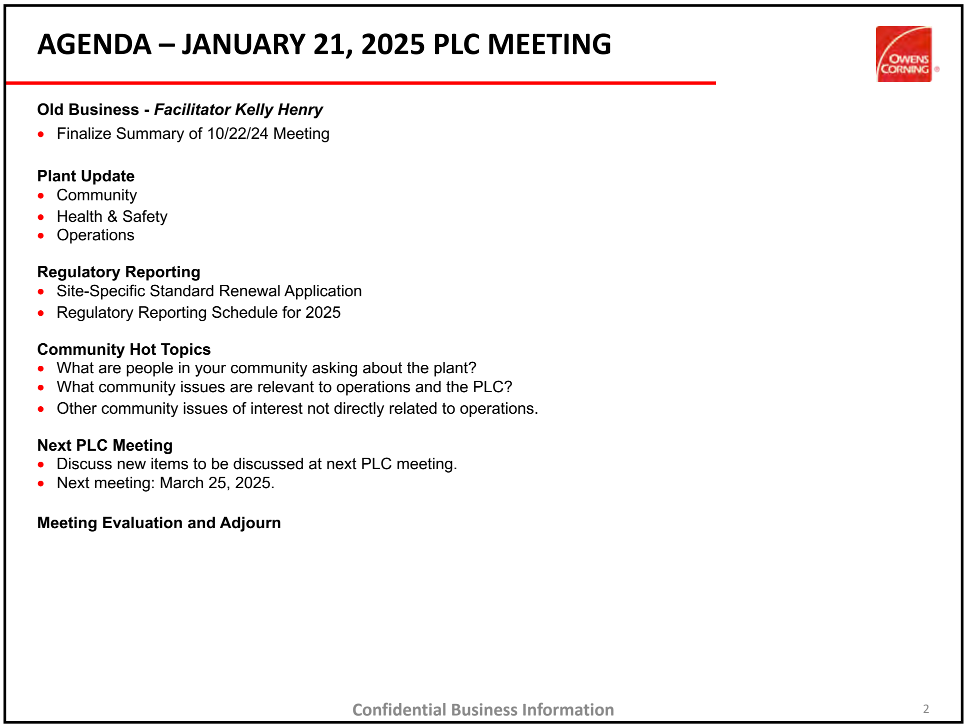
- Written Summary for Site Specific Action Plan
  Due: March 31, 2025
- Site Specific Standard Renewal Application
  Due: March 31, 2025
- National Pollutant Release Inventory
  Due: June 1, 2025
- Emission Summary and Dispersion Modelling Report Update
  Due: June 30, 2025
- Acoustic Assessment Report
  Due: June 30, 2025
- ECA Annual Written Summary
  Due: August 31, 2025



THANK YOU

OWENS CORNING GUELPH PLC MEETING

JANUARY 21, 2025



AGENDA – JANUARY 21, 2025 PLC MEETING

Old Business - *Facilitator Kelly Henry*
- Finalize Summary of 10/22/24 Meeting

Plant Update
- Community
- Health & Safety
- Operations

Regulatory Reporting
- Site-Specific Standard Renewal Application
- Regulatory Reporting Schedule for 2025

Community Hot Topics
- What are people in your community asking about the plant?
- What community issues are relevant to operations and the PLC?
- Other community issues of interest not directly related to operations.

Next PLC Meeting
- Discuss new items to be discussed at next PLC meeting.
- Next meeting: March 25, 2025.

Meeting Evaluation and Adjourn

COMMUNITY UPDATE

Guelph Plant creating festive spirit & connection with Sacred Heart School & Guelph Storm

SACRED HEART
Catholic School

OWENS CORNING

GUELPH STORM

COMMUNITY UPDATE

Wyndham House is committed to preventing, reducing, and ultimately ending youth homelessness by providing comprehensive support and services.

On behalf of Owens Corning Employees, a donation of 100 bags packed with essential items such as toiletries, snacks, warm socks, gloves and hats for youth in need.

These were packed by OC volunteers and delivered on December 17th.

COMMUNITY UPDATE

141 Students	134 Students

Sacred Heart Movie Day on Friday December 20th

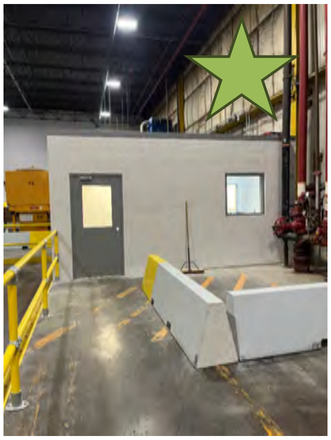
SACRED HEART
Catholic School

HEALTH & SAFETY

New Warehouse Office

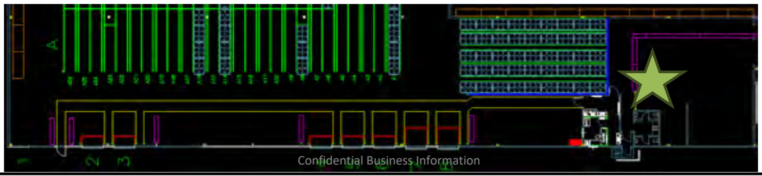
To allow for better control of pedestrian traffic flow, the office was relocated from middle of the warehouse towards the south end.

This completes part of the last stage of the Pedestrian Safety Journey (2 years +)



Forklift – Vision System

This week we are installing a vision system on the forklifts that will sense when people are close and shut off the throttle.



OPERATIONS

New Oxygen Generator commissioning

In the first months of 2025, we are starting up an onsite oxygen generation system to supplement our supply of liquid oxygen for glass melting.

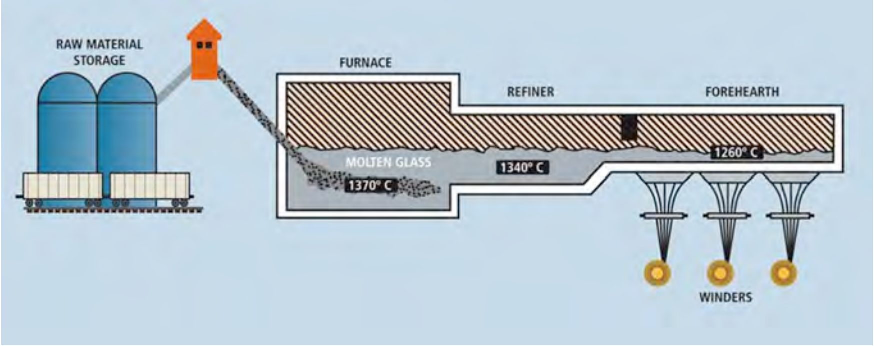
- Located indoors in warehouse area.
- Separates oxygen from the air by *Pressure Swing Adsorption.*

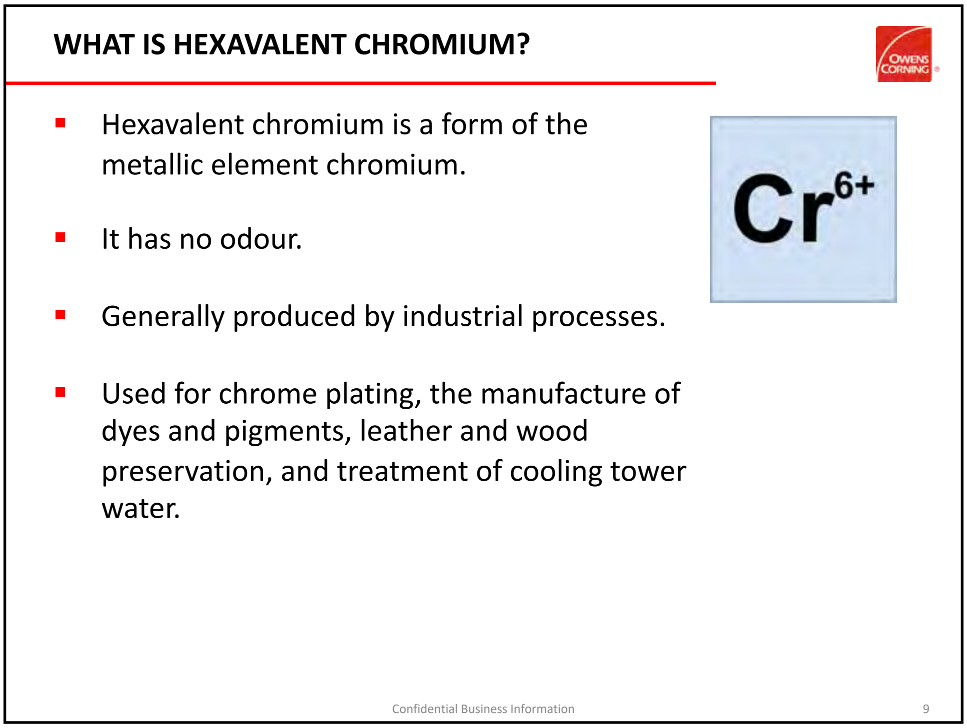
Benefits Are Many

- Reduces liquid oxygen consumption
- Fewer trucks on the road.
- Less fuel used for transportation.
- Reduced noise in the community.
- Lower operating cost.

FIBERGLASS PRODUCTION PROCESS

- Owens Corning does not use or manufacture hexavalent chromium.
- Low levels of hexavalent chromium are created as a by product of the manufacturing process.

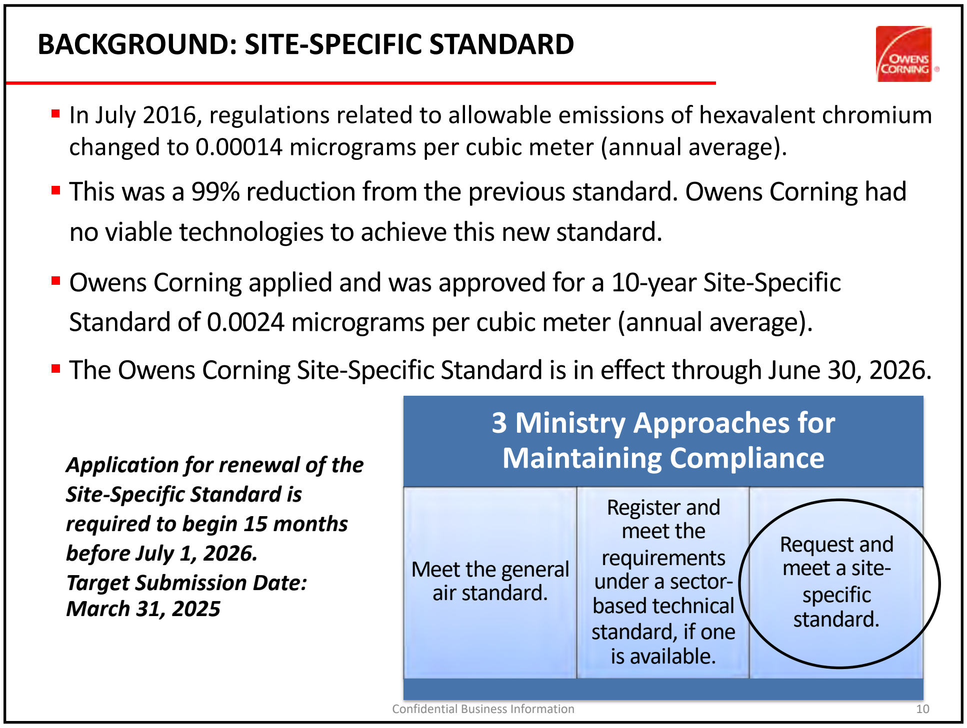




WHAT IS HEXAVALENT CHROMIUM?

- Hexavalent chromium is a form of the metallic element chromium.
- It has no odour.
- Generally produced by industrial processes.
- Used for chrome plating, the manufacture of dyes and pigments, leather and wood preservation, and treatment of cooling tower water.

Cr^{6+}



BACKGROUND: SITE-SPECIFIC STANDARD

- In July 2016, regulations related to allowable emissions of hexavalent chromium changed to 0.00014 micrograms per cubic meter (annual average).
- This was a 99% reduction from the previous standard. Owens Corning had no viable technologies to achieve this new standard.
- Owens Corning applied and was approved for a 10-year Site-Specific Standard of 0.0024 micrograms per cubic meter (annual average).
- The Owens Corning Site-Specific Standard is in effect through June 30, 2026.

Application for renewal of the Site-Specific Standard is required to begin 15 months before July 1, 2026.
Target Submission Date: March 31, 2025

3 Ministry Approaches for Maintaining Compliance

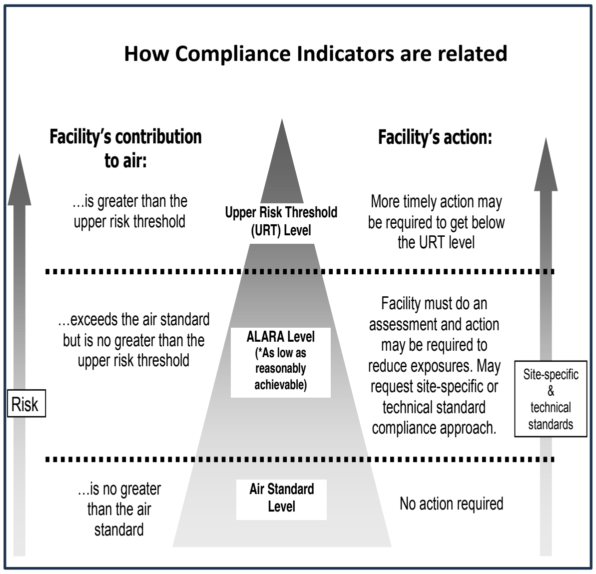
- Meet the general air standard.
- Register and meet the requirements under a sector-based technical standard, if one is available.
- [✓ Request and meet a site-specific standard.]

BASIS FOR UPDATED SITE-SPECIFIC STANDARD

The basis for Owens Corning’s updated site-specific standard is the use of a Ministry approved mathematical air dispersion model.

- 5 years of local meteorological data and site-specific emissions for hexavalent chromium.
- 2024 validated testing (winter and summer) on all sources of hexavalent chromium
    - Conventional forehearth
    - CFM forehearth
    - Furnace
    - Ventilation from furnace hall.
- Actions the facility can take to reduce air emissions as much as possible considering the viable technology.
- The model is the prediction of the highest annual concentration that may occur at any location along the property line or beyond (referred to as a Point of Impingement).

CURRENT EMISSIONS AND OFF-SITE CONCENTRATIONS



How Compliance Indicators are related

Facility’s contribution to air:

Facility’s action:

…is greater than the upper risk threshold

Upper Risk Threshold (URT) Level

More timely action may be required to get below the URT level

…exceeds the air standard but is no greater than the upper risk threshold

ALARA Level (*As low as reasonably achievable)

Facility must do an assessment and action may be required to reduce exposures. May request site-specific or technical standard compliance approach.

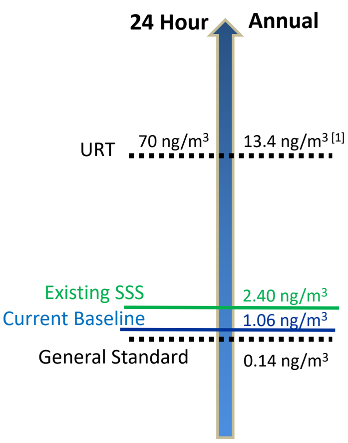
Site-specific & technical standards

Risk

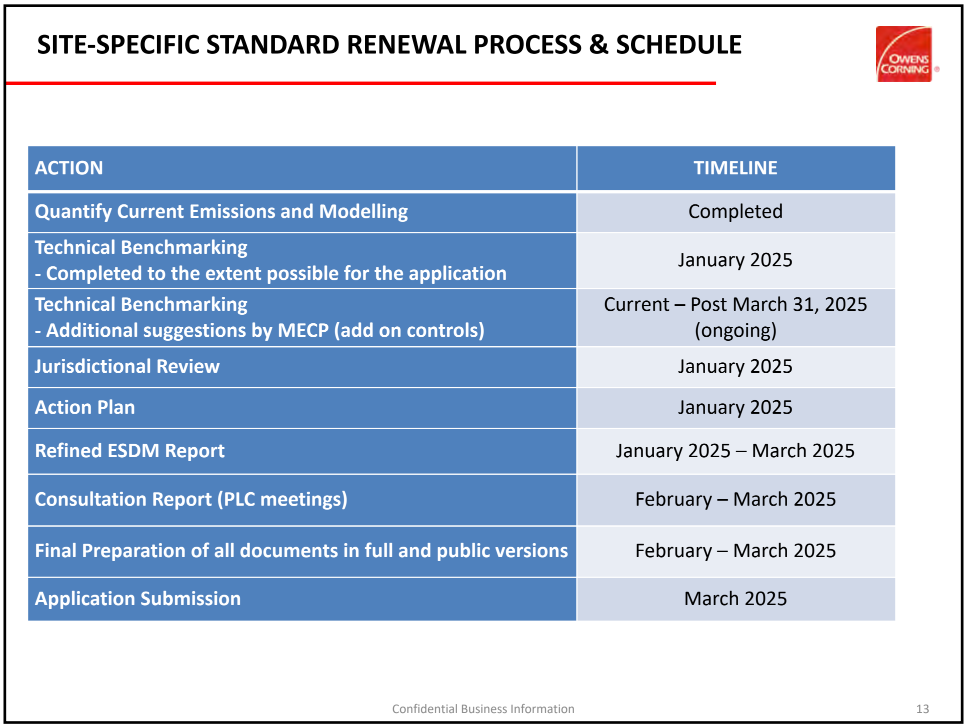
…is no greater than the air standard

Air Standard Level

No action required

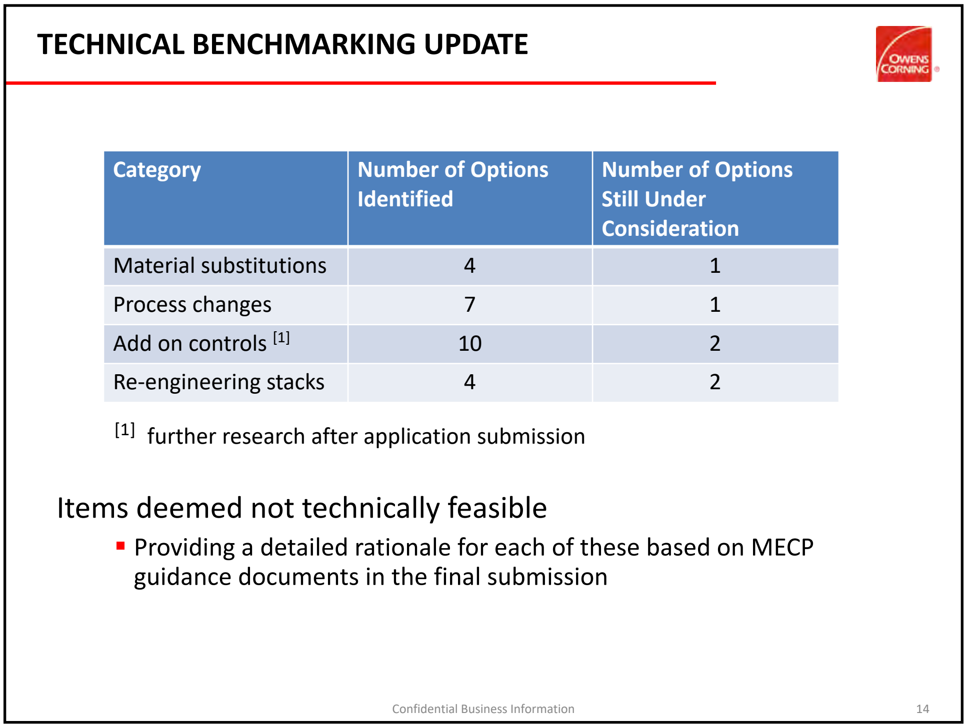


[1] Based on averaging time conversion. No regulatory threshold. Not to scale.



