If this information is required in an accessible format, please contact 1-800-372-1102 ext. 3540.

The Regional Municipality of Durham
Information Report

From:	Commissioner of Works
Report:	#2024-WR-7
Date:	November 6, 2024

Subject:

Response to Questions Raised by Municipality of Clarington Council in Correspondence Received at the June 5, 2024 Works Committee Meeting

Recommendation:

That the Works Committee recommends:

That this report be received for information in response to the direction to staff to address questions raised in correspondence from Municipality of Clarington Council at the June 5, 2024 Works Committee meeting.

Report:

1. Purpose

1.1 The purpose of this report is to provide a written response to the correspondence received from the Municipality of Clarington (Clarington) Council at the June 5, 2024 Works Committee meeting. This report also addresses questions raised by delegations to the May 8, 2024 Works Committee meeting on the same matter.

2. Background

2.1 The Regional Municipality of Durham (Region) completed an Environmental Screening Report in 2021 to assess the impacts of increasing the Durham York Energy Centre (DYEC) capacity to 160,000 tonnes per year from the current capacity of 140,000 tonnes per year. The additional capacity will utilize the existing facility equipment more efficiently and meet the needs of the Region's growing population without any modifications to the facility. The Region

meanwhile continues to focus on increasing diversion from disposal to reduce the quantity of waste required to be processed at the DYEC.

2.2 At the May 27, 2024 meeting, Clarington Council passed two resolutions, PD-035-24 and PD-036-24, addressing concerns related to the DYEC. Copies of these resolutions were submitted to the Minister of the Environment, Conservation and Parks (MECP), and the Region was copied on the correspondence. Responses to the concerns raised in Clarington's resolutions are provided below in Section 3.

2.3 On May 8, 2024, the Works Committee received two delegations regarding the approved Environmental Screening Report for the DYEC. Responses to questions raised during these delegations are also provided below in Section 3.

2.4 The remainder of this report is provided in a Question and Response format to respond to the questions raised in the two meetings outlined above.

3. Questions and Responses

Clarington Council Resolution PD-035-24

3.1 Re-evaluate the 2019 assumptions about the capacity increase given programs to capture additional organics from the garbage and the Region's recent focus on waste reduction as per the Long-term Waste Management Plan 2022-2040.

a. The drivers for the capacity increase have remained the same. Durham Region requires waste disposal capacity to meet the needs of a growing population and reduce tonnage shipped to landfills and the associated greenhouse gas emissions.

3.2 Provide an updated summary of potential environmental/ecological impacts using the most recent data.

a. A series of studies and reports were completed as part of the original Environmental Assessment. These studies were reviewed to assess the impacts of a 20,000 tonne increase in waste throughput. The reviewed studies included surface and stormwater, groundwater, land use, noise, stack emissions, ambient air, greenhouse gas emissions, the natural environment, socioeconomic impacts, traffic, visual effects, and heritage and culture. The study review concluded no significant impacts from the tonnage increase. The MECP reviewed a similar request from Clarington

Council (and the delegations) requesting elevation. The Region has responded to concerns raised to the satisfaction of the MECP. The MECP concluded following a review of the submissions that there was no requirement for the Region to further update existing or conduct additional studies.

3.3 Provide a written opinion from the Region's Medical Officer of Health on potential health impacts of the capacity increase as well as recommendations on improvements to DYEC monitoring plans.

a. The Region's Medical Officer of Health, Dr. Kyle, has had a limited role in the development of the DYEC, acknowledging the MECP approval role and that MECP guidelines are developed in keeping with the prevention of health impacts. In response to a specific request from the community, Dr. Kyle engaged and consulted with Dr. Lesbia F. Smith, MD (Environmental and Occupational Health Plus Inc) in 2011 to conduct a detailed assessment of the potential human health risks associated with the facility. Dr. Smith concluded that assuming the DYEC operates as specified in the Human Health and Ecological Risk Assessment (HHERA), it is unlikely to present unacceptable health risks to individuals near the site or the broader community (Report #2011-MOH-24). The facility, as planned, is not expected to pose a significant public health risk.

b. Attachment 1 is a memo from Dr. Kyle summarizing the expert assessments provided to the Health Department regarding the DYEC environmental monitoring plans. The memo concludes that there is sufficient evidence that the expansion will not result in unanticipated adverse health impacts and that the proposed expansion of the DYEC would be safe. A Senior Toxicologist and Senior Environmental Health Scientist from Intrinsic Corp. conducted a brief Dioxins and Furans study and concluded that emissions from the DYEC do not play a significant role in regional ambient air concentrations of Dioxins and Furans. The Health Department supports continued air and soil monitoring.