SITE-SPECIFIC STANDARD RENEWAL PROCESS & SCHEDULE

ACTION	TIMELINE
Quantify Current Emissions and Modelling	Completed
Technical Benchmarking - Completed to the extent possible for the application	January 2025
Technical Benchmarking - Additional suggestions by MECP (add on controls)	Current – Post March 31, 2025 (ongoing)
Jurisdictional Review	January 2025
Action Plan	January 2025
Refined ESDM Report	January 2025 – March 2025
Consultation Report (PLC meetings)	February – March 2025
Final Preparation of all documents in full and public versions	February – March 2025
Application Submission	March 2025



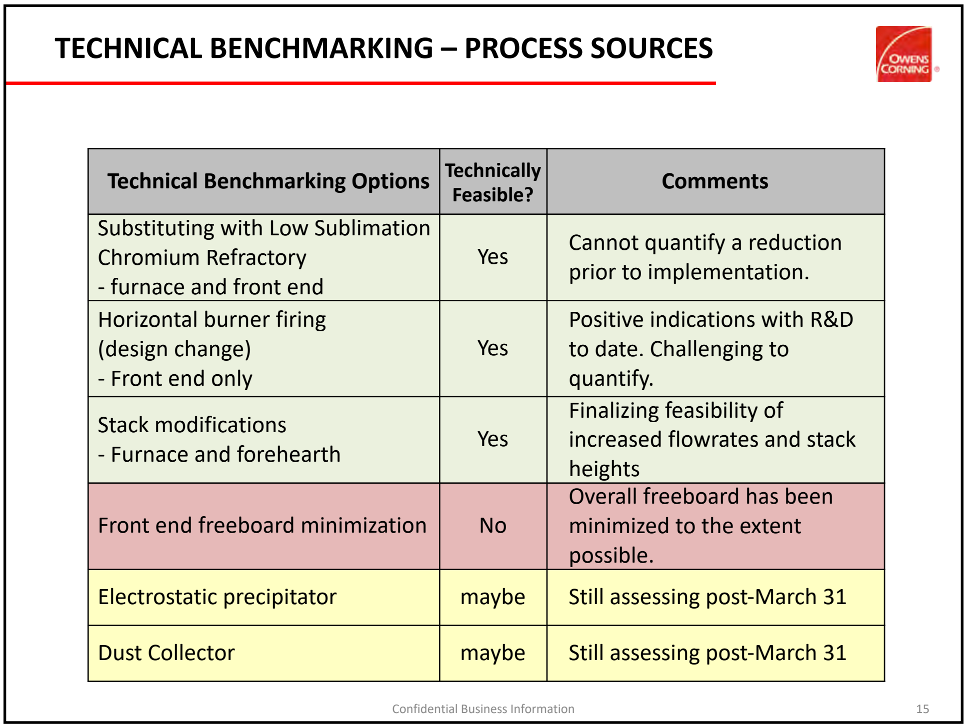
TECHNICAL BENCHMARKING UPDATE

Category	Number of Options Identified	Number of Options Still Under Consideration
Material substitutions	4	1
Process changes	7	1
Add on controls [1]	10	2
Re-engineering stacks	4	2

[1] further research after application submission

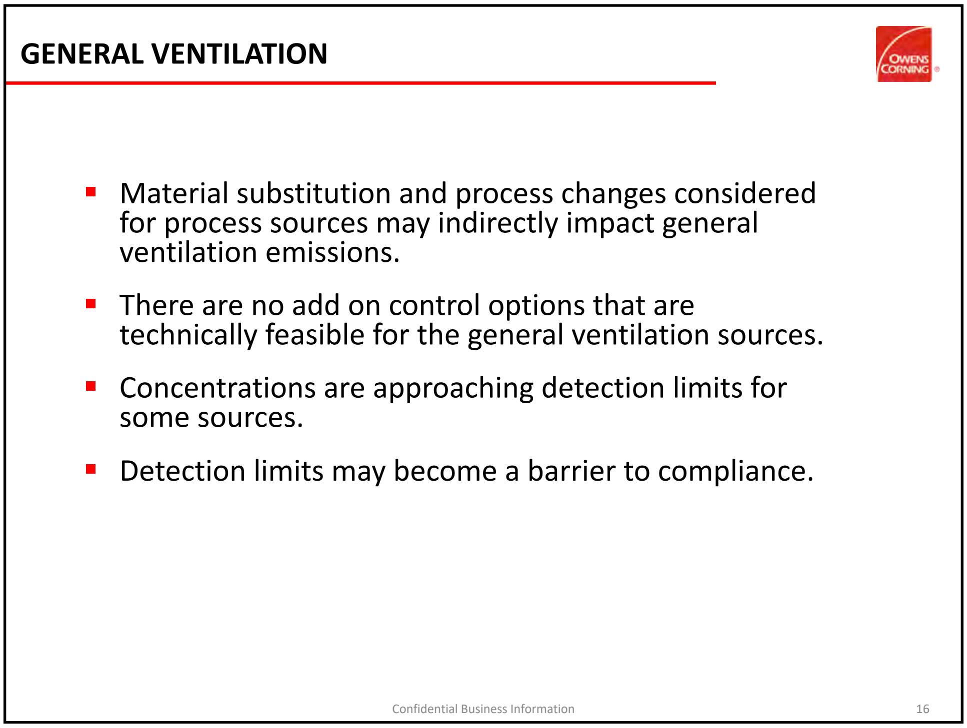
Items deemed not technically feasible

- Providing a detailed rationale for each of these based on MECP guidance documents in the final submission



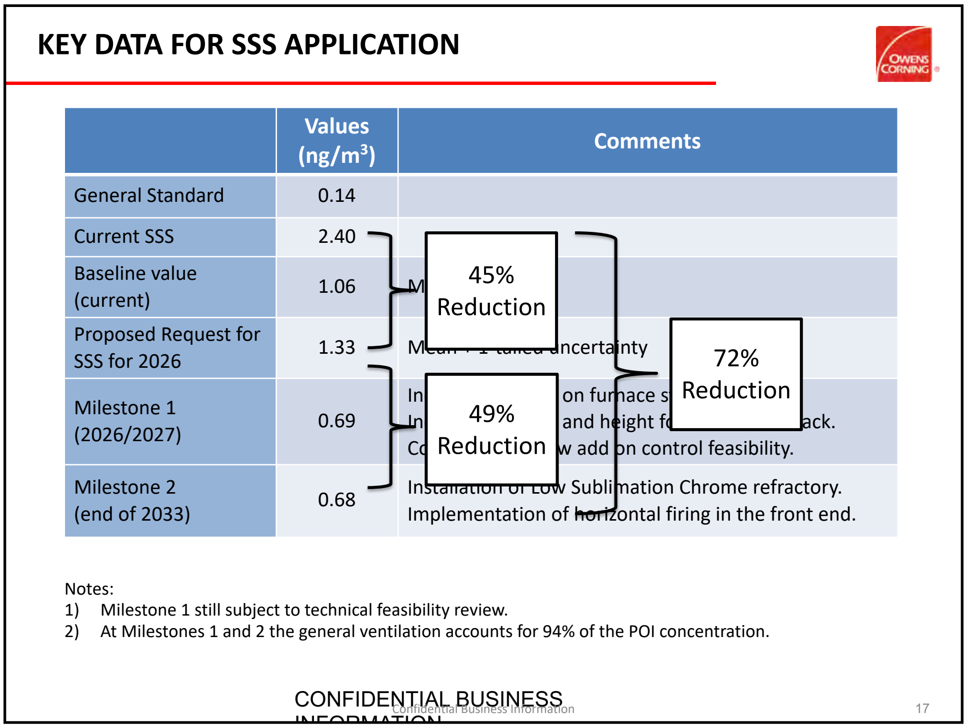
TECHNICAL BENCHMARKING – PROCESS SOURCES

Technical Benchmarking Options	Technically Feasible?	Comments
Substituting with Low Sublimation Chromium Refractory - furnace and front end	Yes	Cannot quantify a reduction prior to implementation.
Horizontal burner firing (design change) - Front end only	Yes	Positive indications with R&D to date. Challenging to quantify.
Stack modifications - Furnace and forehearth	Yes	Finalizing feasibility of increased flowrates and stack heights
Front end freeboard minimization	No	Overall freeboard has been minimized to the extent possible.
Electrostatic precipitator	maybe	Still assessing post-March 31
Dust Collector	maybe	Still assessing post-March 31



GENERAL VENTILATION

- Material substitution and process changes considered for process sources may indirectly impact general ventilation emissions.
- There are no add on control options that are technically feasible for the general ventilation sources.
- Concentrations are approaching detection limits for some sources.
- Detection limits may become a barrier to compliance.



KEY DATA FOR SSS APPLICATION

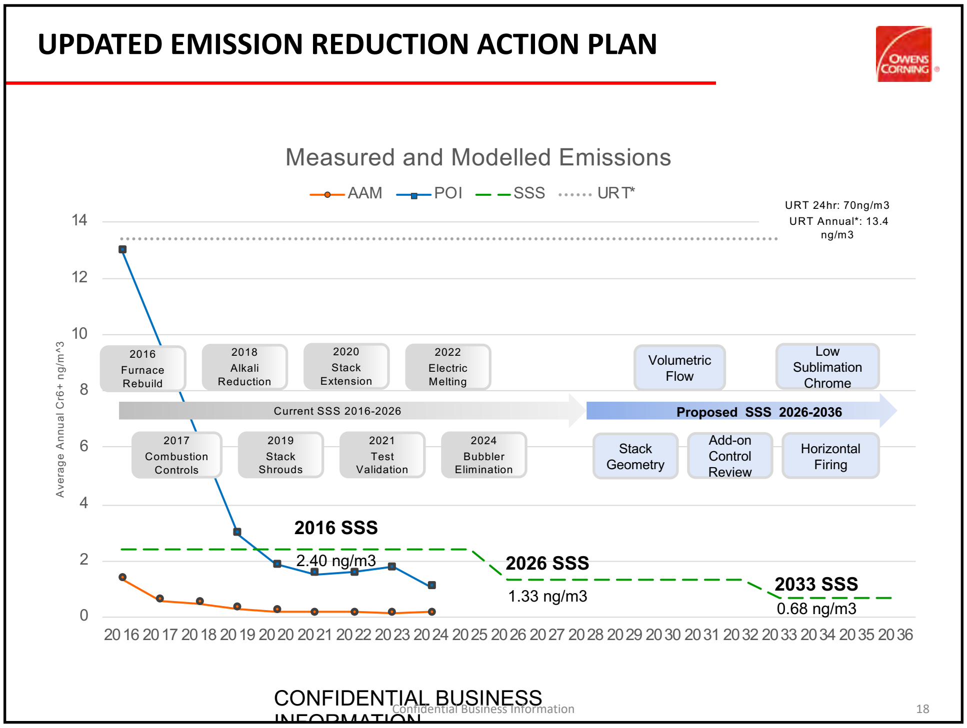
	Values (ng/m³)	Comments
General Standard	0.14	
Current SSS	2.40	
Baseline value (current)	1.06	M
Proposed Request for SSS for 2026	1.33	Mean + 1 tailed uncertainty
Milestone 1 (2026/2027)	0.69	In on furnace s In and height f ack. C w add on control feasibility.
Milestone 2 (end of 2033)	0.68	Installation of Low Sublimation Chrome refractory. Implementation of horizontal firing in the front end.

45% Reduction

49% Reduction

72% Reduction

Notes:
1) Milestone 1 still subject to technical feasibility review.
2) At Milestones 1 and 2 the general ventilation accounts for 94% of the POI concentration.



UPDATED EMISSION REDUCTION ACTION PLAN

JURISDICTIONAL REVIEW – SCOPE AND OBJECTIVE

- Review available pollution control options in other jurisdictions and evaluate whether they could apply for the facility
- Review requirements in other jurisdictions that are relevant to the facility for the contaminant of interest
- Review and summarize the facility's emissions to other similar facilities and associated requirements
- Consulting with the Ministry during our monthly updates and receiving valuable feedback and direction for this process

JURISDICTIONAL REVIEW UPDATE

- Reviewed 13 US permits for glass composites manufacturing
- Two-thirds (2/3 rds) of those facilities do not have control devices on the furnace
- Guelph emission levels are less than or equal to emission levels from US regulatory agencies and permits
- National Emission Standards for Hazardous Air Pollutants (NESHAP)
    - Raw materials
    - Furnace design/schedule (fiberglass industry)

MECP 2025 REPORTING REQUIREMENTS

- Written Summary for Site Specific Action Plan
  Due: March 31, 2025
- Site Specific Standard Renewal Application
  Due: March 31, 2025
- National Pollutant Release Inventory
  Due: June 1, 2025
- Emission Summary and Dispersion Modelling Report Update
  Due: June 30, 2025
- Acoustic Assessment Report
  Due: June 30, 2025
- ECA Annual Written Summary
  Due: August 31, 2025

Next PLC Meeting:
March 25, 2025

THANK YOU

OWENS CORNING GUELPH PLC MEETING

MARCH 25, 2025

AGENDA – MARCH 25, 2025 PLC MEETING

Old Business - *Facilitator Kelly Henry*
- Finalize Summary of 1/21/25 Meeting

Plant Update
- Community
- Health & Safety
- Operations

Regulatory Reporting
- Site-Specific Standard Renewal Application

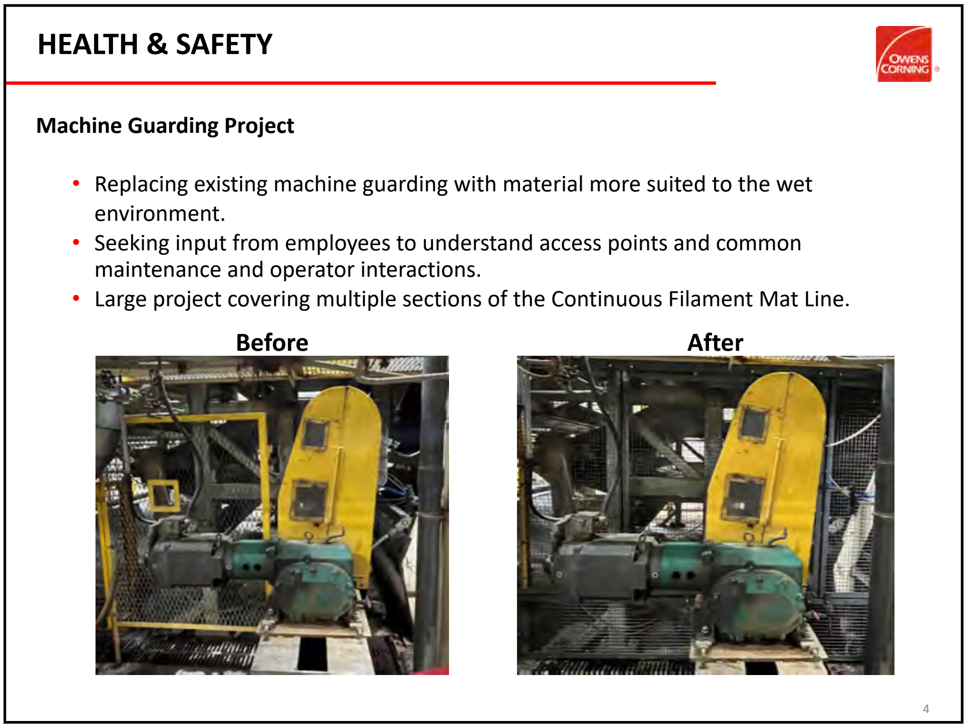
Community Hot Topics
- What are people in your community asking about the plant?
- What community issues are relevant to operations and the PLC?
- Other community issues of interest not directly related to operations.

Next PLC Meeting
- Discuss new items to be discussed at next PLC meeting.
- Next meeting: July 15, 2025.

Meeting Evaluation and Adjourn

COMMUNITY UPDATE

- Plan to support the upcoming Sacred Heart Carnival on Thursday June 19th, 2025.
- In communication with Principal Stefanie Nadalin and the Sacred Heart parent council on sponsorship needs for the upcoming event.
- Provided rental equipment of bouncy castle, bungee run and more from Kiddies Fun Trak in 2024.

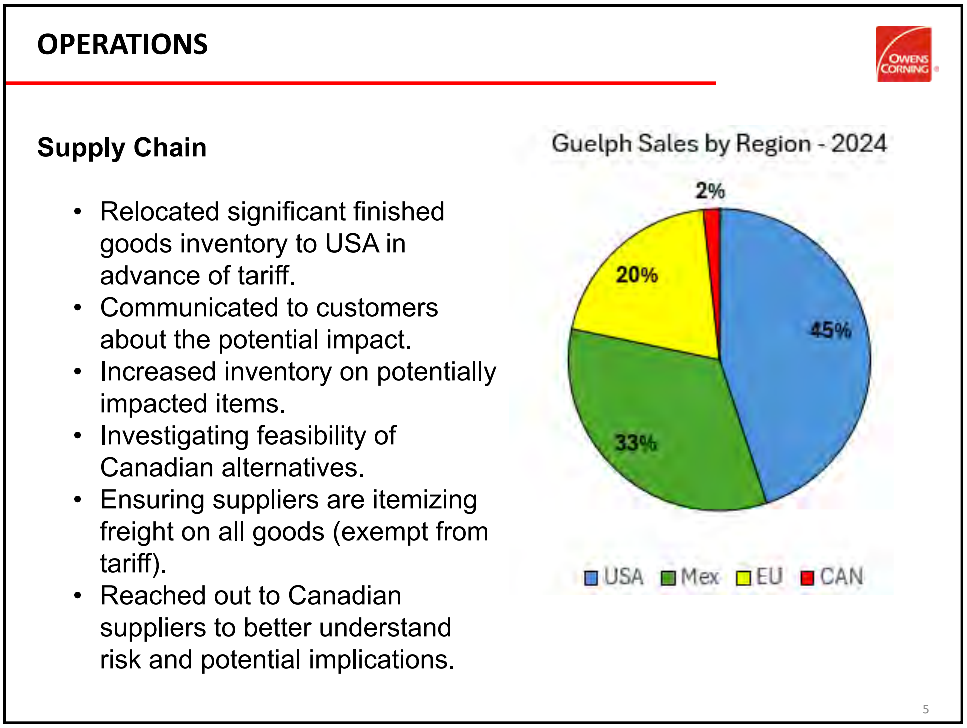


HEALTH & SAFETY

Machine Guarding Project

- Replacing existing machine guarding with material more suited to the wet environment.
- Seeking input from employees to understand access points and common maintenance and operator interactions.
- Large project covering multiple sections of the Continuous Filament Mat Line.