3.4 Include identification of all financial costs associated with the capacity increase including the required Environmental Compliance Approval (ECA) study costs and confirm whether or not Durham and York Regions would be eligible to receive the provincial power subsidy for waste above the current 140,000 tonnes per year.

a. Cost is a relevant but not primary factor for this decision. Staff time is the most significant cost associated with the capacity increase. Additional costs include consultant support for the ECA amendment to complete an Emission Summary and Dispersion Modelling (ESDM) and Acoustic Assessment. Overall, from an operating perspective, the costs of the increased capacity are net positive. The financial impact would remain beneficial to the Region since the unit processing cost payable under the contract is significantly reduced when more than 140,000 tonnes per year are processed, and the Region avoids disposal costs for material that would otherwise have been bypassed. The capacity increase is a more effective utilization of the DYEC and will reduce the quantity of waste sent to landfills. The power purchase agreement will apply to power generated under appropriate conditions, most notably at the end of the year when the facility would otherwise idle one or more boilers as it approaches its annual limit.

3.5 Provide copies of the documents and comments to and from Durham and York Region and their consultants and the MECP since the submission of the December 2021 Environmental Screening Report.

a. Summary tables of the Region's response to stakeholder questions have been posted to the DYEC website: Table A Proponent Response to Elevation Request and Table B Proponent Information Requirements.

3.6 Provide a summary of how the comments and concerns submitted by the Municipality of Clarington and the public were addressed in the Environmental Assessment screening process and how and when any unresolved issues would be addressed.

a. The elevation requests were based on a series of questions from stakeholders with concerns primarily in the areas of air emissions control technology and emissions modelling, the environmental monitoring conducted by the Region, and the Site-Specific Human Health and Ecological Risk Assessment. At the MECP's request, the Region compiled all stakeholder questions into a table and provided a response to each question. Based on the Region's response, the MECP determined that elevation to a full Environmental Assessment was not required.

b. Summaries of the Region's response to stakeholder questions are found in Table A, Proponent Response to Elevation Request, and were considered by the MECP in not granting the request for project elevation.

Clarington Council Resolution PD-036-24

3.7 Provide complete AMESA data for 2015 to 2019, including the underlying documents.

a. The AMESA (Adsorption Method for Sampling Dioxins and Furans) system was initiated in 2015 and has been maintained according to guidelines from the manufacturer, Environment S.A. Deutschland (ESAD), the North American vendor, Altech, and the AMESA Technical Manual.

b. As recommended by ESAD, validation testing on the monitors was performed in 2016 and 2017 to validate and certify the units using the Relative Accuracy (RA) methodology used for the other continuous emissions monitors at the DYEC. As part of the validation testing in 2017, cleaning procedures were incorporated into the validation protocol to replicate the reference method procedure (EPA Method 23). Additional RA validation testing was performed in the Fall of 2018 to coincide with the annual DYEC compliance testing period.

c. Based on the validation testing conducted between 2016 and 2018, the AMESA monitors were not proven to be accurate within the limits set for RA requirements (less than or equal to 10 per cent) when compared to simultaneous EPA Method 23 testing for Dioxins and Furans (D/F) emissions from Energy from Waste (EFW) facilities.

3.8 Provide for 2020 and quarterly AMESA reports that Durham began providing in 2021 all supporting underlying documents together with a detailed rationale for each instance of data invalidation as well as the sample results for those periods where data was available but was not reported; and

3.9 Ensure that all future quarterly AMESA reports include all underlying data and provide a detailed rationale explaining any invalidated results and report all sampling results even if invalidated.

a. Due to variability in the D/F concentrations recorded by the AMESA, caused in part by fluctuations of isokinetic and non-isokinetic conditions during operations periods, the AMESA is not considered a measure of compliance. However, it can and does serve as a useful diagnostic tool to demonstrate that plant operations are relatively steady and help identify operational parameters that may need to be adjusted further in the period between

compliance testing, particularly if readings are received outside of the expected norm, similar to the approach used by the E.U. As an operational tool, the program is overseen by the Contractor, and staff provide summary reports to committee as previously directed. The MECP, in previous responses to the Municipality of Clarington, has confirmed that the program is not a compliance point for the facility and that the ministry is satisfied with the current program.

b. The D/F levels from the DYEC, and in EFW plants, in general, are extremely low compared to permit limits and limits of testing methodologies. At these low levels, the accuracy of the sampling equipment is lower, and the impact of testing and laboratory analysis errors and uncertainties increase.

c. Each AMESA is designed to keep the sample collection isokinetic (there is no disruption to the gas flow rate during sampling, to capture particles that pass through a defined area at a specified time without disrupting their paths). The unit is placed offline when the plant loads drop below a certain level. During these upset events, any non-isokinetic sampling compromises the accuracy of the results and can significantly bias the results.

d. The approach to continuous sampling of D/F at EFW facilities in the U.K. and E.U is similar to that used by the DYEC. Monitoring using an AMESA or similar system is more common in the E.U. The approach and results of the testing of some of these systems are provided in this March 2022 article: Dioxins and WtE Plants: State of the Art.

e. Due to variability in the D/F concentrations recorded by the AMESA, caused in part by fluctuations of isokinetic and non-isokinetic conditions during upset periods, the AMESA cannot be considered a measure of compliance. However, it can serve as a useful diagnostic tool to demonstrate that plant operations are relatively steady and help identify operational parameters that may need to be adjusted if higher or lower readings are recorded by the system, similar to the approach used by the E.U.