Before **After**

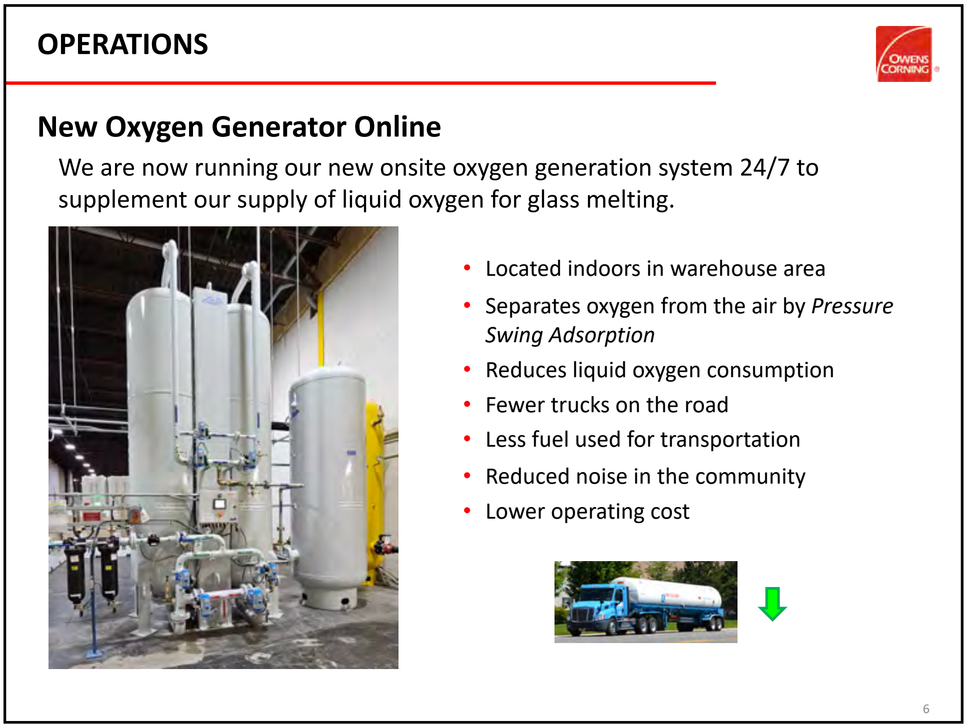


OPERATIONS

Supply Chain

- Relocated significant finished goods inventory to USA in advance of tariff.
- Communicated to customers about the potential impact.
- Increased inventory on potentially impacted items.
- Investigating feasibility of Canadian alternatives.
- Ensuring suppliers are itemizing freight on all goods (exempt from tariff).
- Reached out to Canadian suppliers to better understand risk and potential implications.

Guelph Sales by Region - 2024



OPERATIONS

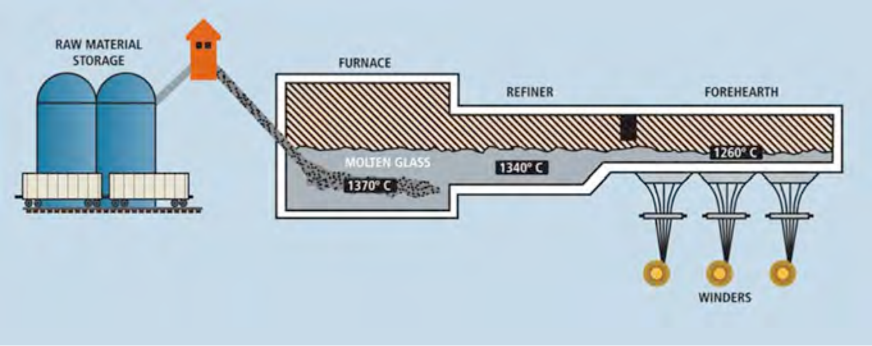
New Oxygen Generator Online

We are now running our new onsite oxygen generation system 24/7 to supplement our supply of liquid oxygen for glass melting.

- Located indoors in warehouse area
- Separates oxygen from the air by *Pressure Swing Adsorption*
- Reduces liquid oxygen consumption
- Fewer trucks on the road
- Less fuel used for transportation
- Reduced noise in the community
- Lower operating cost

FIBERGLASS PRODUCTION PROCESS

- Owens Corning does not use or manufacture hexavalent chromium.
- Low levels of hexavalent chromium are created as a by product of the manufacturing process.



WHAT IS HEXAVALENT CHROMIUM?

- Hexavalent chromium is a form of the metallic element chromium.
- It has no odour.
- Generally produced by industrial processes.
- Used for chrome plating, the manufacture of dyes and pigments, leather and wood preservation, and treatment of cooling tower water.

Cr^{6+}

BACKGROUND: SITE-SPECIFIC STANDARD

- In July 2016, regulations related to allowable emissions of hexavalent chromium changed to 0.00014 micrograms per cubic meter (annual average).
- This was a 99% reduction from the previous standard. Owens Corning had no viable technologies to achieve this new standard.
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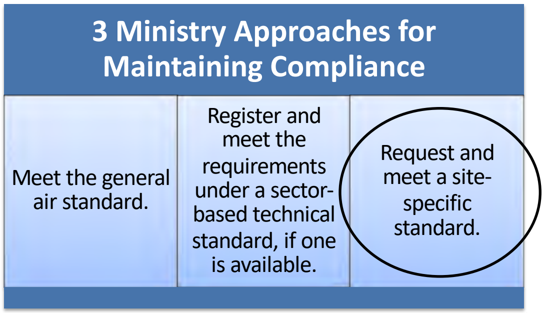
- The Owens Corning Site-Specific Standard is in effect through June 30, 2026.

Application for renewal of the Site-Specific Standard is required to begin 15 months before July 1, 2026.
Target Submission Date: March 31, 2025



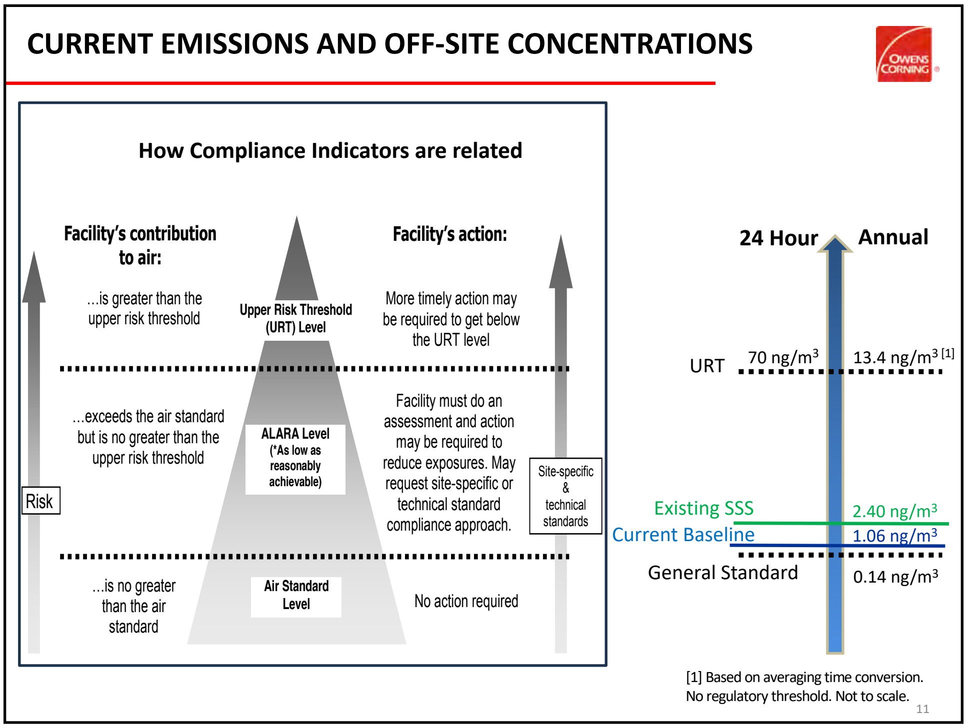
3 Ministry Approaches for Maintaining Compliance

Meet the general air standard.	Register and meet the requirements under a sector-based technical standard, if one is available.	Request and meet a site-specific standard.

BASIS FOR UPDATED SITE-SPECIFIC STANDARD

The basis for Owens Corning's updated site-specific standard is the use of a Ministry approved mathematical air dispersion model.

- 5 years of local meteorological data and site-specific emissions for hexavalent chromium.
- 2024 validated testing (winter and summer) on all sources of hexavalent chromium
  - Conventional forehearth
  - CFM forehearth
  - Furnace
  - Ventilation from furnace hall.
- Actions the facility can take to reduce air emissions as much as possible considering the viable technology.
- The model is the prediction of the highest annual concentration that may occur at any location along the property line or beyond (referred to as a Point of Impingement).



CURRENT EMISSIONS AND OFF-SITE CONCENTRATIONS

How Compliance Indicators are related

Facility's contribution to air:

...is greater than the upper risk threshold

...exceeds the air standard but is no greater than the upper risk threshold

...is no greater than the air standard

Upper Risk Threshold (URT) Level

ALARA Level (*As low as reasonably achievable)

Air Standard Level

Facility's action:

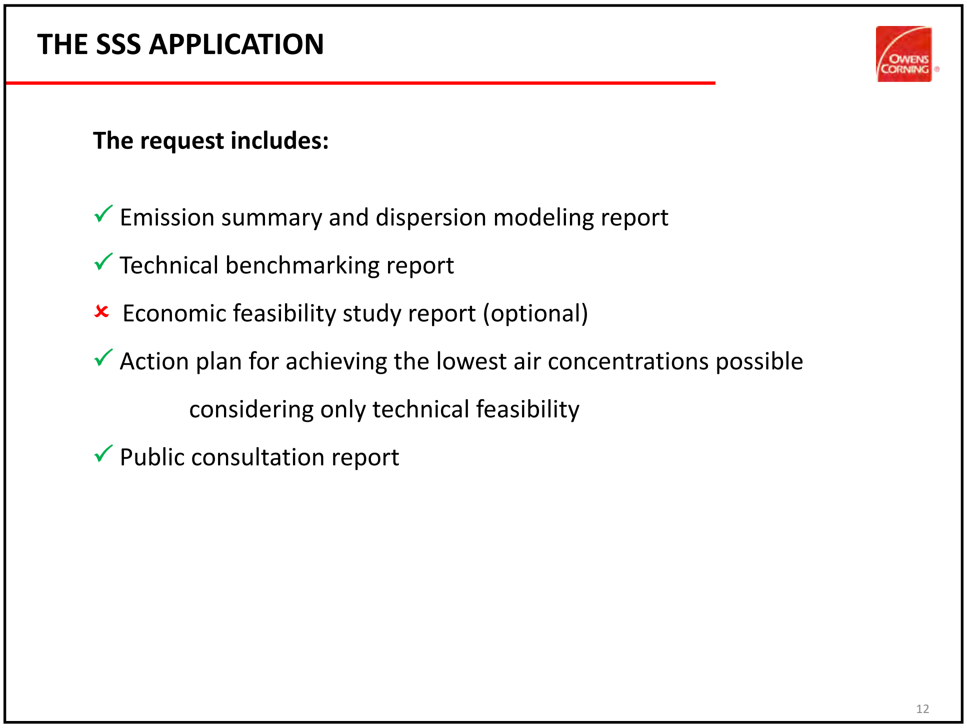
More timely action may be required to get below the URT level

Facility must do an assessment and action may be required to reduce exposures. May request site-specific or technical standard compliance approach.

No action required

	24 Hour	Annual
URT	70 ng/m³	13.4 ng/m³ [1]
Existing SSS		2.40 ng/m³
Current Baseline		1.06 ng/m³
General Standard		0.14 ng/m³

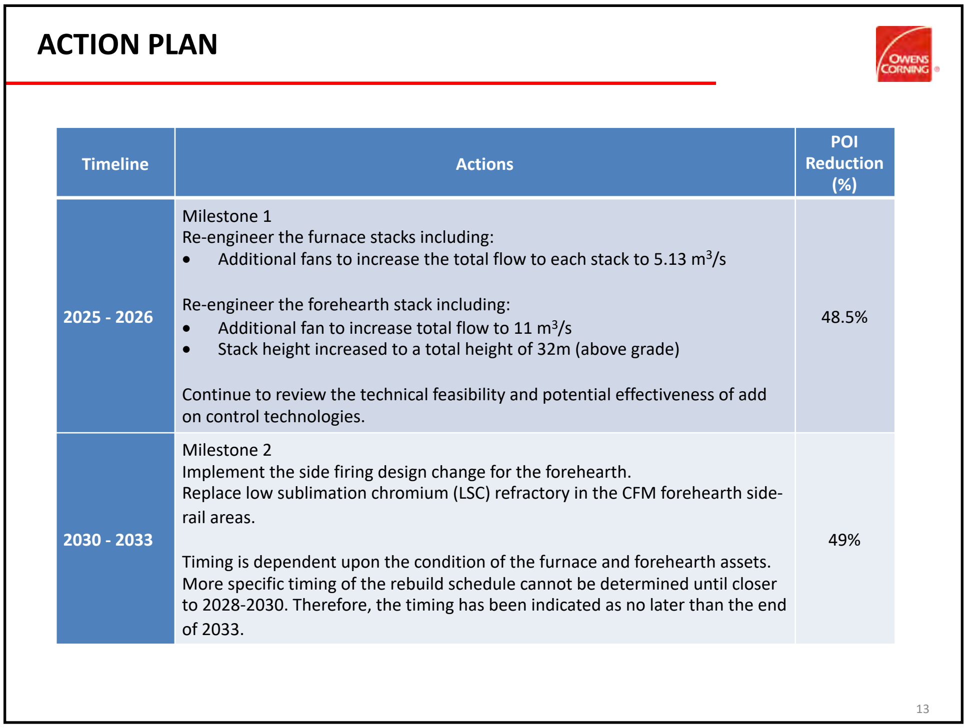
[1] Based on averaging time conversion. No regulatory threshold. Not to scale.



THE SSS APPLICATION

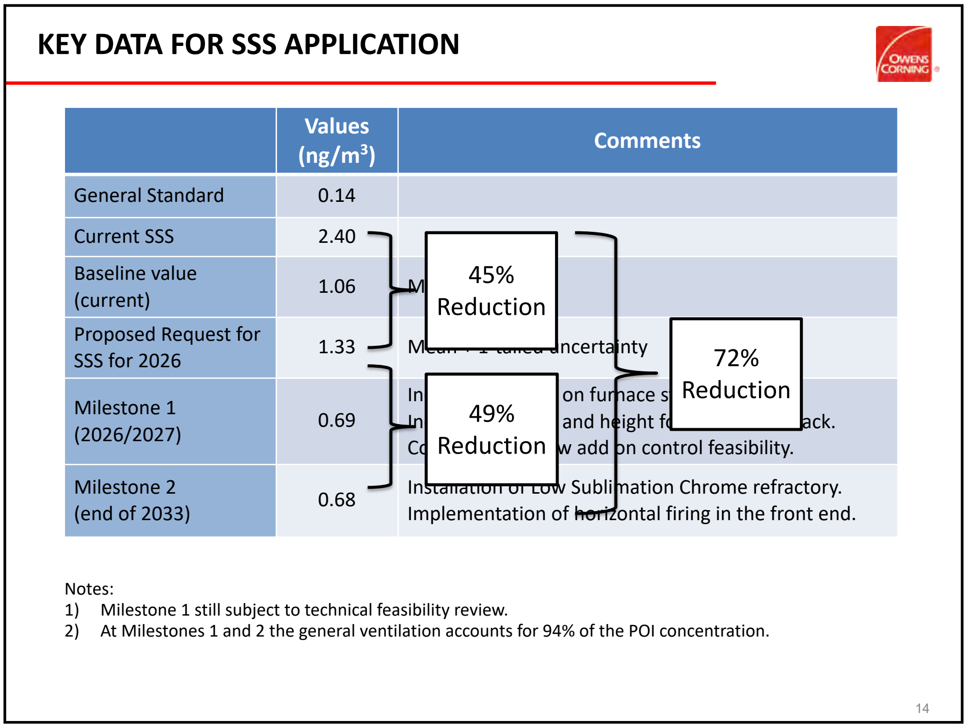
The request includes:

- ✓ Emission summary and dispersion modeling report
- ✓ Technical benchmarking report
- ✗ Economic feasibility study report (optional)
- ✓ Action plan for achieving the lowest air concentrations possible considering only technical feasibility
- ✓ Public consultation report



ACTION PLAN

Timeline	Actions	POI Reduction (%)
2025 - 2026	Milestone 1 Re-engineer the furnace stacks including: • Additional fans to increase the total flow to each stack to 5.13 m^3/s Re-engineer the forehearth stack including: • Additional fan to increase total flow to 11 m^3/s • Stack height increased to a total height of 32m (above grade) Continue to review the technical feasibility and potential effectiveness of add on control technologies.	48.5%
2030 - 2033	Milestone 2 Implement the side firing design change for the forehearth. Replace low sublimation chromium (LSC) refractory in the CFM forehearth side-rail areas. Timing is dependent upon the condition of the furnace and forehearth assets. More specific timing of the rebuild schedule cannot be determined until closer to 2028-2030. Therefore, the timing has been indicated as no later than the end of 2033.	49%



KEY DATA FOR SSS APPLICATION

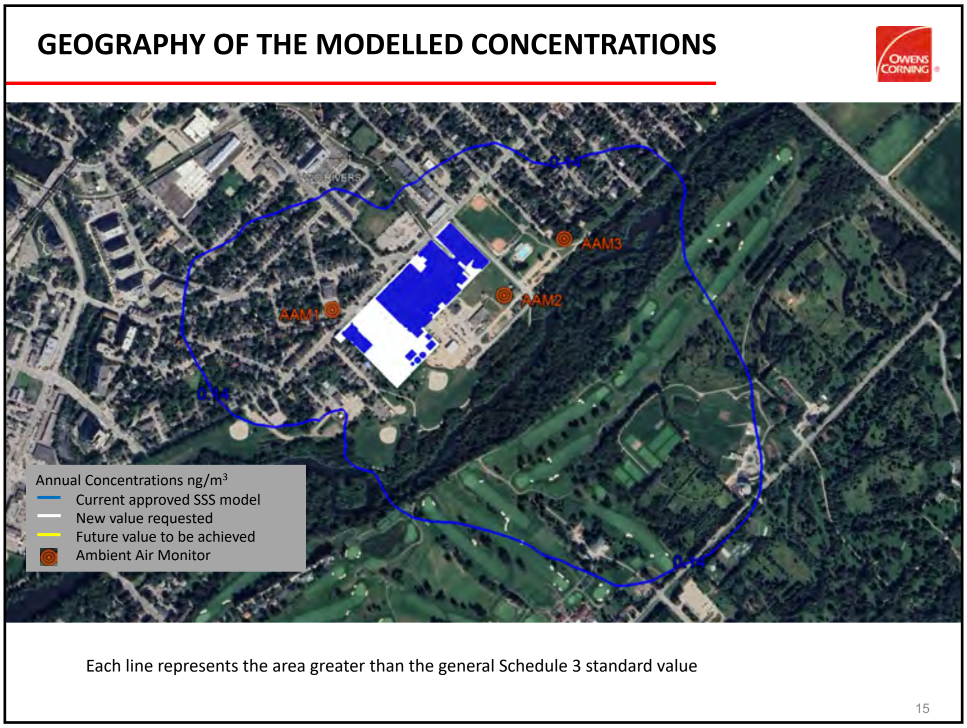
	Values (ng/m^3)	Comments
General Standard	0.14	
Current SSS	2.40	
Baseline value (current)	1.06	M
Proposed Request for SSS for 2026	1.33	Mean + 1 tailed uncertainty
Milestone 1 (2026/2027)	0.69	In on furnace s In and height fo ack. Co w add on control feasibility.
Milestone 2 (end of 2033)	0.68	Installation of Low Sublimation Chrome refractory. Implementation of horizontal firing in the front end.