Works Committee Delegation

3.10 What are the potential environmental and health impacts of the proposed increase to 160,000 tonnes per year?

a. The DYEC will continue to operate using the existing facility equipment. A comprehensive site-specific Human Health and Ecological Risk Assessment (HHERA) that assessed baseline and upset cases was completed in 2009. The scenarios studied in the HHERA indicate that emissions from the facility would not lead to any adverse health risks under an operating design capacity of up to 400,000 tonnes per year.

b. As part of the current proposal, considering scenarios of 160,000 tonnes per year operating conditions, an Air Quality Impact Assessment (Assessment) was prepared by Golder Associates to document the change in air quality. The Assessment concluded that the increase in annual throughput by 20,000 tonnes per year is not expected to significantly impact local air quality.

3.11 What is the opinion of Durham Region's Medical Officer of Health on the proposed increase?

a. Please see the response to Question 3.3 above.

3.12 What are the additional costs associated with the capacity increase, including required study costs?

a. Additional costs to support the ECA amendment application would be for the completion of an ESDM study and an Acoustic Assessment report. Overall, from an operating perspective, the costs of the increased capacity are net positive, and the financial impact would remain beneficial to the Region since the unit processing cost payable under the contract is significantly reduced when more than 140,000 tones per year are processed.

3.13 Please include material provided to MECP since the December 2021 Environmental Screening Report and the MECP comments over the course of the capacity increase application. Were additional tables prepared to address MECP questions?

a. The additional tables have been posted on the DYEC website: Table A, Proponent Response to Elevation Request, and Table B, Proponent Information Requirements.

3.14 Can you provide the results of recent waste audits?

a. On November 24, 2023, staff provided an update on waste audit results in Information Report 2023-INFO-96.

3.15 Why isn't the Minister's letter posted on the DYEC website?

a. The Minister's letter has been posted on the DYEC webpage: 2021 Streamlined Environmental Assessment. The Environmental Screening Report, supporting materials and future correspondence can also be found at this location.

3.16 Will you post the ECA Amendment Application and Study Data to the DYEC website?

a. The information requested in the letter will be posted on the DYEC website completion.

3.17 Now that MECP has denied the elevation requests, what are the next steps to the ECA application and completion and the mandatory requirements, if any, for further stakeholder engagement?

a. At the end of the Environmental Screening Process, the proponent issues a Statement of Completion to formalize the completion of the Environmental Screening Process when a final decision was made not to elevate the project to a full Environmental Assessment. The Statement of Completion allows the Region to proceed with the project as described in the Environmental Screening Report.

b. The Region will proceed with an ECA amendment application that will include engaging consultants to complete an updated ESDM report in accordance with Ontario Regulation 419/05 and an Acoustic Assessment Report to meet the requirements of MECP noise guideline NPC-300.

4. Conclusion

4.1 Staff committed to providing written responses to the questions raised in the delegations heard at the May 8, 2024 Works Committee meeting. This report fulfills that commitment.

4.2 Based on the Environmental Screening Report, additional information requested by the MECP, and responses provided to the MECP to address stakeholder

concerns, the Minister has denied the elevation requests for the DYEC capacity increase.

4.3 Staff will proceed with the next steps, including completing and submitting an ECA amendment application in accordance with the regulations and Environmental Screening Report approval.

4.4 For additional information, contact: Andrew Evans, Director, Waste Management Services, at 905-668-4113 extension 4102.

5. Attachments

Attachment #1: 2024 Durham Region Health Department DYEC Letter dated October 4, 2024

Respectfully submitted,

Original Signed By:

Ramesh Jagannathan, M.B.A., M.Eng., P.Eng., PTOE
Commissioner of Works

Recommended for Presentation to Committee

Original Signed By:

Elaine C. Baxter-Trahair
Chief Administrative Officer

The Regional Municipality of Durham

Health Department

605 ROSSLAND ROAD EAST
LEVEL 2
PO BOX 730
WHITBY, ON L1N 0B2
CANADA

905-668-2020
1-800-841-2729
Fax: 905-666-6214

durham.ca/health

An Accredited Public Health Agency

facebook.com/DurhamRegionHealth
instagram.com/DurhamRegionHealth
x.com/DurhamHealth
youtube.com/DurhamHealth