45% Reduction

49% Reduction

72% Reduction

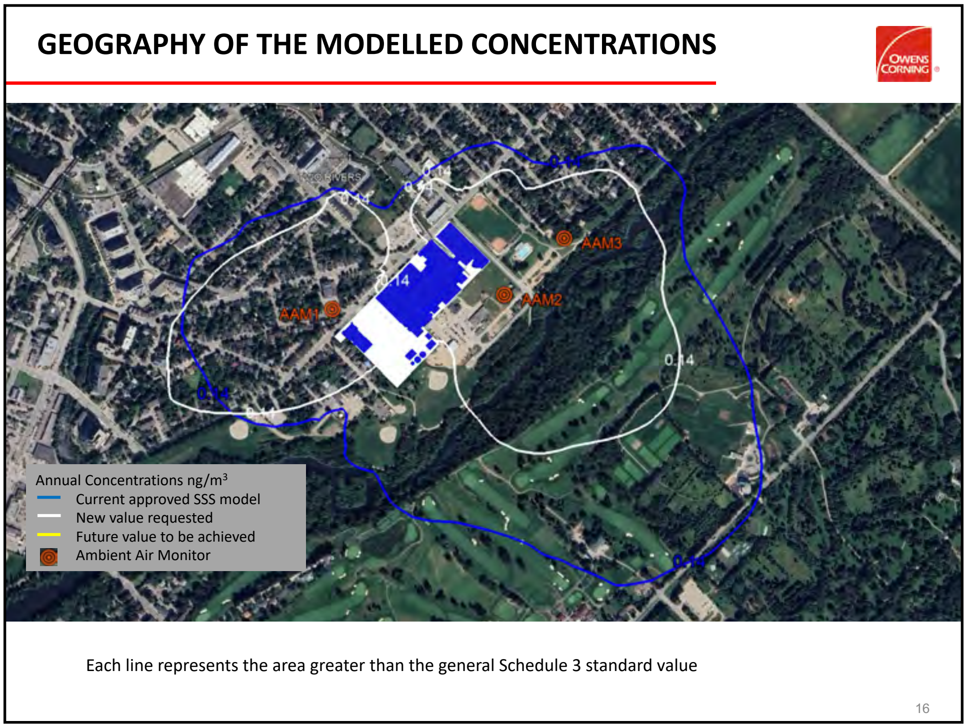
Notes:
1) Milestone 1 still subject to technical feasibility review.
2) At Milestones 1 and 2 the general ventilation accounts for 94% of the POI concentration.



GEOGRAPHY OF THE MODELLED CONCENTRATIONS

Each line represents the area greater than the general Schedule 3 standard value

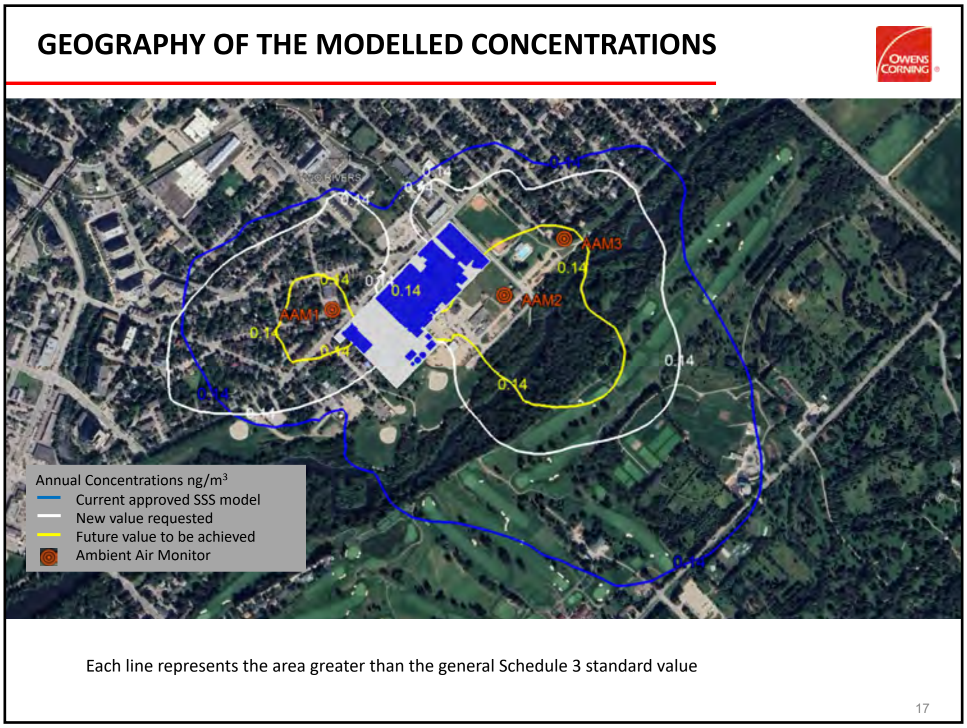
15



GEOGRAPHY OF THE MODELLED CONCENTRATIONS

Each line represents the area greater than the general Schedule 3 standard value

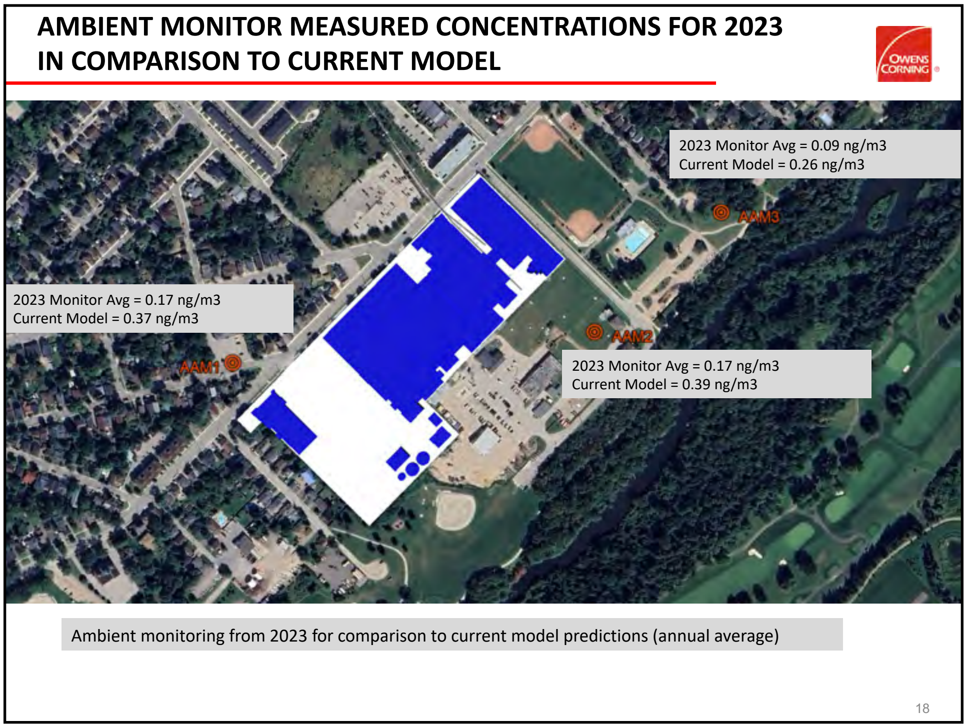
16



GEOGRAPHY OF THE MODELLED CONCENTRATIONS

Each line represents the area greater than the general Schedule 3 standard value

17



AMBIENT MONITOR MEASURED CONCENTRATIONS FOR 2023 IN COMPARISON TO CURRENT MODEL

2023 Monitor Avg = 0.09 ng/m3
Current Model = 0.26 ng/m3

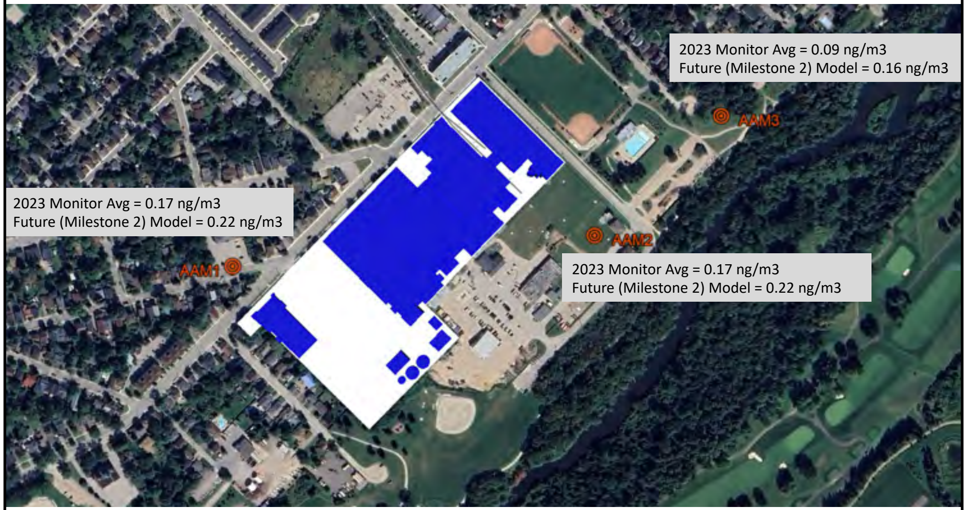
2023 Monitor Avg = 0.17 ng/m3
Current Model = 0.37 ng/m3

2023 Monitor Avg = 0.17 ng/m3
Current Model = 0.39 ng/m3

Ambient monitoring from 2023 for comparison to current model predictions (annual average)

18

AMBIENT MONITOR MEASURED CONCENTRATIONS FOR 2023 IN COMPARISON TO FUTURE MODEL



2023 Monitor Avg = 0.09 ng/m3
Future (Milestone 2) Model = 0.16 ng/m3

2023 Monitor Avg = 0.17 ng/m3
Future (Milestone 2) Model = 0.22 ng/m3

2023 Monitor Avg = 0.17 ng/m3
Future (Milestone 2) Model = 0.22 ng/m3

Ambient monitoring from 2023 for comparison to current model predictions (annual average)

AMBIENT AIR MONITORING – ANNUAL AVERAGES

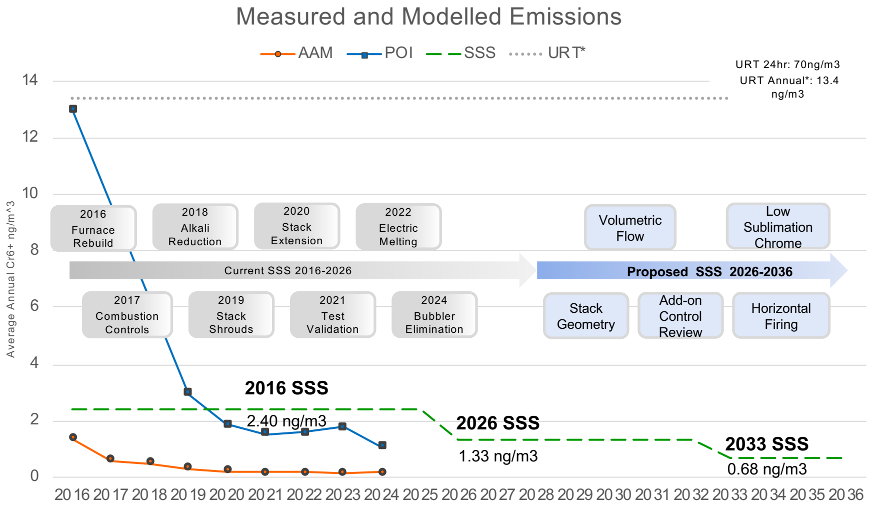
2017-2023 Annual Average Hexavalent Chromium Concentrations

Annual Average Measured Concentrations (ng/m³)

Monitoring Location	2017	2018	2019	2020	2021	2022	2023
Location 1 - School	0.55	0.32	0.23	0.21	0.11	0.17	0.17
Location 2 - Waterworks	0.87	1.00	0.51	0.33	0.40	0.23	0.17
Location 3 - Park	0.42	0.29	0.16	0.12	0.13	0.08	0.09

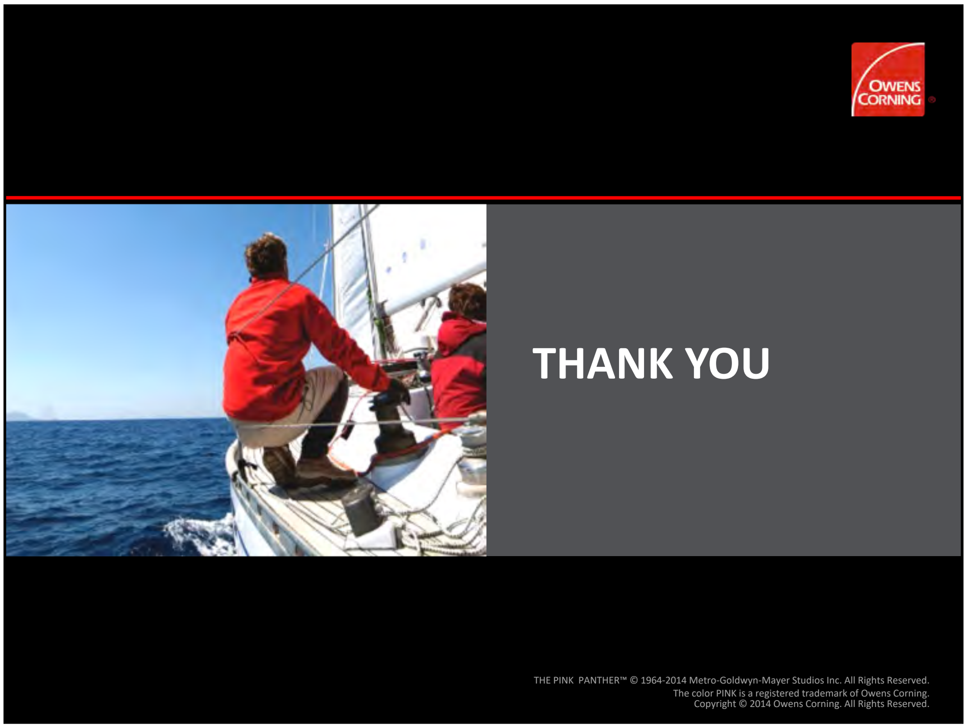
Site Specific Standard is 2.4 nanograms per cubic meter
Final sampling event for City Waterworks was July 12, 2023

UPDATED EMISSION REDUCTION ACTION PLAN



MECP 2025 REPORTING REQUIREMENTS

- Written Summary for Site Specific Action Plan
  Due: March 31, 2025
- Site Specific Standard Renewal Application
  Due: March 31, 2025
- National Pollutant Release Inventory
  Due: June 1, 2025
- Emission Summary and Dispersion Modelling Report Update
  Due: June 30, 2025
- Acoustic Assessment Report
  Due: June 30, 2025
- ECA Annual Written Summary
  Due: August 31, 2025



THANK YOU

Appendix C - 2024-25 PLC Summaries

Owens Corning Composite Materials Canada LP
Guelph Plant
Public Liaison Committee (PLC)
DRAFT Meeting Summary
April 23, 2024
5:30 p.m. – 6:25 p.m.

PLC Members in Attendance:
Caroline Forsyth, Guelph Water Works
Beverley Hale, Associate VP Research (Agri–Food Partnership), University of Guelph
Melanie Lamb, Two Rivers Neighbourhood Group
Lorraine Pagnan, Community Member

Absent:
Paul Allen, Guelph Water Works
Steve Gazzola, President, Italian Canadian Club
John Kinkead, Community Member
Mark Mayo, Manager of Operations, Guelph Chamber of Commerce
Peter Smith, Community Member

Representatives from Owens Corning Guelph:
Brett Arnold, Quality Leader
Kate Stanley, Community Liaison Representative
Jeff Taylor, Plant Manager

Other Attendees:
Rachel Jones, Montrose Environmental Group

Facilitator
Kelly Henry

Meeting Handouts:
- Draft PLC Meeting Summary – Jan. 23, 2024

Welcome and Introductions
Kelly Henry greeted the committee members and reviewed the mission of the PLC.

She shared news about several PLC representatives. Long-standing member Bo Cheyne, who worked for Wellington Dufferin Guelph Public Health, is moving on to a new career opportunity and will no longer be on the PLC. Also, Sacred Heart Principal Victoria Sheehan is leaving her post and has notified the company that Stephanie Nadalin, the new acting principal at the school, will fill her position. On behalf of Owens Corning, Kelly thanked them both for their service and wished them well in their next adventures.

In other news, congratulations were extended to Patrick Drabicki, Environment, Health and Safety Leader at the plant. Patrick and his wife welcomed their son, Ethan Lee Drabicki, to the world on April 16.

Old Business
- The group finalized the summary of the Jan. 23, 2024, PLC Meeting. The summary will be posted to the website (ocguelph.com).

Plant Update

- Jeff Taylor gave an update on:
    - Community
        - Owens Corning Guelph is a proud partner with Volunteer Canada to support Food 4 Kids Guelph. The company donated $7,500 to cover the weekly cost of providing weekend food bags, known as Portable Packs, to 500 students. Team members from all shifts helped pack 486 bags, which were then sent to area schools for distribution. Hunger is a major concern for the children of families in need.
        - The company is raising awareness for colorectal cancer, the second leading cause of cancer-related death in Canada, by sponsoring the “Dress in Blue” campaign. Owens Corning is providing a $2,500 donation on behalf of an employee who had the disease and whose husband passed away from the disease.
    - Health and Safety
        - No reportable incidents or injuries have occurred since the last PLC meeting.
        - A capital project to improve machine guarding in the plant is 70 percent complete.
    - Operations
        - The company is continuing to invest in its facilities. A renovation of the operations office and fitness centre is expected to be completed over the next three to four years.
    - Business Update
        - On Feb. 9, Owens Corning made two significant announcements:
            - Acquisition of Masonite International Corporation
            - Review of strategic alternatives for its glass reinforcements business (GR), of which the Guelph plant is a part.
        - These choices are consistent with Owens Corning’s strategy to focus on building and construction materials.
- Brett Arnold and Jeff Taylor discussed:
    - Written Summary for Site Specific Action Plan
        - Submitted on March 27 to the Ministry of Environment, Conservation and Parks (MECP), the plan lists the accomplishments that Owens Corning Guelph has achieved since 2016.
        - The facility is conducting source testing to:
            - Demonstrate ongoing compliance with the current site-specific standard (SSS)
            - Support the development of emission rates for the renewal of the SSS, as a condition of wrapping up the ambient monitoring program.
        - The SSS for hexavalent chromium expires on June 30, 2026; the renewal application is intended to be submitted between December 2024 and March 2025, in accordance with the Ministry’s requirements.
    - The first round of source testing took place from Feb. 13-15, with results showing a significant reduction in emissions.

    - The plant met with representatives from the MECP in March to initiate the SSS renewal application process. Meetings will be held monthly. The team will continue to communicate with MECP regarding any public concerns.

Ambient Air Monitoring – Conclusion of the Program

- By way of background, Jeff Taylor reported:
    - In July 2023, the company asked the MECP for relief from the Environmental Compliance Approval (ECA) condition requiring the site to conduct an Ambient Air Monitoring program.
    - The MECP gave conditional approval on Feb. 23, 2024 for the Air Monitoring program to end, provided that the plant conducts two rounds of stack testing.
    - As stated earlier, the first stack testing occurred on Feb. 13-15, 2024. A second round of stack testing is set for mid-June 2024.
    - The Lyons Park and Tytler School monitors were removed in February 2024. The Waterworks unit was removed in July 2023 at the request of the city.

Rachel Jones presented:

- The draft Ambient Air Monitoring Report for the first quarter, 2024.
- An overview of the annual Ambient Air Monitoring results. The results reflected a decrease in measured hexavalent chromium levels that are well below the site-specific standard.

Regulatory Reporting

- Jeff Taylor reviewed:
    - The regulatory reporting schedule for 2024:
        - Quarterly Ambient Air Monitoring Report (Submitted: February 14)
        - Written Summary for Site Specific Action Plan (Submitted: March 27)
        - Annual Ambient Air Monitoring Report (Due: May 15 – final annual report)
        - National Pollutant Release Inventory (Due: June 1)
        - Emission Summary and Dispersion Modelling Update (Due: June 30)
        - Acoustic Assessment Report (Due: June 30)
        - ECA Annual Written Summary (Due: Aug. 31)

Community Hot Topics

- Beverley Hale said the University of Guelph continues to roll along, even in the face of fiscal challenges. She said she is excited to see the great conclusion to the Air Monitoring program.
- Lorraine Pagnan shared information about upcoming community events, such as the Ukrainian Church bazaar. She talked about the ongoing construction taking place on York Road.
- Caroline Forsyth updated the group on the construction happening at the Guelph Waterworks facility.
- Melanie Lamb said the Two Rivers group is doing well. New people have been hired, one to do programming and the other to work on the community gardens. Summertime brings lots of activities, such as summer camp and the Sacred Heart Carnaval.

Action Items:

The company will:

- Seek and implement opportunities for driving additional reductions.
- Continue to report stack testing results to the Ministry and PLC.

- Post the July 16, 2024, PLC agenda to the website a month prior to the next meeting.
- Commit to continue the PLC.

Next Meeting: Tuesday, July 16, 2024

- Provide an update on regulatory reporting for 2024.
- Share information on the company's operations.

Owens Corning Composite Materials Canada LP
Guelph Plant
Public Liaison Committee (PLC)
DRAFT Meeting Summary
July 16, 2024
5:30 p.m. – 6:50 p.m.

PLC Members in Attendance:
Caroline Forsyth, Guelph Water Works
John Kinkead, Community Member
Lorraine Pagnan, Community Member

Absent:
Melanie Lamb, Two Rivers Neighbourhood Group
Mark Mayo, Manager of Operations, Guelph Chamber of Commerce
Peter Smith, Community Member

Representatives from Owens Corning Guelph:
Brett Arnold, Quality Leader
Patrick Drabicki, Environment, Health and Safety Leader
Kate Stanley, Community Liaison Representative
Jeff Taylor, Plant Manager

Other Attendees:
Penny McInnis, Montrose Environmental Group

Facilitator
Kelly Henry

Meeting Handouts:
- Draft PLC Meeting Summary – April 23, 2024

Welcome and Introductions
Kelly Henry greeted the committee members and reviewed the mission of the PLC.

She shared news about the retirement of Beverley Hale, Associate VP of Research at the University of Guelph and a founding member of the PLC. On behalf of Owens Corning, Kelly thanked her for her valuable service to the committee and wished her well.

Old Business
- The group finalized the summary of the April 23, 2024, PLC Meeting. The summary will be posted to the website (ocguelph.com).

Plant Update
- Jeff Taylor gave an update on:
    - Community
        - The company donated to the Sacred Heart School Carnival, held every year in June.
        - Praise the Ward, a community celebration, is set for Sept. 21. The company is contributing to the cost of printing and publicity for the event.

- Patrick Drabicki reviewed:
    - Health and Safety
        - No reportable incidents or injuries occurred since the last PLC meeting.
        - A team of employees recently completed a capital project to improve machine guarding.
        - The plant is implementing an innovative method known as “mistake proofing,” or its Japanese equivalent *poka-yoke* (pronounced PO-ka yo-KAY), which uses an automatic device or a process that either makes it impossible for an error to occur or makes the error immediately obvious once it has been committed.
- Jeff Taylor shared information regarding:
    - Operations
        - Two new employees have joined the plant team. The job openings were created by attrition.
        - The company is continuing to invest in its facilities. Renovations are underway to upgrade the facility offices and fitness centre.
        - A large area containing obsolete equipment is being cleared and will be converted into warehouse space.
- Jeff Taylor and Brett Arnold discussed:
    - Renewal of the Site-Specific Standard
        - A Site-Specific Action Plan was submitted in March to the Ministry of Environment, Conservation and Parks (MECP). The plan lists the accomplishments that Owens Corning Guelph has achieved since 2016.
        - The SSS for hexavalent chromium expires on June 30, 2026; the renewal application is required to begin 15 months prior to that date and submission of the application is planned for March 2025.
        - A renewal schedule has been developed that includes a list of action items, such as two rounds of source testing, which have already taken place, and technical benchmarking, which is ongoing and will be completed prior to the application submission.
        - The plant is meeting with representatives from the MECP on a monthly basis to initiate the SSS renewal application process. Plans are underway for a September site visit by the Ministry.
        - The team will continue to communicate with MECP regarding any public concerns.

Air Monitoring Program – Conclusion of the Program

- Patrick Drabicki reported on:
    - The final quarterly and final annual Ambient Air Monitoring Reports that were submitted to the MECP on May 15.
    - These are the last monitoring reports to be submitted to the Ministry

Regulatory Reporting

- Jeff Taylor reviewed:
    - The regulatory reporting schedule for 2024:
        - Written Summary for Site Specific Action Plan (Submitted: March 27)
        - Quarterly Ambient Air Monitoring Report (Submitted: May 15 for Q1 2024).
        - Annual Ambient Air Monitoring Report (Submitted: May 15 – Final annual Air Monitoring Report)

    - National Pollutant Release Inventory (Submitted: June 1)
    - Emission Summary and Dispersion Modelling Report Update (Completed: June 28)
    - Acoustic Assessment Report Update (No updates needed)
    - ECA Annual Written Summary (Due: Aug. 31)

Community Hot Topics

- Lorraine Pagnan said she enjoyed the Sacred Heart Carnival. She also talked about the ongoing construction taking place on York Road.
- Caroline Forsyth updated the group on the construction happening at the Guelph Water Works facility.
- John Kinkead thanked Owens Corning for sharing information on its operations.

Action Items:

The company will:

- Seek and implement opportunities for driving additional reductions.
- Continue to report stack testing results to the Ministry and PLC.
- Post the October 22, 2024 PLC agenda to the website a month prior to the next meeting.
- Commit to continue the PLC.

Next Meeting: Tuesday, October 22, 2024

- Provide an update on regulatory reporting for 2024
- Share information on the company’s operations

Owens Corning Composite Materials Canada LP
Guelph Plant
Public Liaison Committee (PLC)
DRAFT Meeting Summary
October 22, 2024
5:30 p.m. – 6:40 p.m.

PLC Members in Attendance:
Tyler Black, Environmental Health Specialist, Wellington-Dufferin-Guelph Public Health
Caroline Forsyth, Health and Safety Manager, Guelph Water Works
Calvin Hyde, Membership Sales/Engagement Specialist, Guelph Chamber of Commerce
Melanie Lamb, Program Coordinator, Two Rivers Neighbourhood Group
Marcel Schlaf, Ph.D., Department of Chemistry, University of Guelph

Absent:
John Kinkead, Community Member
Stefanie Nadalin, Principal, Sacred Heart Catholic Elementary School
Lorraine Pagnan, Community Member

Representatives from Owens Corning Guelph:
Brett Arnold, Quality Leader
Patrick Drabicki, Environment, Health and Safety Leader
Kate Stanley, Community Liaison Representative
Jeff Taylor, Plant Manager

Other Attendees:
Penny McInnis, Montrose Environmental Group

Facilitator
Kelly Henry

Meeting Handouts:
- Draft PLC Meeting Summary – July 16, 2024

Welcome and Introductions

Kelly Henry greeted the committee members and reviewed the mission of the PLC. She welcomed new members Tyler Black, Calvin Hyde, and Dr. Marcel Schlaf.

Brett Arnold gave an overview of the products manufactured at the plant and how they are used.

Old Business

- The group finalized the summary of the July 16, 2024, PLC Meeting. The summary will be posted to the website (ocguelph.com).

Proposed Meeting Schedule for 2024

- Q1: Proposed Jan. 21
- Q2: Proposed March 25
- Q3: Proposed July 15
- Q4: Proposed Oct. 21

Plant Update

- Jeff Taylor gave an update on:
    - Community
        - Owens Corning was a sponsor of Praise the Ward, a community celebration, which took place on Sept. 21. The company covered the cost of printing and publicity for the event.
- Patrick Drabicki reviewed:
    - Health and Safety
        - No reportable incidents or injuries occurred since the last PLC meeting.
        - A variety of audits have been conducted over the past few weeks.
            - A three-day ISO audit was conducted in late September during which the plant's health and safety, environmental and quality systems were reviewed. No nonconformities were identified.
            - Two internal "cross audits" were completed. Patrick Drabicki traveled to Amarillo, Texas, to review a sister plant's operations, while a team member from Jackson, Tenn., audited the Guelph facility. Each experience resulted in learnings and observations.
- Jeff Taylor shared information regarding:
    - Operations
        - A newly-renovated office for the technical team is complete and a large area within the plant has been converted into warehouse space.
        - A roofing replacement project is underway.
- Jeff Taylor, Brett Arnold and Penny McInnis discussed:
    - Site-Specific Standard (SSS) Renewal Application
        - The SSS for hexavalent chromium expires on June 30, 2026; the renewal application is required to begin 15 months prior to that date and submission of the application is planned for March 31, 2025.
        - A renewal schedule has been developed which includes a list of action items, including two rounds of source testing (performed in 2024), and technical benchmarking, which is ongoing and will be completed prior to the application submission.
        - The plant is meeting with representatives from the MECP on a monthly basis to confer on the SSS renewal application process and report progress. A tour of the site for the MECP was conducted in September 2024.
        - The team will continue to communicate with MECP regarding any public concerns.

Regulatory Reporting

- Jeff Taylor reviewed:
    - The regulatory reporting schedule for 2025:
        - Written Summary for Site Specific Action Plan (Due: March 31)
        - Site Specific Standard Renewal Application (Due: March 31)
        - National Pollutant Release Inventory (Due: June 1)
        - Emission Summary and Dispersion Modelling Report Update (Due: June 30)
        - Acoustic Assessment Report (Due: June 30)
        - ECA Annual Written Summary (Due: August 31)

Community Hot Topics

- Caroline Forsyth updated the group on the construction happening at the Guelph Water Works facility.
- Melanie Lamb talked about the Pumpkin Promenade happening on Nov. 1. Activities include an illuminated pumpkin trail, a jack-o-lantern contest, pumpkin carving demonstrations, face painting, music, food and refreshments.
- Calvin Hyde discussed upcoming Chamber of Commerce events. He mentioned that Shakiba Shayani, the president and CEO, will be leaving the organization and a search is being conducted to replace her.
- Tyler Black updated the committee on health department initiatives, including flu shot clinics and Covid vaccines.
- Marcel Schlaf gave on update of University of Guelph initiatives and the Guelph Community Boating Club, of which he is a member.

Action Items:

The company will:

- Seek and implement opportunities for driving additional reductions.
- Continue to report stack testing results to the Ministry and PLC.
- Post the Oct. 22, 2024 PLC agenda to the website a month prior to the next meeting.
- Commit to continue the PLC.

Next Meeting: Tuesday, Jan. 21, 2025

- Provide an update on regulatory reporting for 2025.
- Share information on the company's operations.

Owens Corning Composite Materials Canada LP
Guelph Plant
Public Liaison Committee (PLC)
DRAFT Meeting Summary
January 21, 2025
5:30 p.m. – 6:55 p.m.

PLC Members in Attendance:
Tyler Black, Environmental Health Specialist, Wellington-Dufferin-Guelph Public Health
Caroline Forsyth, Guelph Water Works
Calvin Hyde, Membership Sales/Engagement Specialist, Guelph Chamber of Commerce
Melanie Lamb, Two Rivers Neighbourhood Group
Lorraine Pagnan, Community Member
Marcel Schlaf, Ph.D., Department of Chemistry, University of Guelph

Guest:
Jeff Burdon, Manager Local Air Quality, Ministry of the Environment, Conservation and Parks (MECP)

Absent:
John Kinkead, Community Member
Stefanie Nadalin, Principal, Sacred Heart Catholic Elementary School

Representatives from Owens Corning Guelph:
Brett Arnold, Quality Leader
Patrick Drabicki, Environment, Health and Safety Leader
Kate Stanley, Community Liaison Representative
Jeff Taylor, Plant Manager

Other Attendees:
Danielle Agar, Montrose Environmental Group
Penny McInnis, Montrose Environmental Group

Facilitator
Kelly Henry

Meeting Handouts:
- Draft PLC Meeting Summary – October 22, 2024

Welcome and Introductions
Kelly Henry greeted the committee members and reviewed the mission of the PLC. Jeff Taylor welcomed and introduced Jeff Burdon, Manager Local Air Quality, Ministry of the Environment, Conservation and Parks (MECP), as a guest.

Old Business
- The group finalized the summary of the October 22, 2024, PLC Meeting. The summary will be posted to the website (ocguelph.com).

Plant Update
- Jeff Taylor gave an update on:

  - Community
    - Annual holiday traditions continued, as Grade 3 students from Sacred Heart School joined members of the Guelph Storm hockey team and its mascot, “Spyke,” in decorating the Owens Corning Christmas tree. Owens Corning adopted the Sacred Heart School many years ago and has a history of supporting school programs, such as sponsoring Movie Day for the entire school, when 275 students went to the cinema on Dec. 20 and had a choice to see either Wicked or Moana 2.
    - The company sponsored the Guelph Storm hockey game on Dec. 13. The game benefited the non-profit group Big Brothers, Big Sisters and raised funds for the organization.
    - On Dec. 17, Owens Corning volunteers packed and delivered 100 bags filled with essential items such as toiletries, snacks, socks, gloves and hats to Wyndham House for youth in need. The organization is committed to preventing, reducing and ending youth homelessness by providing support and services.
- Patrick Drabicki reviewed:
  - Health and Safety
    - No reportable incidents or injuries occurred since the last PLC meeting.
    - A new warehouse office has been built near the plant’s Shipping Department. This is a safer location than the previous office, which was in the middle of the warehouse area. This new location allows for better control of pedestrian flow.
    - A forklift vision system is being installed, which senses if people are close by and automatically shuts off the machine’s throttle.
- Brett Arnold shared information regarding:
  - Operations
    - In the first few months of 2025, the facility will be installing a new oxygen generation system to supplement the supply of liquid oxygen needed for melting glass. This initiative will result in reduced liquid oxygen consumption, fewer trucks on the road, less fuel used for transportation, reduced noise in the community and lower operating costs.
- Jeff Taylor, Brett Arnold and Penny McInnis discussed:
  - Site-Specific Standard (SSS) Renewal Application
    - The SSS for hexavalent chromium expires on June 30, 2026; the renewal application is required to begin 15 months prior to that date and submission of the application is planned for March 31, 2025.
    - The basis for Owens Corning’s updated site-specific standard is the use of a Ministry approved mathematical air dispersion model. The model is the prediction of the highest annual concentration that may occur at any location along the property line or beyond (referred to as a Point of Impingement).
    - A renewal schedule is being followed, and much work has been completed including:
      - two rounds of source testing (performed in the winter and summer of 2024) on all emission sources of hexavalent chromium, and technical benchmarking.
      - performing the required elements of technology benchmarking and jurisdictional review.

        - Based on the information from these efforts, Owens Corning will be requesting a SSS of 1.33 nanograms per cubic meter on an annual average basis, which is a significant reduction from the current SSS. The facility is also preparing an Action Plan for continued improvements over the life of the permit as part of its submittal.
    - The plant is meeting with representatives from the MECP monthly to confer on the SSS renewal application process.
    - The team will continue to communicate with MECP regarding any public concerns.
- Technical Benchmarking
    - The process of technical benchmarking is to identify commercially available and technically feasible emission control technologies and techniques to reduce the concentrations of hexavalent chromium. The purpose is to identify a pollution control strategy to reduce the maximum predicted Point of Impingement concentration.
    - The team has completed technical benchmarking to the extent possible prior to submitting the application. This includes options such as material substitutions, process changes, add-on controls, and re-engineering the stacks.
    - The application will review all technologies evaluated, including those deemed to be not technically feasible, in the final submission.
- Jurisdictional Review
    - As part of the process, the team is examining similar operations in other jurisdictions to determine if they could apply to the Owens Corning Guelph facility. They reviewed 13 U.S. pollution control permits for glass composites manufacturing and found that two-thirds of the facilities do not have control devices on their furnaces.
    - In addition, the team compared and summarized the facility's emissions to other similar facilities and associated requirements. The emission levels at the Guelph plant are less than or equal to emission levels from U.S. regulatory agencies and permits.
    - In response to new information and additional suggestions by the Ministry, after the application is submitted, the facility has committed to continue its assessment of add-on controls as potential ways to reduce emissions. This includes an examination of filtration mechanisms. New information would be submitted to the Ministry as a supplement to the application.
- Updated Emission Reduction Action Plan
    - In the spirit of continuous improvement and as part of the mandated application protocol, Owens Corning will research, assess and implement additional emission reduction technologies that may be able to be applied at different stages (from the beginning to the end) of the manufacturing process.
- Public Consultation
    - Jeff explained that public consultation also is required as part of the application process.
    - Ministry regulations indicate a facility making a request for a site-specific standard may make the request without holding a public meeting if the Director has previously set a site-specific standard for the same

        contaminant at the same facility. This is the case for the Owens Corning Facility.
        - The Ministry has the discretion (per Section 34.1) to request a public meeting or information session regarding a site-specific standard renewal on a case-by-case basis.
        - It is Owens Corning's position that this Public Liaison Committee, which has been meeting quarterly since it was established in 2017 for the exchange of information between the Plant and the local community, meets its requirements for public consultation.
        - The Plant will be submitting a Public Consultation Report with its application and will share it with the PLC at its next meeting.

Questions to Jeff Burdon

- Jeff Burdon engaged in answering questions from the PLC about the Ministry's application process and the state of applicable science.
- As part of his comments, Jeff Burdon also stated that as part of the application there is a requirement to host a public meeting and it can be in a forum like the PLC.

Regulatory Reporting

- Jeff Taylor reviewed:
    - The regulatory reporting schedule for 2025:
        - Written Summary for Site Specific Action Plan (Due: March 31)
        - Site-Specific Standard Renewal Application (Due: March 31)
        - National Pollutant Release Inventory (Due: June 1)
        - Emission Summary and Dispersion Modelling Report Update (Due: June 30)
        - Acoustic Assessment Report (Due: June 30)
        - ECA Annual Written Summary (Due: August 31)

Community Hot Topics

- Lorraine Pagnan reminded the group that Alice Street will be closed for two weeks at the beginning of February. She asked about a noise in the area that sounded like crickets. It happened several weeks ago, and she wondered if anyone at the plant noticed it.
- Melanie Lamb talked about outreach efforts conducted by the Two Rivers Neighbourhood Group during the busy Christmas season. She said the group is planning events around Valentine's Day and Easter. She thanked Owens Corning for sponsoring Movie Day at Sacred Heart School.
- Calvin Hyde announced that Andy Veilleux is the new president and CEO of the Guelph Chamber of Commerce. He discussed upcoming Chamber events and voiced concern regarding potential tariffs from the U.S.
- Tyler Black reminded the PLC members to stay safe during the extreme cold weather. Area warming shelters, including Guelph City Hall, are open to residents needing assistance.
- Marcel Schlaf gave on update of University of Guelph initiatives and the Guelph Community Boating Club, of which he is vice commodore. The club is run by volunteers and offers a variety of programs including sailing lessons, along with windsurfing, canoeing, kayaking, and rowing.