"Service Excellence for our Communities"

October 4, 2024

Mr. Ramesh Jagannathan
Commissioner of Works
The Regional Municipality of Durham
605 Rossland Road East
Whitby, ON L1N 6A3

Dear Ramesh:

Re: Opinion on Durham York Energy Centre (DYEC) Proposed Capacity Increase to 160,000 tonnes per year (tpy)

As you recall, you requested an opinion from us on the potential health impacts of a 20,000 tpy capacity increase, as well as recommendations on improvements to DYEC environmental monitoring plans in follow up to request made by the Municipality of Clarington in Correspondence Item 7.1 a) dated May 28, 2024. As you know, medical officers of health have no role to play regarding the regulation of waste incinerators. Hence, I have had no involvement with this matter for close to 15 years since the original environment assessment was under consideration. Accordingly, we retained the services of Intrinsik Corp and Dr. Ray Copes to advise us.

Intrinsik Corp.

Intrinsik Corp. (i.e., Dr. Glenn Ferguson, Senior Environmental Health Scientist and Mr. Elliot Sigal, Senior Toxicologist) was engaged to conduct a review of the supporting documents required for the DYEC expansion and the current environmental monitoring programs undertaken at the DYEC (1st attachment). The following are its significant findings:

- The Environmental Screening Report (ESR) and specifically, the Air Quality Impact Assessment Report (these reports are available here), followed the appropriate approach to evaluating the impacts on air quality that may arise from the proposed increase in waste stream throughput.

- Air dispersion modelling under the 160,000 tpy scenario has predicted that ambient air concentrations of the emissions would remain the same or be decreased. If ambient concentrations

remain the same or are decreased, then the conclusions that the increase in annual throughput of DYEC by 20,000 tpy would not be expected to significantly impact local air quality would also be correct.

- Intrinsik conducted a brief dioxin and furan congener fingerprint analysis, where the isomeric fingerprint from stack testing was compared to the isomeric fingerprint from ambient monitoring, in order to determine whether that emission source may be a significant source driving ambient concentrations of dioxins and furans. This analysis indicates that emissions from the DYEC do not play a significant role in regional ambient air concentrations of dioxins and furans.

- There is a slight upward trend for dioxins and furans noted in the most recent rounds of soil sampling. Should the subsequent round show a continued increase, a decreased sampling interval (i.e., more frequent) might be recommended to further monitor this trend as it could be indicative of a fugitive emission source of dioxins and furans that are not showing up in stack testing data.

- Intrinsik concluded that there is sufficient evidence that the expansion will not result in unanticipated adverse health impacts and the proposed expansion of the DYEC would be safe based on the modelling and data presented in the ESR.

Dr. Ray Copes

Dr. Ray Copes, former Chief, Environmental and Occupational Health, Public Health Ontario, was asked to review the Intrinsik memo and to comment on potential health impacts of the expansion, if any (2nd attachment). The following are his main findings:

- Dr. Copes concurs with Intrinsik's conclusion that the expansion in capacity is not likely to result in adverse effects on human health. This conclusion relies heavily on the results of the air dispersion modelling which predicts no increase, and in many cases a decrease, in ambient air concentrations of pollutants from the DYEC.

- He noted that ambient air monitoring for common air pollutants in the vicinity of the DYEC has not shown any negative impacts on air pollutant concentrations attributable to the facility since its start-up in 2016.

- Given the experience to date with the facility, it seems implausible that the proposed increase in capacity of roughly 15% will have any appreciable impact on pollutant concentrations at nearby monitoring stations. However, a continued air monitoring program is essential to verify these predictions.

Conclusion

In light of the aforementioned advice we received, it is our opinion that it is reasonable to conclude that increasing the annual waste throughput from 140,000 to 160,000 tpy within the current regulatory and environmental monitoring frameworks remains protective of human health. We also support a continued air monitoring program to verify the predictions in the ESR.

It is noted that there is a slight upward trend for dioxins and furans in the most recent rounds of soil sampling. Should the subsequent round of soil sampling show a continued increase, we support a decreased sampling interval (i.e., more frequent) to further monitor this trend.

Sincerely,

R.J. Kyle, BSc, MD, MHSc, CCFP, FRCPC, FACPM
Commissioner & Medical Officer of Health

Attachments

1. Intrinsik Memo: Document Review of the DYEC Expansion for the Reports for the Durham Region Health Department
2. Dr. Ray Copes Memo: Review of Intrinsik report – regarding Durham York Energy Centre

MEMO

September 05, 2024

To: Robert Kyle
(Robert.Kyle@durham.ca)

From: Elliot Sigal and Glenn Ferguson
Intrinsik Corp.