Action Items:
The company will:

- Seek and implement opportunities for driving additional reductions.
- Continue to report stack testing results to the Ministry and PLC.
- Post the March 25, 2025 PLC agenda to the website a month prior to the next meeting.
- Commit to continue the PLC.

Next Meeting: Tuesday, March 25, 2025

- Review of the Site-Specific Standard (SSS) Renewal Application.
- Provide an update on regulatory reporting for 2025.
- Share information on the company's operations.

Appendix D - Information Package

GLOSSARY OF TERMS

Chromium	Chromium is an odorless and tasteless metallic element. Chromium is found naturally in rocks, plants, soil and volcanic dust, humans and animals. The most common forms of chromium in the environment are trivalent chromium (chromium-3), and hexavalent chromium (chromium-6). Hexavalent chromium can occur in the environment from the erosion of natural chromium deposits but it can also be produced by industrial processes.
ECA	Acronym for Environmental Compliance Approval, the comprehensive air and noise permit for the Facility.
Emissions	Technically, all solid, liquid, or gaseous discharges from a facility, but most commonly used to refer to discharges of a material to the atmosphere whether in solid, liquid, or gaseous form.
Forehearth	A special heated channel (trough) for transporting molten glass from the furnace to the bushings.
Monitoring and Modelling	Considered complementary tools to assess potential impacts on the local community. Accurate and well-located monitors can provide information on the magnitude and variability of a facility’s emissions in addition to their potential impact. However, monitoring data is usually limited to a few locations and for a limited number of measurements which can bias the interpretation of the results. Conversely, modelling allows estimates of concentrations over a large number of receptors and a wide range of meteorological conditions. However, modelling results can also be biased by various factors including uncertainties or omissions in the quality of the emission data, or available information on local meteorological conditions.
Point of Impingement	With respect to the discharge of a contaminant; does not include any point that is located on the same property as the source of contaminant.
Sensitive receptors	Any receptor (location) beyond the property line that fits in the category of: dwellings (houses, apartments), educational facilities, child care facilities, health care facilities, and senior citizens' residences or long-term care

	facilities.
Site-specific standard	A site-specific standard is an air concentration approved by a director of the Ministry for an individual facility that is challenged in meeting the air standard.
Stacks	A chimney used to release exhaust, smoke, heat or other emissions into the air.
Upper Risk Threshold	A concentration of a contaminant in air, set above the general air standard. URTs are used by the Ministry to manage risks both during and after the phase-in period of an air standard and also during the evaluation of requests for site-specific standards.

TECHNOLOGY BENCHMARKING REPORT
HEXAVALENT CHROMIUM
GUELPH PLANT

Prepared for: **OWENS CORNING COMPOSITE MATERIALS CANADA LP**

Prepared by: **MONTROSE ENVIRONMENTAL SOLUTIONS CANADA INC.**

DRAFT
Version 0.1
March 2025
Point Edward, Ontario

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EXECUTIVE SUMMARY

This Technology Benchmarking Report (TBR) has been prepared to support the Owens Corning Guelph Glass site-specific annual standard renewal request for hexavalent chromium under Section 32 of Ontario Regulation 419/05: Air Pollution – Local Air Quality (O. Reg. 419/05; Government of Ontario 2025). This report (TBR) is a required element of the renewal application for the site-specific standard and has been prepared in accordance with the Ministry of the Environment, Conservation and Parks (MECP) publications *Guide to Requesting a Site-Specific Standard* (GRSSS; MOECC 2017a) and the *Guideline for the Implementation of Air Standards in Ontario* (GIASO; MOECC 2017b).

The Owens Corning facility is located at 247 York Road in Guelph, Ontario. The facility produces textile glass yarn and fiberglass for reinforcements for commercial and industrial markets worldwide. This facility is the sole producer of fiberglass for reinforcements in Ontario and Canada and has been operating in Guelph since 1951. Due to the nature of the process, the facility operates continuously 24 hours per day, 365 days per year. Detailed process descriptions and documentation of emission estimates are located in the Emission Summary and Dispersion Modelling (ESDM) Report.

This is a companion document to the ESDM report where modelling indicates that the facility would not meet the hexavalent chromium standard and that a site-specific standard is necessary. This report provides an assessment of the available technologies to reduce point of impingement (POI) concentrations of hexavalent chromium using the top-down approach prescribed by Appendix A of the MECP GRSSS guidance document.

This Technical Benchmarking Report:

- identifies all available technologies to reduce the POI concentration of hexavalent chromium
- assesses the commercial availability of each of the technologies identified and screens out those options which are not commercially available
- assesses the technical feasibility of each of the identified technologies and screens out options that are not feasible
- ranks the technically feasible pollution mitigation options, and combinations of options (pollution control strategies), based on reductions in POI concentrations

Twenty-two (22) individual technologies in the following categories were assessed:

- Material Substitutions (4 options)
- Process Changes (7 options)
- Add-On Controls (11 options)

An additional category of “Other” was added for re-engineering of exhaust points to overcome site-specific dispersion challenges. While this is not a required option for consideration, it is another method for the facility to reduce the predicted POI concentrations in the surrounding community.

The technically feasible individual technologies and combinations of options were modelled and ranked based on their potential to reduce the predicted POI concentrations. The following table summarizes the assessment of these pollution control strategies.

Combination Description	Overall Percent POI Concentration Reduction	Ranking
Furnace: Furnace volumetric flow rate increase Forehearth: Horizontal burner firing in the CFM forehearth Stack height increase (to 32mag) Volumetric flow rate increase Substitute with Low Sublimation Chromium Refractory in CFM forehearth	49%	1
Furnace: Furnace volumetric flow rate increase Forehearth: Stack height increase (to 32mag) Volumetric flow rate increase Substitute with Low Sublimation Chromium Refractory in CFM forehearth	48.5%	2
Forehearth: Horizontal burner firing in the CFM forehearth Stack height increase (to 32mag) Volumetric flow rate increase Substitute with Low Sublimation Chromium Refractory in CFM forehearth	45%	3
Forehearth: Stack height increase (to 32mag) Volumetric flow rate increase Substitute with Low Sublimation Chromium Refractory in CFM forehearth	45%	4
Furnace: Furnace volumetric flow rate increase Forehearth: Horizontal burner firing in the CFM forehearth Stack height increase (to 32mag) Substitute with Low Sublimation Chromium Refractory in CFM forehearth	42%	5

The above combinations show the control options selected for the top five pollution control combinations. Additional details related to all of these control options are located in the TBR.

EMISSION SUMMARY & DISPERSION MODELLING REPORT FOR A SITE-SPECIFIC STANDARD

GUELPH PLANT

Prepared for: **OWENS CORNING COMPOSITE MATERIALS CANADA LP**

Prepared by: **MONTROSE ENVIRONMENTAL SOLUTIONS CANADA INC.**

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Version 0.1
March 2025
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EXECUTIVE SUMMARY

The Owens Corning Composite Materials Canada LP Guelph Glass facility is requesting a renewal of the site-specific annual standard for hexavalent chromium under Section 32 of Ontario Regulation 419/05: Air Pollution – Local Air Quality (O. Reg. 419/05). The Owens Corning Guelph Glass facility is located at 247 York Road, Guelph, Ontario in the Township of Guelph/Eramosa and Wellington County. This Emission Summary and Dispersion Modelling Report (EDSMR) is a required element of Owens Corning's request. This facility currently operates under Amended Environmental Compliance Approval Number 2625-BNET4H.

The NAICS code for the Owens Corning Guelph facility is 327214, Glass Manufacturing, and is required to demonstrate compliance using advanced dispersion models (AERMOD).

The facility produces textile glass yarn and fiberglass for reinforcements for commercial and industrial markets worldwide. This facility is the sole producer of fiberglass for reinforcements in Ontario and Canada and has been operating in Guelph since 1951. Due to the nature of the process, the facility operates continuously 24 hours per day, 365 days per year. The facility has a maximum production capacity of approximately 16,000 tonnes of molten glass per year.

Glass fibers are produced by melting raw materials in gas fired furnaces and transporting the molten glass through forehearth channels to "bushings" where it is mechanically pulled to form the fibers. Subsequently, the fibers are used to make glass yarns, mat and reinforcements. The raw materials used to manufacture these high-tech glass fibers consist of dry solids, in powder and granular form, including clay, sand, limestone, and dolomite.

This ESDM Report contains all significant sources of contaminants present at the facility. Sources of emissions include:

- Raw materials handling and storage
- Glass melting operations
- Production of textile glass
- Production of textile glass products
- Packaging of products

Owens Corning Guelph has an annual site-specific standard of 0.0024 (μg/m^3) for hexavalent chromium. A site-specific standard is a modelled air concentration at a selected Point of Impingement (POI) developed and approved using site-specific emissions, meteorological data, and an approved air dispersion model, combined with a site-specific Action Plan. This compliance approach focuses on actions the facility can take to reduce hexavalent chromium concentrations to the extent possible, taking into consideration available technology and best practices. A site-specific standard is an interim standard established for a specific period of time to ensure continued review of available and feasible technologies.

Several documents are provided as part of the request for a site-specific standard for hexavalent chromium.

These documents include:

- Emission Summary and Dispersion Modelling Report (ESDMR)
- Technology Benchmarking Report
- Action Plan for achieving reductions

For the Owens Corning Guelph facility, emission estimates for hexavalent chromium are based on validated source testing conducted in 2024 on all sources of hexavalent chromium including the glass melting furnace, forehearth, and furnace hall general ventilation. These emission estimates were then modelled using the AERMOD air dispersion model Version 22112 and a 5 year site-specific meteorological dataset processed by the Ontario Ministry of Environment, Conservation and Parks (MECP).

The Action Plan for the Owens Corning Guelph Glass Plant includes a combination of material substitution, process and design changes as well as re-engineering of exhaust stacks. Due to the continuous nature of the process, the material substitution and process changes will be implemented during the next scheduled shutdown for the assets. The modifications to the exhaust stacks is planned for completion in 2026 as it is expected these can be done while the facility continues to operate normally.

The following table summarizes the current facility emissions and POI concentrations as well as the post-Action Plan concentrations.

Emission Summary Table - Hexavalent Chromium

Contaminant	Averaging Time	Emission Rate (g/s)	Location of Point of Impingement (POI)	Maximum Modelled Concentration (ng/m^3)	MECP POI Criteria (ng/m^3)	Schedule	Limiting Effect	% of Criteria
Hexavalent Chromium (Current Average)	24-hour	1.16E-04	All Receptors	4.67	70	URT	Health	6.7%
			Sensitive receptor	3.36	70	URT	Health	4.8%
	Annual		All Receptors	1.06	2.4	SSS	Health	44.1%
			Sensitive receptor	0.41	2.4	SSS	Health	17.1%
Hexavalent Chromium (Current with Uncertainty)	24-hour	1.37E-04	All Receptors	5.67	70	URT	Health	8.1%
			Sensitive receptor	3.97	70	URT	Health	5.7%
	Annual		All Receptors	1.33[1]	2.4	SSS	Health	55.5%
			Sensitive receptor	0.49	2.4	SSS	Health	20.3%
Hexavalent Chromium (After Action Plan)	24-hour	1.31E-04	All Receptors	2.61	70	URT	Health	3.7%
			Sensitive receptor	2.16	70	URT	Health	3.1%
	Annual		All Receptors	0.68	1.33[2]	Proposed SSS	Health	51.4%
			Sensitive receptor	0.23	1.33[2]	Proposed SSS	Health	17.3%

[1] Proposed SSS concentration

[2] Owens Corning is applying for this value as the site-specific standard for hexavalent chromium

Current Emission Summary Table – 1 hour Average (All Other Compounds)

Contaminant	CAS #	1 Hour Emission Rate (g/s)	1 hr Facility MAX GLC (ug/m^3)	1 Hour POI Criteria (ug/m^3)	Schedule	Limiting Effect	% of Criteria
SULPHUR DIOXIDE	7446-09-05	6.15E-01	3.78E+01	100	Schedule 3	Health & Vegetation	37.8%
NITROGEN OXIDES (EXPRESSED AS NO$_2$)	10102-44-0	1.16E+00	6.61E+01	400	Schedule 3	Health	16.5%

Current Emission Summary Table – 24 hour Average (All Other Compounds)

Contaminant	CAS #	24 Hour Emission Rate (g/s)	24 hr Facility MAX GLC (ug/m^3)	24 Hour POI Criteria (ug/m^3)	Schedule	Limiting Effect	% of Criteria
PM - PARTICULATE MATTER	N/A - M08	4.52E-01	8.59E+01	120	Schedule 3	Visibility	71.6%
HYDROGEN FLUORIDE -GASEOUS-GROWING SEASON GS [1]	7664-39-3	6.41E-03	1.95E-01	0.86	Schedule 3	Vegetation	22.6%
NITROGEN OXIDES (EXPRESSED AS NO_2)	10102-44-0	1.16E+00	3.77E+01	200	Schedule 3	Health	18.9%
Chromium Compounds (Di-,Tri-,metallic)	7440-47-3	7.93E-05	7.89E-03	0.5	Schedule 3	Health	1.6%
HYDROGEN CHLORIDE	7647-01-0	4.01E-03	1.22E-01	20	Schedule 3	Health	0.6%
2,2-dibromo-3-nitrilopropionamide	10222-01-2	6.01E-03	6.07E-01	1	Screening Level	Health	<Screening Level
5-Chloro-2-methyl-2H-isothiazol-3-one	55965-84-9	3.45E-03	4.65E-01	1.35	Screening Level	Health	<Screening Level
5-Chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	1.19E-03	1.60E-01	0.5	Screening Level	Health	<Screening Level
2-Methyl-4-Isothiazolin-3-one	2682-20-4	1.19E-03	1.60E-01	0.5	Screening Level	Health	<Screening Level
MAGNESIUM NITRATE	10377-60-3	4.48E-03	5.69E-01	2	Screening Level	Health	<Screening Level
Dibromoacetonitrile	3252-43-5	1.45E-03	3.43E-01	1.65	Screening Level	Health	<Screening Level
1-Propanol, 3-(trimethoxysilyl)-, methacrylate	2530-85-0	6.41E-04	6.48E-02	0.5	Screening Level	Health	<Screening Level
Diallyl Phthalate	131-17-9	4.77E-03	5.74E-01	5	Screening Level	Health	<Screening Level
Sodium acetate	127-09-3	1.20E-02	1.57E+00	15	Screening Level	Health & Particulate	<Screening Level
Polyethylene glycol	25322-68-3	1.80E-02	1.82E+00	40	Screening Level	Health	<Screening Level
Sodium Bromide	7647-15-6	5.03E-02	5.12E+00	120	Screening Level	Health & Particulate	<Screening Level
BENZOYL PEROXIDE	94-36-0	4.45E-03	8.42E-01	25	Screening Level	Health	<Screening Level
3-(Triethoxysilyl)propylamine	919-30-2	1.95E-02	2.54E+00	80	Screening Level	Health	<Screening Level
Acid Solubilized Fatty Acid Amide (Prop1)	NA	2.79E-02	7.97E+00	8.261	FL/APOIC	NA	<FL/APOIC
Acid Solubilized Fatty Acid Amide (Prop2)	NA	1.24E-02	3.54E+00	3.672	FL/APOIC	NA	<FL/APOIC
Benzenamine, N-[3-(trimethoxysilyl)propyl]-	3068-76-6	6.72E-03	8.75E-01	1.114	FL/APOIC	NA	<FL/APOIC

[1] Assessed against the most stringent criteria for Gaseous Growing Season

Current Emission Summary Table – 30 Day Average (All Other Compounds)

Contaminant	CAS #	30 Day Emission Rate (g/s)	Facility MAX GLC (µg/m³)	30 Day POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria
HYDROGEN FLUORIDE -GASEOUS-GROWING SEASON GS [1]	7664-39-3	6.41E-03	7.59E-02	0.34	Schedule 3	Health	22.3%

[1] assessed against the most stringent criteria for Gaseous Growing Season

Current Emission Summary Table – Annual Average (All Other Compounds)

Contaminant	CAS #	Annual Emission Rate (g/s)	Annual Facility MAX GLC (µg/m³)	Annual POI Criteria (µg/m³)	Schedule	Limiting Effect	% of Criteria
SULPHUR DIOXIDE	7446-09-05	6.15E-01	2.13E+00	10	Schedule 3	Health & Vegetation	21.3%

Owens Corning Guelph Glass Plant

247 York Road
Guelph, Ontario N1E 3G4

Fact Sheet – March 2025

The Owens Corning Guelph Glass Plant is one of 32 Composites Manufacturing Facilities located around the world. The Composite Solutions Business (CSB) of Owens Corning is a global pioneer and industry leader in the glass fiber reinforcements, nonwovens and specialty composite fabrics industry, with a long history of product innovation and customer focus. Reinforcements, such as glass fiber, are used in composite materials to give physical and mechanical properties that traditional materials, such as plastic alone, cannot provide.

Owens Corning is committed to conducting its operations in a manner that protects the public's health and safety, and the environment. **For more information, please contact us at 1 (866) 639-6557.**

Fast Facts – Guelph Glass Plant

- A member of the Guelph Community since 1951; owned by Owens Corning since 1989
- Owens Corning's sole composites facility in Ontario as well as Canada
- Occupies 377,000 sq. ft. on 21.27 acres of land
- Pays $260,000 in city taxes annually
- Employs 73
- Plant Manager: Jeff Taylor

We Value Our Neighbours

- Supporter of Big Brothers Big Sisters of Guelph, about $8,000 annually
- Supports Habitat for Humanity with workers and $2,000 from Owens Corning Foundation
- Supports Sacred Heart Catholic School in many ways, with Holiday Movie Day, Carnival, entertainment and tickets to local junior hockey team, Guelph Storm
- Corporate sponsor of Guelph Storm

Our Products

Owens Corning glass fiber materials are found in more than 70,000 end-use applications in the construction, wind energy, water infrastructure, industrial, transportation, consumer goods, and aerospace/defense sectors.

Continuous Filament Mat (CFM) Applications

- Structural Cross sections:
    - Ladder Rail
    - Cooling Tower Structure
- Electrical isolation back planes

Owens Corning Guelph Glass Plant Public Liaison Committee (PLC)

The mission of the Owens Corning Guelph Glass Plant PLC is to enable and maintain regular, constructive dialogue between the Facility and community representatives for the mutual benefit of the community and the company. It was formed under the terms and conditions of the Amended Environmental Compliance Approval (ECA Number 4548-AA3QXU) for the Owens Corning Guelph Glass Plant.

Established	January 2017
Active Members	10
• **Representing**	• Neighbourhoods near the facility • Guelph Chamber of Commerce • University of Guelph • Sacred Heart School • Wellington-Dufferin-Guelph Public Health • Guelph Water Works
Meetings	Held Quarterly at Plant (Virtual in 2020, 2021 and 2022 due to COVID-19)
Meeting Agendas and Summaries Posted to ocguelph.com	

The membership of the PLC represents a cross section of the Guelph community at large. PLC membership is voluntary and is not compensated. The Ministry of the Environment, Conservation and Parks is actively engaged in the PLC in an advisory role. Representatives of the MECP may not attend every meeting. Owens Corning appreciates the time and commitment of our PLC members.

PLC Purpose

The purpose of the PLC is to:

a) Keep the community informed about the operations of the Facility
b) Keep the Company informed of any community concerns about the operations of the Facility.
c) Serve as a forum for the dissemination, review and exchange of information related to the Facility.

The PLC shall not exercise any supervisory, regulatory or approval roles with respect to the operation of the Facility.