Cc: Anthony Di Pietro
(Anthony.DiPietro@Durham.ca)

Dianne San Juan
(Dianne.SanJuan@Durham.ca)

Re: Document Review of the DYEC Expansion for the Durham Region Health Department

Executive Summary

Intrinsik Corp (Intrinsik) was requested by Durham Region Health Department to review the Environmental Screening Report (*i.e.*, Durham and York Regions, 2021) and related reports compiled in support of an increase in waste processing capacity of the Durham-York Energy Centre (DYEC) from 140,000 to 160,000 tonnes per year (tpy). The review focused on the following questions:

1) **Environmental Screening Report**
   - Evaluate the report and related documents to determine if increasing the annual waste throughput from 140K to 160K tpy within the current regulatory and environmental monitoring frameworks remains protective of human health.
   - Is there sufficient evidence that the expansion will not result in unanticipated adverse health impacts?
   - Is the proposed expansion of the DYEC safe?
2) **Review of Environmental Monitoring Program**
   - Assess the existing environmental monitoring program.
   - Have there been any changes to industry best practices for environmental monitoring and surveillance for energy-from-waste facilities, especially with respect to ambient air monitoring?
   - Could enhancements be made to the existing environmental monitoring program to reflect these updates (if any)
   - To review and comment on the Adsorption Method for Sampling Dioxins and Furans (AMESA) program.
3) **Provide a trend line/analysis of ambient air quality monitoring data for the DYEC**
   - Provide a summary of air quality monitoring data trends from pre-construction to current, to support medical expert opinion.

6605 Hurontario Street, Suite 500| Mississauga, ON, Canada L5T 0A3
905-364-7800 | www.intrinsik.com

Overall, Intrinsik is of the opinion that the Environmental Screening Report (ESR) and specifically the Air Quality Impact Assessment (AQIA) report follow the appropriate approach to evaluating the impacts on air quality that may arise from the proposed increase in waste stream throughput. The higher volume of waste is expected to result in a more consistent and sustained combustion process, leading to a higher stable temperature and increased efficiency in the steam turbine. Modelling has also predicted that the higher throughput of waste will result in increased flue gas volume which will improve movement and airflow within the stack, which are expected to result in higher in-stack temperatures and exit velocities. As a result, air dispersion modelling under the 160,000 tpy scenario has predicted that ambient air concentrations of the emissions would remain the same or be decreased.

If ambient concentrations remain the same or are decreased, then the conclusions that the increase in annual throughput of DYEC by 20,000 tpy would not be expected to significantly impact local air quality would also be correct. Other health-linked streams in the ESR (i.e., surface and groundwater, land, noise, socio-economic, etc.) also conclude that the proposed increase in treatment throughput would not result in any adverse health impacts. As such, we conclude that there is sufficient evidence that the expansion will not result in unanticipated adverse health impacts and the proposed expansion of the DYEC would be safe based on the modelling and data presented.

Finally, the facility employs a sophisticated environmental monitoring program which has demonstrated no evidence of impacts from the facility to the surrounding environment since it began operations. Based on our research, the AMESA program appears to be the most common dioxin and furan stack monitoring technology used in facilities such as this one. It should be noted that it is really intended for monitoring long-term trends of dioxin and furan stack emissions and not real-time monitoring presentations. As such, we agree with its current presentation in annual reports and comparison to stack monitoring test results to ensure ongoing compliance with dioxin and furan emission standards.

We believe the current environmental monitoring program is well designed and provides a good evaluation of the potential impacts of the facility on the surrounding environment, and we agree that an increase of 20,000 tpy in the facility throughput would not change the conclusions of the original health assessment.

Introduction

At the request of the Durham Region Health Department, Intrinsik Corp (Intrinsik) has reviewed the Environmental Screening Report (Durham and York Regions, 2021) and related reports compiled in support of an increase in waste processing capacity of the Durham-York Energy Centre (DYEC) from 140,000 to 160,000 tonnes per year (tpy). The review focuses on the following questions:

1) **Environmental Screening Report**
   - Evaluate the report and related documents to determine if increasing the annual waste throughput from 140K to 160K tpy within the current regulatory and environmental monitoring frameworks remains protective of human health.
   - Is there sufficient evidence that the expansion will not result in unanticipated adverse health impacts?
   - Is the proposed expansion of the DYEC safe?
2) **Review of Environmental Monitoring Program**
   - Assess the existing environmental monitoring program.
   - Have there been any changes to industry best practices for environmental monitoring and surveillance for energy-from-waste facilities, especially with respect to ambient air monitoring?
   - Could enhancements be made to the existing environmental monitoring program to reflect these updates (if any)
   - To review and comment on the Adsorption Method for Sampling Dioxins and Furans (AMESA) program.
3) **Provide a trend line/analysis of ambient air quality monitoring data for the DYEC**
   - Provide a summary of air quality monitoring data trends from pre-construction to current, to support medical expert opinion.