PLC Objectives

The objectives of the PLC are to:

- Review and discuss Facility operations related to Ministry approval of the Environmental Compliance Approval, including but not limited to, environmental concerns, offsite community impacts (e.g., noise, odour, etc.) , and any other issues of relevance identified and agreed upon by PLC consensus.
- Review all draft “Written Summary Forms” and the draft quarterly and annual reports on the Facility’s ambient air monitoring results before they are submitted to the Ministry.
- Review all future amendments to the ECA or Facility operations before the application is submitted to the Ministry.
- Act as a catalyst and resource for bringing information and concerns to the PLC and for providing the community with information gained through the PLC meetings.
- Identify opportunities of mutual benefit for improved community relations and/or understanding of the Facility, its benefits and value to the community.
- Support the Company’s efforts to establish and maintain a PLC membership that represents a broad and balanced cross-section of the community.

Owens Corning Guelph Glass Plant

247 York Road Guelph, Ontario N1E 3G4

Site Specific Standard Application: Request Summary Fact Sheet – March 2025

What We're Requesting	The Owens Corning Guelph Glass Plant (Owens Corning) is requesting from the Ministry of the Environment, Conservation and Parks (Ministry) an interim site-specific annual standard for hexavalent chromium under Section 32 of Ontario Regulation 419/05: Air Pollution – Local Air Quality.
About the Glass Manufacturing Process	The facility produces fiberglass reinforcements for commercial and industrial markets worldwide. This facility has been operating in Guelph since 1951 and owned by Owens Corning since 1989. It is the sole producer of fiberglass for reinforcements in Ontario and Canada. The process is a continuous one, running 24 hours a day, 365 days a year. The facility currently processes approximately 16,000 tonnes of glass fiber product per year.
Hexavalent Chromium is a Byproduct of the Manufacturing Process	Glass fibers are produced by melting raw materials in a gas fired furnace and transporting the molten glass through special heated channels called forehearths to "bushings" where it is mechanically pulled to form the fibers. The glass melting and molten glass transport structures are made from materials that include chromium oxide, which resist extreme wear conditions in the furnace and forehearths. As a result of the high temperatures and other conditions of the process, an extremely small fraction of the chromium oxide is transformed into hexavalent chromium and emitted to the air, primarily via 3 stacks.
In Compliance with Current Air Regulations	The Ministry uses a framework for managing risk to local communities from a facility's emissions of a contaminant to air. The Guelph Glass Plant is in compliance with current Ministry regulations for local air quality.
About the Standard	On July 1, 2016, a new hexavalent chromium air standard went into effect - 0.00014 micrograms per cubic meter (µg/m^3) on an annual average basis. The standard is protective of human health. This Schedule 3 air standard represents a 99% reduction from the historical standard for hexavalent chromium.
An Interim Site-Specific Standard Is an Allowable Approach	An interim site-specific standard is an approach developed by the Ministry to enable a facility to maintain compliance as long as the Ministry is satisfied that the facility is reducing emissions as much as possible with technology based solutions and best practices. The facility was granted a site-specific standard of 0.0024 µg/m^3 on July 1, 2016 that expires on June 30, 2026.
The Basis of Owens Corning's New Interim Site-Specific Standard	The basis for Owens Corning's updated site-specific standard is the use of a Ministry approved mathematical air dispersion model. ▪ 5 years of local meteorological data and site-specific emissions for hexavalent chromium. ▪ 2024 validated testing (winter and summer) on all sources of hexavalent chromium ▪ Forehearth, , furnace, ventilation from furnace hall. ▪ Actions the facility can take to reduce air emissions as much as possible considering the viable technology. ▪ The model is the prediction of the highest annual concentration that may occur at any location along the property line or beyond (referred to as a Point of Impingement).
Our Request	As a result of modeling, the Owens Corning Guelph Glass Plant is requesting an interim site-specific standard of 0.00133 µg/m^3 on an annual average basis, for a term of 10 years.

About the Process for Requesting an Interim Site-Specific Standard

The request must be made 15 months in advance of the expiration of the current site-specific standard.

Owens Corning will submit its request by March 31, 2025.

The request must include:

- ✓ Emission summary and dispersion modeling report
- ✓ Technical benchmarking report
- ✓ Economic feasibility study report (optional)
- ✓ Action plan for achieving the lowest air concentrations possible considering both technical and economic feasibility
- ✓ Public consultation report

We Encourage Your Questions and Input

Email Owens Corning at
OCGuelph@owenscorning.com

Or Send a letter

to: Jeff Taylor
Owens Corning
247 York Road
Guelph, Ontario N1E 3G4

Public Consultation Requirements:

- ✓ A facility making a request for a site-specific standard may make the request without holding a public meeting if the Director has previously set a site-specific standard for the same contaminant at the same facility.

The Guideline for the Implementation of Air Standards in Ontario identifies key stakeholders for public input as residents within 500m of the facility, community groups, existing local environmental groups, Ministry / Public Health Units, municipalities, and other levels of government.

Owens Corning established a Public Liaison Committee (PLC) in 2017 to promote the exchange of information between the Plant and the local community. A combination of the PLC meetings, proactive outreach to local government, and maintenance and promotion of a plant website focused on the site-specific standard meet the intent of public consultation and provide the necessary transparency.

Owens Corning is committed to a transparent process and plans to continue to proactively inform and respond to inquiries regarding this request. The facility will make available the draft Executive Summaries of the main components of the application and a complete written copy of a draft of the proposed request via its website **www.ocguelph.com** and in print to all who request it.

The Ministry will then conduct a technical review of the request.

- ✓ The request for an interim site-specific specific standard allows for comment directly to Owens Corning and to the Ministry through the Environmental Registry of Ontario (ERO). The Ministry will post the application on the ERO for public comment at www.ero.ontario.ca

Owens Corning Guelph Glass Plant
247 York Road Guelph, Ontario N1E 3G4

Site Specific Standard Request: Action Plan Summary - March 2025

Background

On July 1, 2016, Ontario implemented a hexavalent chromium air standard of 0.00014 micrograms per cubic meter (µg/m^3) on an annual average basis. The Schedule 3 standard represented a 99% reduction from the historical standard for hexavalent chromium. The Guelph facility was granted a site-specific standard of 0.0024 µg/m^3 on July 1, 2016, which expires on June 30, 2026.

Owens Corning is applying for a new, more stringent site-specific standard of 0.00133 µg/m^3 on an annual average basis that reflects the improvements made by the facility since 2016. No combination or individual technology was predicted to achieve the general air emission standard for hexavalent chromium. Owens Corning is committed to reducing point of impingement concentrations of hexavalent chromium. The proposed Action Plan is expected to reduce total point of impingement concentration by more than 71 percent beyond the current approved site-specific standard.

This Action Plan Summary has been prepared to support the Owens Corning Guelph Glass request for a new site-specific annual standard for hexavalent chromium under Section 32 of Ontario Regulation 419/05: Air Pollution – Local Air Quality (O. Reg. 419/05). The Action Plan was prepared in accordance with the methodology provided by the Ministry of the Environment, Conservation and Parks (Ministry) in the document “Guide to Requesting an Alternative Air Standard” (GRAAS; Ministry 2017), to meet the requirement of Section 33(4) sub paragraph 4 of O. Reg. 419/05. The Action Plan identifies and provides the timing for the planned steps that will be implemented to reduce point of impingement concentrations of hexavalent chromium.

The Owens Corning facility produces fiberglass for reinforcements for commercial and industrial markets worldwide. This facility is the sole producer of fiberglass for reinforcements in Ontario and Canada and has been operating in Guelph since 1951. Due to the nature of the process, the facility operates continuously 24 hours per day, 365 days per year. Detailed process descriptions and documentation of emission estimates are in the Emission Summary and Dispersion Modeling (ESDM) Report. The Action Plan is one of the companion documents to the ESDM Report where modeling indicates that the facility would not meet the current hexavalent chromium standard and that a site- specific standard is necessary.

Technology Benchmarking

The facility has completed the required elements of a Technology Benchmarking study to identify all possible control technologies. These options were evaluated based on commercial availability and technical feasibility. The remaining emission control technologies (and combinations of technologies) to reduce the concentrations of hexavalent chromium were assessed and ranked based on their ability to reduce the offsite air concentrations. Technologies and combinations of technologies in the following categories were assessed:

- Material Substitutions,
- Process Changes,
- Add-On Controls, and
- Re-engineering of exhaust points to overcome site-specific dispersion challenges.

Several specific technologies evaluated include:

- Electrostatic Precipitator or Dust Collector on furnace and forehearth stacks,
- Front end freeboard minimization,
- Stack modifications, furnace and forehearth,
- Horizontal burner firing (design change), front end only, and
- Low sublimation chromium refractory, furnace and front end.

The Technology Benchmarking Report includes a list of all options considered.

Actions Planned

The glass making process is a continuous one, which is why the process must run 24 hours a day, 365 days a year. Based on the operation cycle and investment in the furnace, the process for rebuilding that can range from 8 to 20 years depending on asset life and capital spending schedules.

The implementation timelines are based on which activities can be completed while the plant remains in operation, and which must wait until a facility planned shutdown. The stack modifications for increasing flowrate and stack heights can be completed while the facility is operational and are scheduled to occur by the end of 2026 pending final engineering design. The replacement of the low sublimation chromium (LSC) refractory and the design changes to the forehearth require a facility shutdown at the end of that asset life. The Continuous Filament Mat (CFM) section of the forehearth is expected to require a rebuild between 2030 and 2033. Therefore, the implementation schedule for the forehearth LSC refractory and design changes are scheduled to be completed by the end of 2033.

When all the actions are implemented, the plan is expected to reduce total point of impingement concentration by more than 71 percent beyond the current approved site-specific standard. Work will not stop there. This is an ongoing continuous improvement process. Owens Corning will pursue technologies toward meeting the general standard and anticipates implementing additional reduction technologies.

TIMELINE	ACTION
2026	**Milestone 1** Re-engineer the furnace stacks including: • Adding fans to increase the velocity of each stack Re-engineer the forehearth stack including: • Adding a fan to increase total velocity • Increase the stack height Continue to review the technical feasibility and potential effectiveness of electrostatic precipitator and dust collector technologies. Additional action may be taken based on the findings of the review.
2030-2033	**Milestone 2** Implement the side firing design change for the Continuous Filament Mat (CFM) forehearth. Replace CFM forehearth side-rails with low sublimation chromium (LSC) after performance of the in-service LSC is verified via a wear pattern assessment. Timing is dependent upon the condition of the furnace and forehearth assets. More specific timing of the rebuild schedule cannot be determined until closer to 2028-2030. Therefore, the timing has been indicated as no later than the end of 2033.

APPENDIX E: PLC QUESTIONS AND ANSWERS

Accountability

From July 16, 2024 PLC Meeting
Q. Have other facilities gone through dealing with these changes related to standards with new furnace, etc., and data?
While there are other activities and operations that create hexavalent chromium, this is the only glass fiber materials plant of its kind in Ontario. The Owens Corning plant in Toronto manufactures insulation, which is a different process.

From July 16, 2024 PLC Meeting
Q. What are the other jurisdictions' standard of care?
We are still completing the jurisdictional review, but so far the findings are that the Ontario Ministry of the Environment, Conservation and Parks has the most stringent standards for hexavalent chromium.

From July 16, 2024 PLC Meeting
Q. Is Owens Corning meeting with the approvals group at the Ministry?
Yes, starting in 2024 Owens Corning has been meeting with the Ministry on a monthly basis.

Emissions

From January 21, 2025 PLC Meeting
Q. Who conducts the stack testing?
Our team of environmental experts at Montrose Environmental conducts the testing.

From January 21, 2025 PLC Meeting
Q. Is there any way to do real-time Ambient Air Monitoring testing?
The team discussed the technical merits of doing real-time ambient air monitoring testing and, together with the PLC member, concluded that it wouldn't work. It was noted that from 2017 - 2023 the plant conducted ambient air monitoring at three locations and Annual Average Hexavalent Chromium Concentrations for all seven years was well below the site specific standard.

From October 22, 2024 PLC Meeting
Q. How many stack samples are required in the next 6 months?
There is no defined schedule currently. As part of the renewal, the plant agreed to conduct stack testing in February 2024 and June 2024. The Ministry may require additional testing.

From July 16, 2024 PLC Meeting
Q. When is the next stack testing scheduled?
It will be up to the Ministry to decide on a testing schedule. Some source testing is expected in the future and the PLC will be informed when it is planned and occurs.

From July 16, 2024 PLC Meeting
Q. How do product lines and production rate changes affect emissions?
The only source of chromium at the facility is the refractory in the furnace and Owens Corning has 70 years of experience in managing the lifespan of that asset. There are no other equipment or maintenance components that are key to managing the hex chrome emissions.

APPENDIX E: PLC QUESTIONS AND ANSWERS

From March 25, 2025 PLC Meeting
Q. The work you'll be doing under Milestone 1 is essentially a diluted effect?
We are looking to improve certain areas in the plant, like the space around the shrouding. Also, where the air comes from any potential future emissions would be captured. Some emissions go into our general ventilation fan and we want to limit that.

From March 25, 2025 PLC Meeting
Q. You are currently finishing the mitigation from 2016. That one is ending and you are re-applying again. You still need to show a reduction in the hexavalent chromium? Where does one general standard end and the other begin?
Since we can't achieve the general standard, we are required to request a Site-Specific Standard (SSS). We're submitting a request for a lower SSS.

From March 25, 2025 PLC Meeting
Q. Owens Corning is asking the Ministry to approve a lower Site-Specific Standard?
In Ontario, the Ministry allows manufacturing facilities to have emissions, but at certain levels. Those emissions get modelled. Some facilities need to do more to reduce the emissions and the Ministry asks those facilities to come up with a site-specific standard for their facility.

From March 25, 2025 PLC Meeting
Q. Why would the point of impingement change from what we had in 2016?
Those lines of impingement are determined in part from meteorological data. That information can change slightly from year to year. There may be more winds heading in that direction. Or the speed and impact could change.

From March 25, 2025 PLC Meeting
Q. Hypothetically, if there were tall buildings erected in the area, it could impact the point of impingement?
Yes.

From March 27, 2025 Meeting with Guelph Officials
Q. Does the hexavalent chromium escape into the air through the stacks?
Hexavalent chromium is a byproduct of the manufacturing process. The glass melting and molten glass transport structures are made from materials that include chromium oxide, which resist extreme wear conditions in the furnace and forehearths. As a result of the high temperatures and other conditions of the process, an extremely small fraction of the chromium oxide is transformed into hexavalent chromium and emitted to the air, primarily via the three stacks. Since 2016, we have proactively communicated with the public about our process improvements and the potential risks. It is important to know that the hexavalent chromium doesn't accumulate in nature.

From March 27, 2025 Meeting with Guelph Officials
Q. As the hexavalent chromium travels, does it become weaker?
Yes.

APPENDIX E: PLC QUESTIONS AND ANSWERS

Operations

From October 22, 2024 PLC Meeting
Q. Where is the hexavalent chromium coming from?
Hexavalent chromium is a byproduct of the manufacturing process. The glass melting and molten glass transport structures are made from materials that include chromium oxide, which resist extreme wear conditions in the furnace and forehearths. As a result of the high temperatures and other conditions of the process, an extremely small fraction of the chromium oxide is transformed into hexavalent chromium and emitted to the air, primarily via 3 stacks.

From October 22, 2024 PLC Meeting
Q. Is the refractory a proprietary material?
It's a commercially available product.

From October 22, 2024 PLC Meeting
Q. What is the annual throughput in relation to the ug/m3 annual average site-specific standard?
The site-specific standard for the Guelph facility is 2.4 ng/m^3 on an annual average basis. Owens Corning has a current baseline of 1.06 ng/m^3.

From January 21, 2025 PLC Meeting
Q. Could Owens Corning use a bubbler scrubber with any reducing agent to take the exhaust and convert it to tri chrome?
Based on flow rates and concentrations, this method is deemed to be not feasible.

From October 22, 2024 PLC Meeting
Q. Is there a reductive wash in the stack?
We are looking at options as part of technical benchmarking, including add-on controls.

From October 22, 2024 PLC Meeting
Q. Is there an additive that's reducing the soda content?
In 2018, the plant changed the amount of soda in the raw materials.

From October 22, 2024 PLC Meeting
Q. Do you run your product lines as batch or continuously?
Our operations run continuously.

From March 25, 2025 PLC Meeting
Q. What is the purpose of bubbler elimination?
It maximizes the amount of electric energy or eboost which reduces the amount of fuel needed and reduces combustion intensity.

From March 25, 2025 PLC Meeting
Q. What's the chromium content of your feed?
There are trace amounts of chromium, but it's not hexavalent chromium. It's trivalent chromium, which is not a substance of concern.

APPENDIX E: PLC QUESTIONS AND ANSWERS

Health

From January 21, 2025a PLC Meeting

Q. With what frequency will you reassess Point of Impingement testing?

This will be part of the proposed action plan we are submitting as part of our application and will depend on timing and the actions that need to be quantified.

Communications

From March 25, 2025 PLC Meeting

Q. How do people contact the plant?

You can use the number listed on the fact sheets. (866) 639-6557

APPENDIX E: PLC QUESTIONS AND ANSWERS

Ministry Process

From January 21, 2025 PLC Meeting

Q. As I understand it, the plant needs to submit the application by March 31, 2025, which is 15 months ahead of the timeline for approval by the Ministry. Is that correct?

That is correct. There will be a posting to the Environmental Registry of Ontario website with a 45-day public comment period that gives people an opportunity to comment on the application.

From October 22, 2024 PLC Meeting

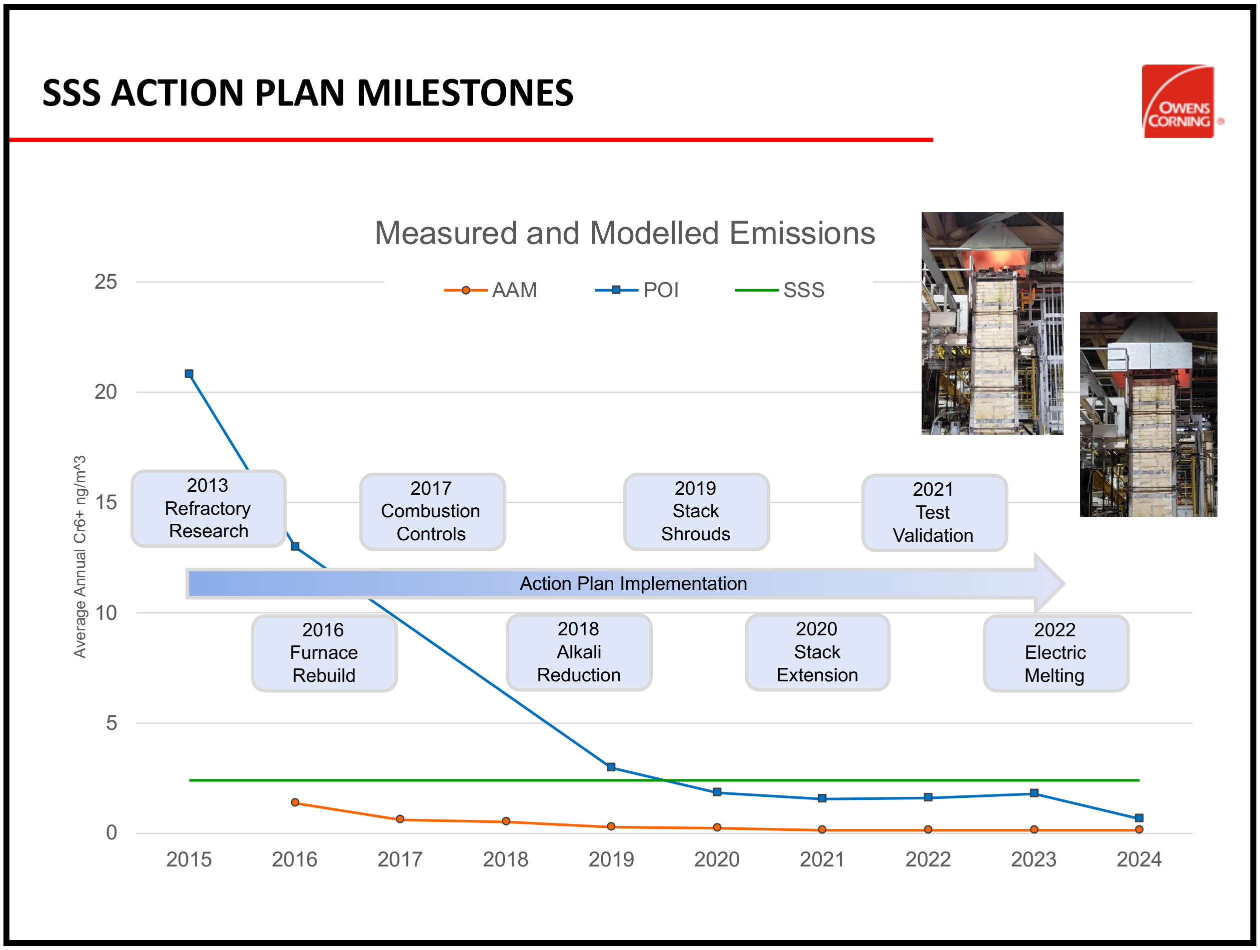
Q. What is the background concentration of hexavalent chromium?

When the furnace was being rebuilt in 2016 and the facility was shut down and not contributing to ambient air levels, the plant took background air samples. The levels measured were just below the General Standard.

From October 22, 2024 PLC Meeting

Q. How did you reduce facility emissions?

The following slide was shared, and the actions taken by the Plant since approval of its current site-specific standard and the effect of those actions reviewed.



SSS ACTION PLAN MILESTONES

Measured and Modelled Emissions

2013 Refractory Research

2016 Furnace Rebuild

2017 Combustion Controls

2018 Alkali Reduction

2019 Stack Shrouds

2020 Stack Extension

2021 Test Validation

2022 Electric Melting

Action Plan Implementation

APPENDIX E: PLC QUESTIONS AND ANSWERS

Date	Category	Question	Response
July 16, 2024	Accountability	**Have other facilities gone through dealing with these changes related to standards with new furnace, etc., and data?**	While there are other activities and operations that create hexavalent chromium, this is the only glass fiber materials plant of its kind in Ontario. The Owens Corning plant in Toronto manufactures insulation, which is a different process.
July 16, 2024	Accountability	**What are the other jurisdictions' standard of care?**	We are still completing the jurisdictional review, but so far the findings are that the Ontario Ministry of the Environment, Conservation and Parks has the most stringent standards for hexavalent chromium.
July 16, 2024	Accountability	**Is Owens Corning meeting with the approvals group at the Ministry?**	Yes, starting in 2024 Owens Corning has been meeting with the Ministry on a monthly basis.
July 16, 2024	Emissions	**When is the next stack testing scheduled?**	It will be up to the Ministry to decide on a testing schedule. Some source testing is expected in the future and the PLC will be informed when it is planned and occurs.
July 16, 2024	Emissions	**How do product lines and production rate changes affect emissions?**	The only source of chromium at the facility is the refractory in the furnace and Owens Corning has 70 years of experience in managing the lifespan of that asset. There are no other equipment or maintenance components that are key to managing the hex chrome emissions.

APPENDIX E: PLC QUESTIONS AND ANSWERS

October 22, 2024	Emissions	**How many stack samples are required in the next 6 months?**	There is no defined schedule currently. As part of the renewal, the plant agreed to conduct stack testing in February 2024 and June 2024. The Ministry may require additional testing.
October 22, 2024	Operations	**Where is the hexavalent chromium coming from?**	Hexavalent chromium is a byproduct of the manufacturing process. The glass melting and molten glass transport structures are made from materials that include chromium oxide, which resist extreme wear conditions in the furnace and forehearths. As a result of the high temperatures and other conditions of the process, an extremely small fraction of the chromium oxide is transformed into hexavalent chromium and emitted to the air, primarily via 3 stacks
October 22, 2024	Operations	**Is the refractory a proprietary material?**	It's a commercially available product.
October 22, 2024	Operations	**What is the annual throughput in relation to the ug/m3 annual average site-specific standard?**	The site-specific standard for the Guelph facility is 2.4 ng/m^3 on an annual average basis. Owens Corning has a current baseline of 1.06 ng/m^3.
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October 22, 2024	Operations	**Is there an additive that's reducing the soda content?**	In 2018, the plant changed the amount of soda in the raw materials.

APPENDIX E: PLC QUESTIONS AND ANSWERS

October 22, 2024	Operations	**Do you run your product lines as batch or continuously?**	Our operations run continuously.
October 22, 2024	Ministry Process	**What is the background concentration of hexavalent chromium?**	When the furnace was being rebuilt in 2016 and the facility was shut down and not contributing to ambient air levels, the plant took background air samples. The levels measured were just below the General Standard.
October 22, 2024	Ministry Process	**How did you reduce facility emissions?**	The following slide was shared, and the actions taken by the Plant since approval of its current site-specific standard and the effect of those actions reviewed.
January 21, 2025	Emissions	**Who conducts the stack testing?**	Our team of environmental experts at Montrose Environmental conducts the testing.
January 21, 2025	Emissions	**Is there any way to do real-time Ambient Air Monitoring testing?**	The team discussed the technical merits of doing real-time ambient air monitoring testing and, together with the PLC member, concluded that it wouldn’t work. It was noted that from 2017 - 2023 the plant conducted ambient air monitoring at three locations and Annual Average Hexavalent Chromium Concentrations for all seven years was well below the site specific standard.

APPENDIX E: PLC QUESTIONS AND ANSWERS

January 21, 2025	Operations	**Could Owens Corning use a bubbler scrubber with any reducing agent to take the exhaust and convert it to tri chrome?**	Based on flow rates and concentrations, this method is deemed to be not feasible.
January 21, 2025	Health	**With what frequency will you reassess Point of Impingement testing?**	This will be part of the proposed action plan we are submitting as part of our application and will depend on timing and the actions that need to be quantified.
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March 25, 2025	Emissions	**Owens Corning is asking the Ministry to approve a lower Site-Specific Standard?**	In Ontario, the Ministry allows manufacturing facilities to have emissions, but at certain levels. Those emissions get modelled. Some facilities need to do more to reduce the emissions and the Ministry asks those facilities to come up with a site-specific standard for their facility.
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March 25, 2025	Emissions	**Hypothetically, if there were tall buildings erected in the area, it could impact the point of impingement?**	Yes.
March 25, 2025	Operations	**What is the purpose of bubbler elimination?**	It maximizes the amount of electric energy or eboost which reduces the amount of fuel needed and reduces combustion intensity.
March 25, 2025	Operations	**What's the chromium content of your feed?**	There are trace amounts of chromium, but it's not hexavalent chromium. It's trivalent chromium, which is not a substance of concern.
March 25, 2025	Communications	**How do people contact the plant?**	You can use the number listed on the fact sheets. (866) 639-6557

APPENDIX E: PLC QUESTIONS AND ANSWERS

March 27, 2025	Emissions	**Does the hexavalent chromium escape into the air through the stacks?**	Hexavalent chromium is a byproduct of the manufacturing process. The glass melting and molten glass transport structures are made from materials that include chromium oxide, which resist extreme wear conditions in the furnace and forehearths. As a result of the high temperatures and other conditions of the process, an extremely small fraction of the chromium oxide is transformed into hexavalent chromium and emitted to the air, primarily via the three stacks. Since 2016, we have proactively communicated with the public about our process improvements and the potential risks. It is important to know that the hexavalent chromium doesn’t accumulate in nature.
March 27, 2025	Emissions	**As the hexavalent chromium travels, does it become weaker?**	Yes.

Attachment 5
Action Plan

ACTION PLAN – HEXAVALENT CHROMIUM

GUELPH PLANT

Prepared for: **OWENS CORNING COMPOSITE MATERIALS CANADA LP**

Prepared by: **MONTROSE ENVIRONMENTAL SOLUTIONS CANADA INC.**

Version 1.0
March 2025
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ACTION PLAN – HEXAVALENT CHROMIUM

GUELPH PLANT

Prepared for Owens Corning Composite Materials Canada LP, March 2025

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03-28-2025
PROVINCE OF ONTARIO

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DISCLAIMER

Montrose Environmental Solutions Canada Inc. (Montrose) certifies to Owens Corning Composite Materials Canada LP (the Client) that the conclusions in this report are the professional opinions of Montrose at the time of the report and concerning the scope described in the report. The opinions are based on the site conditions observed on the date set out in the report and information obtained during the performance of the scope and do not contemplate subsequent changes in site conditions or information or changes in applicable law or standards subsequent to the date of the report. Montrose has exercised a customary level of skill, care, and diligence in using information received from the Client and/or third parties in the preparation of the report, however assumes no responsibility or liability for the consequences of any error or omission contained in such information. This report was prepared solely for the use of the Client in relation to the specific scope, location, and purpose for which Montrose was retained and is not intended to be used for any variation or extension of the scope or any other project or purpose. Any other use or reliance on the report by the Client or any use or reliance by any third party without the prior express written consent of Montrose is at the sole risk and responsibility of the user and Montrose makes no representation or warranty with respect to any unauthorized use and expressly disclaims any legal duty of care to any such person. Neither Montrose nor its affiliates are responsible for damages, losses, fines, penalties, or other harm incurred by such unauthorized user as a result of decisions made or actions taken based on this report. This report may not be read or reproduced except in its entirety.

VERSION CONTROL

Version	Date	Issue Type	Filename	Description
V0.1	25-Mar-2025	Draft	41296-526 Action Plan 2025-03-25 draft V0.1.docx	Issued to client for review
V1.0	27-Mar-2025	Final	41296-526 Action Plan 2025-03-27 final V1.0.docx	Issued to client

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    1.2 Purpose 1
2 PROGRESS (2013 – 2024) 2
3 PREFERRED POLLUTION CONTROL COMBINATION 2
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4 REFERENCES 4

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1 INTRODUCTION

1.1 Facility Description & Background

The Owens Corning Guelph Glass facility is located at 247 York Road in Guelph, Ontario. The facility produces textile glass yarn and fiberglass for reinforcements for commercial and industrial markets worldwide. This facility is the sole producer of fiberglass for reinforcements in Ontario and Canada and has been operating in Guelph since 1951. Due to the nature of the process, the facility operates continuously 24 hours per day, 365 days per year. Detailed process descriptions and documentation of emission estimates are located in the Emission Summary and Dispersion Modelling (ESDM) Report.

In 2011, *Ontario Regulation 419/05: Air Pollution – Local Air Quality* (O. Reg. 419/05; Government of Ontario 2025) was amended to introduce new air standards for a number of compounds including hexavalent chromium along with a 5 year phase in period for these standards. On July 1, 2016, the hexavalent chromium air standard came into effect at 0.00014 micrograms per cubic meter ($\mu g/m^3$) on an annual average basis. This Schedule 3 air standard represents a 99% reduction from the historical standard for hexavalent chromium.

O.Reg. 419/05 contains provisions to request a Site-Specific Standard if a facility is unable to demonstrate compliance with a Schedule 3 air standard. The facility was unable to technically and economically meet the updated standard in advance of 2016 and was granted a Site-Specific Standard of 0.0024 $\mu g/m^3$ on July 1, 2016. The Site-Specific Standard expires on June 30, 2026. The facility has achieved significant reductions since 2016; however, it is still unable to achieve the Schedule 3 standard for hexavalent chromium. Therefore, Owens Corning is applying for a new Site-Specific Standard for the Guelph facility.

1.2 Purpose

This action plan has been prepared to support the Owens Corning Guelph Glass facility's request for renewal of a Site-Specific Standard for hexavalent chromium under Section 32 of O. Reg. 419/05. This report has been prepared in accordance with *Guide to Requesting a Site-Specific Standard* (GRSSS; MOECC 2017), Ministry of the Environment, Conservation and Parks, Version 2.0, February, 2017 and meets the requirements of Section 33(4) sub paragraph 4 of O. Reg. 419/05. The action plan identifies the planned steps and implementation schedule to reduce point of impingement (POI) concentrations of hexavalent chromium.

The facility has completed the required elements of technology benchmarking identifying commercially available and technically feasible emission control technologies and techniques to reduce the POI concentrations of hexavalent chromium. The technology benchmarking effort has identified a pollution control strategy to reduce the maximum predicted POI concentration presented in this report. Details of the technology benchmarking are located in the accompanying Technology Benchmarking Report.

The objectives of this action plan are to:

- Identify the pollution control combination selected to reduce hexavalent chromium POI concentrations
- Provide timelines associated with the action plan commitments

2 PROGRESS (2013 – 2024)

The Owens Corning Guelph Glass facility has been actively implementing the original action plan and investing in continuous research and development to bring about meaningful reductions to the generation of hexavalent chromium emissions. The following is a high level summary of work completed to date.

TABLE 1 Summary of Completed Work

Date	Actions Completed
2013	• Installed low sublimation chromium (LSC) refractory in a section of channel as a pilot trial as best available refractory technology
2016	• Replaced the furnace with improved technology • Installed state of the art combustion control system and used improved construction techniques on all remaining sections of the process (forehearths) • Re-engineered process stacks to overcome specific dispersion challenges
2017	• Hosted a technical symposium for hexavalent chromium research and development (R&D) • Conducted computer modelling simulations for alternative furnace burner configurations • Completed additional furnace sealing to reduce ingress/egress • Reconfigured and optimized the furnace thermocouple and oxygen sensor • Conducted multiple R&D source testing programs
2018	• Conducted detailed chemical and thermodynamic modelling to further define the variables influencing hexavalent chromium generation • Modified the raw material (batch) recipe to permanently reduce the alkali content • Conducted multiple source testing programs to assess the impact of modifications
2019	• Conducted fluid dynamics modelling of the furnace hall to better understand the general ventilation emissions • Re-engineered general ventilation exhaust stacks for improved dispersion • Modified the furnace and forehearth stacks to increase flue gas capture • Implemented variable speed fans and data tracking for the general ventilation sources • Reviewed the potential for modifying process exhaust cooling rates • Conducted a full source testing program for all stacks
2020	• Modified the furnace stacks for improved dispersion
2022	• Re-built the furnace with supplemental electric heat (e-boost), reduced freeboard area, and altered burner positioning all of which were identified from R&D and chemical modelling as opportunities to reduce the formation of hexavalent chromium)
2024	• Eliminated furnace bubblers allowing for increased e-boost capacity and an expected reduction of hexavalent chromium generation • Conducted two full source testing programs to define emissions prior to preparing the Site-Specific Standard Renewal Application

3 PREFERRED POLLUTION CONTROL COMBINATION

Owens Corning is committed to reducing POI concentrations of hexavalent chromium and has selected a combination of options expected to reduce the predicted offsite POI concentration by 49% by 2033. This Preferred Pollution Control Combination is the technically feasible pollution control combination from all sources that achieves the maximum reduction in POI concentration.

Research and development conducted over the past several years has led to a deeper understanding of the influence of combustion temperature and burner location at the chromium refractory freeboard area and its relationship to hexavalent chromium generation. As a result, Owens Corning is in the final stages of an alternative oxygen/gas combustion design for the forehearth area. This design change involves repositioning the “top fired” burners to a horizontal “side fired” configuration and the use of smaller, more frequently spaced burners to achieve a more consistent temperature profile. Thermodynamic modelling of this redesign predicts a reduction of the exhaust gas velocity at the freeboard area which is expected to reduce the generation of hexavalent chromium.

In the 2010-2013 time frame, a low sublimation chromium (LSC) refractory was formulated by SEFPRO. This LSC refractory is expected to have a lower rate of total chromium sublimation (solid to gas transformation). As part of their commitment to ongoing improvements and trialing new technologies, Owens Corning installed this LSC refractory in 2013 in a section of forehearth and it is still in-service today. When the forehearth reaches end of life and requires a rebuild, the wear on the in-service LSC refractory will be observed for any concerning wear patterns which would indicate it failed to perform as designed. If the performance of the in-service LSC refractory is confirmed, Owens Corning plans to install LSC refractory as a best practice for the CFM forehearth siderails during the next rebuild.

In addition to the installation of the above technologies, modifications are planned for the furnace and forehearth stacks. Fans will be installed to draw air from inside the furnace hall into the furnace and forehearth stacks. This action will increase the exit velocity to improve dispersion and enhance emission capture into process stacks and reduce concentrations from general ventilation. The forehearth stack will be extended to a total height of 32 m above ground to overcome the influence of the building on dispersion.

Owens Corning will also continue to review and assess the technical feasibility and potential effectiveness of electrostatic precipitator and dust collector technologies for hexavalent chromium.

3.1 Schedule

Glass melting at this facility is a continuous operation with scheduled shutdown periods for rebuilds which can range from 8 to 20 years depending on asset life and capital spending schedules. Therefore, the implementation timelines are based on which activities can be completed while the plant remains in operation. The stack modifications for increasing flowrate and stack heights can be completed while the facility is operational and are scheduled to occur by the end of 2026 pending final engineering design. The installation of the LSC refractory and the design changes to the forehearth require a facility shutdown at the end of that asset life. The CFM section of the forehearth is expected to require a rebuild between 2030 and 2033, therefore the implementation schedule for the forehearth LSC refractory and design changes are scheduled to be completed by the end of 2033.

Owens Corning will continue to conduct R&D related to decreasing the formation of hexavalent chromium in the process and monitor the development/emergence of technologies to reduce emissions.

The following table provides a summary of the action plan commitments and timelines.

TABLE 2 Action Plan Summary

Timeline	Actions	Predicted POI Reduction from Current (%)
2025 - 2026	**Milestone 1** Re-engineer the furnace stacks including: • Additional fans to increase the total flow to each stack to 5.13 m^3/s Re-engineer the forehearth stack including: • Additional fan to increase total flow to 11 m^3/s • Stack height increased to a total height of 32 m (above grade) Continue to review the technical feasibility and potential effectiveness of electrostatic precipitator and dust collector technologies.	48.5%
2030 - 2033	**Milestone 2** Implement the side firing design change for the CFM forehearth. Replace low sublimation chromium (LSC) refractory in the CFM forehearth siderails after performance is verified via wear pattern assessment of in-service LSC. Timing is dependent upon the condition of the furnace and forehearth assets. More specific timing of the rebuild schedule cannot be determined until closer to 2028-2030. Therefore, the timing has been indicated as no later than the end of 2033.	49%

The most significant portion of the reduction in the POI concentration is expected with the implementation of Milestone 1. The reductions predicted with Milestone 2 are minimal in comparison due to the absence of data to accurately quantify reductions associated with the technologies to be implemented. Source testing after Milestone 2 will generate some of the first data available for these emerging materials and technologies.

4 REFERENCES

Government of Ontario. 2025. *O.Reg. 419/05 - Air Pollution - Local Air Quality*. Ontario Regulation Consolidated July 1, 2023. Currency date February 18, 2025. 2025. https://www.ontario.ca/laws/regulation/050419

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