Environmental Screening Report (ESR)

The Regional Municipalities of Durham and York have commenced an Environmental Screening Process in accordance with the Waste Management Projects Regulation (Ontario Regulation 101/07) of the Environmental Assessment Act to amend the Environmental Compliance Approval for the DYEC. The Environmental Compliance Approval for the DYEC currently allows the facility to process up to a maximum of 140,000 tpy of waste for disposal at the site. The Regions are proposing to increase this amount by 20,000 tpy for a total of 160,000 tpy. The facility is capable of processing 160,000 tpy with its current equipment and is currently being underutilized despite demand for additional waste disposal capacity for residential waste within the Regions.

An Environmental Screening Report (ESR) has been prepared in support of the DYEC capacity increase. Other than Criteria 6.11 in the Environmental Criteria Screening Criteria Checklist (Appendix A of the ESR document), Health is not specifically addressed in the ESR.

Criteria 6.11: Cause negative effects on public health and safety indicates the following:

> *The Human Health and Ecological Risk Assessment completed in 2009 determined that overall the chemical emissions from the facility would not lead to any adverse health risks to residents, farmers or other receptors at the 140,000 tonnes per year operating scenario and minimal risk during upset conditions at the 400,000 tonne per year operating scenario. Additional modelling will be completed in the next stage of the screening process to confirm that no negative impacts will result from the tonnage increase to 160,000 tonnes per year*

Rather the ESR focuses on Air Quality impacts as a surrogate for health (i.e., if air quality is not negatively impacted then health will not be negatively impacted). Since air quality has the largest potential impact on health, there is merit to such an approach. The air quality impacts of an increase in capacity from 140,000 to 160,000 tpy is addressed in Appendix D (Air Quality Impact Assessment (AQIA) of 160,000 tpy 2021) and reviewed below.

The following is a synopsis of the ESR report, with a specific focus on the potential for health impacts:

- The ESR focuses on an increase in capacity from 140,000 to 160,000 tpy
- The original Environmental Assessment and Human Health and Ecological Risk Assessment (HHERA) considered a capacity of 400,000 tpy
- The ESR process requires completion of the Environmental Criteria Screening Criteria Checklist. The checklist is an evaluation of potential environmental effects that could result from the project. The Checklist (Appendix A of the ESR), addresses the following Criterion:
    - Surface and Groundwater
    - Land
    - Air and Noise
    - Natural Environment
    - Resources
    - Socio-Economic
    - Heritage and Culture
    - Aboriginal
    - Other
- The Checklist identifies air and noise as potential negative effects of expansion
    - Criteria 3.1: Cause negative effects on air quality due to emissions (for parameter such as temperature, thermal treatment exhaust flue gas volume, nitrogen dioxide (NO_2), sulphur dioxide (SO_2), oxygen (O_2), opacity, hydrogen chloride (HCl), total suspended particulate (TSP), or other contaminants)?
        - *The potential for environmental effects on air quality exists because of stack emissions. The profile and dispersion characteristics of the stack may change because of the increase in facility throughput*.
    - The AQIA (Appendix D of the ESR) assesses the potential for air quality impacts (AQIA reviewed below)
        - AQIA: capacity increase will NOT have a negative effect on local ambient air quality
    - Socio Economic (proximity to airport or heliport) is also noted as a potential negative impact
    - Health is specifically addressed in Criteria 6.11 of the Environmental Criteria Screening Criteria Checklist (Appendix A)
        - Criteria 6.11: Cause negative effects on public health and safety
            - HHERA determined no adverse effects @140k tpy
            - minimal risks during upset conditions @ 400k tpy
            - response to Criterial 6.11 implies that additional HHERA modelling will be conducted

- As part of the DYEC's environmental monitoring programs, two ambient air monitoring stations were established in 2013 to monitor ambient air quality in the vicinity of the DYEC. Historical air monitoring trends are discussed below. The ESR addresses ambient air quality in Section 4.3.5.
    - Table 11: 2020 - 19 events where 1hr MAX SO_2 exceeded AAQC
        - no exceedances of 24-hr average or annual average for $PM_{2.5}$, SO_2 and NO_2
        - 1-hour exceedances not likely from facility due to wind direction and concurrent stack data
    - Table 12: 2018-2020 - no exceedance of rolling averages for $PM_{2.5}$, SO_2 and NO_2
    - Table 13: 2020 – no exceedances for TSP or metals
    - Table 14: 2020 - Few (4-5) exceedances of benzo(a)pyrene (B(a)P)
        - modeling suggest exceedances are NOT facility related
    - Table 15: 2020 – no exceedances for dioxins and furans
    - Increase in capacity is NOT expected to impact local air quality
- A comparison of the modelling results from the 140,000 tpy and 160,000 tpy operating scenarios determined that the change in predicted concentrations between the two scenarios is small with maximum predicted concentrations of all Indicator Parameters showing a decrease for future maximum operating scenario of 160,000 tpy operating scenario
- Health is NOT specifically addressed in the ESR except for Criteria 6.11 which states that "additional modelling will be completed in the next stage of the screening process to confirm that no negative impacts will result from the tonnage increase to 160,000 tonnes per year". It was uncertain as to whether this is referring to modelling as part of a human health risk assessment (HHRA) as was completed in 2009 as part of the original facility approvals, or if its further air dispersion modelling. However, subsequent follow-up with the Region of Durham indicated that outside of that conducted as part of the planned Emission Summary and Dispersion Modelling (ESDM) report, there is no additional modelling or monitoring planned.
- In addition to air quality, the ESR considers potential impacts on odour, noise and traffic.
    - Potential odour emission sources associated with the processing of waste includes:
        - Truck transportation of waste onto the site
        - Waste handling and storage onsite
        - Thermal treatment of waste onsite
    - Based on the initial EA, odour impact mitigation design features of the DYEC and recent sampling, no significant negative effects from odour will result from the 20,000 tpy capacity increase
    - Since DYEC operations commenced in 2016, there have been no noise complaints attributed to the operation of the facility
    - Based on the review of the initial EA, the acoustic assessment for ECA application and subsequent acoustic assessments, no significant negative effects from noise are anticipated from the 20,000 tpy capacity increase
    - An updated acoustic assessment undertaken in 2019. Noise emissions associated with Facility operations continue operate in compliance with MECP noise guideline as specified in NPC 300.

    - The processing of an additional 20,000 tpy may result in up to four additional trucks per day, including waste delivery, reagent delivery and residual removal vehicles. Based on the review of the initial EA and the actual truck traffic associated with the operational DYEC, no significant negative effects to local traffic will result from the 20,000 tpy capacity increase

- Increasing the waste capacity of the DYEC to 160,000 tpy will result in additional ash generation. An additional 20,000 tpy of waste per year is estimated to result in an additional 14 per cent ash generation. This ash will continue to be shipped to a landfill for use as daily cover.
- Table A - public comments.
    - 54 questions from Municipality of Clarington and 8 individuals
    - Questions about HHRA and human health concerns
        - responses point to emissions
        - responses to questions are consistent with ESR
- Table B - Information Requirements
    - All necessary info included.

Air Quality Impact Assessment (AQIA)

An Air Quality Impact Assessment was provided as Appendix D of the ESR. The purpose of the AQIA was to document any potential change in air quality related to the proposed step increase of 20,000 tpy. The AQIA notes that the proposed Project would not introduce any new sources of emissions to the DYEC but would impact the rate of emissions from the existing 87.6 m tall stack to handle the increased throughput of municipal solid waste (Golder, 2021).

To conduct this evaluation, Golder (2021) completed air dispersion modelling of stack emissions for four discrete emission scenarios:

1. **Scenario 1A:** Current maximum operating conditions (*i.e.*, main stack operating at 140,000 tpy)
2. **Scenario 1B:** Current maximum operating conditions plus ancillary sources (*i.e.*, main stack operating at 140,000 tpy with simultaneous silo filling and testing of the diesel-fired emergency power generator)
3. **Scenario 2A:** Future maximum operating conditions (*i.e.*, main stack operating at 160,000 tpy)
4. **Scenario 2B:** Future maximum operating conditions plus ancillary sources (*i.e.*, main stack operating at 160,000 tpy with simultaneous silo filling and testing of the diesel-fired emergency power generator)

Modelling was completed using the US EPA- and MECP-approved CALPUFF modelling system for approximately 90 contaminants over a receptor grid extending 40 km by 40 km centred on DYEC. Ground-level air concentrations were also provided for a total of 291 discrete sensitive receptors in the study area including industrial areas, residences/residential areas, hospitals, schools, day cares, nursing homes, recreational areas and water bodies. Both the modelled grid and sensitive receptor locations can be seen below in Figure 1. Emission rates for the stack were calculated using a combination of source testing data, in-stack emission limits and literature-based emission factors. Golder indicated that all input data were reviewed and approved by the MECP in advance of modelling.

As part of this modelling, Golder also conducted a cumulative assessment by stacking modelled contributions from the DYEC on top of background air quality concentrations (calculated by comparing the differences between the upwind Courtice and downwind Rundle monitoring stations) to produce a predicted air concentration at sensitive receptor locations in the surrounding community based on the future maximum operating conditions of the proposed Project. For averaging periods of 24-hours or less, the 90th percentile of the background monitoring data was used to represent a reasonable worst-case scenario. For the evaluation of chronic exposures, annual average concentrations were used.

Results of the cumulative modelling indicated that concentrations of all chemicals of concern were predicted to be below the provincial or federal guideline or criteria for that chemical, except for benzo(a)pyrene during maximum operations and NOx during testing of the emergency diesel power generator. Golder (2021) concluded that elevated benzo(a)pyrene concentrations were due to emissions from nearby Highway 401, and that emissions from DYEC contributing less than 1% of the cumulative concentration. Exceedances of the oxides of nitrogen (NOx) criterion were driven primarily by regional background concentrations with no significant differences observed in the predicted concentrations of NO_2 between the current and the future operation scenarios (Golder, 2021).

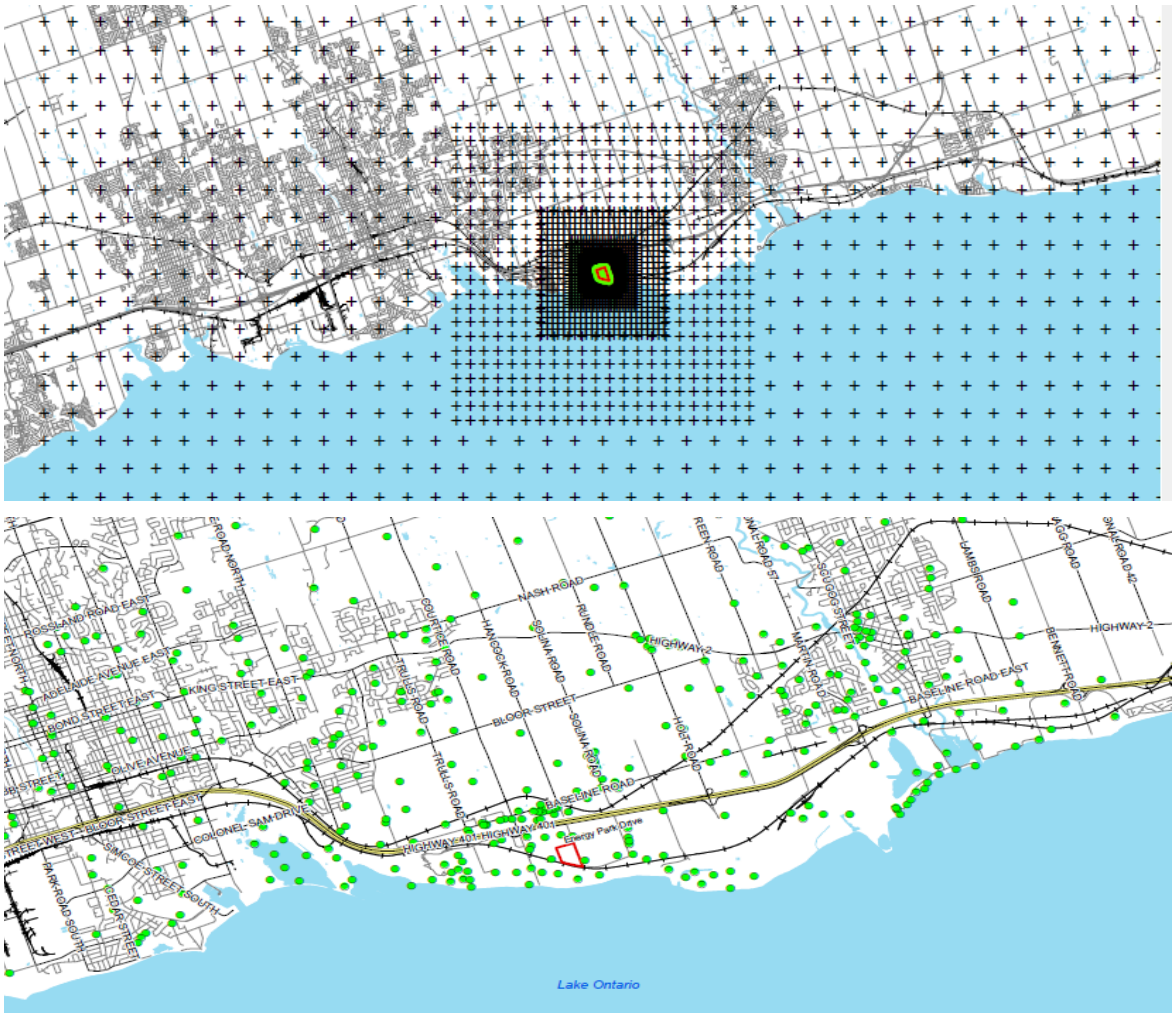


Figure 1 Grid and Sensitive Receptor Locations Modelled by CALPUFF

Interestingly, the AQIA predicted a small overall decrease in the maximum predicted concentrations for many of the contaminants when moving from 140,000 to 160,000 tpy due to an increased efficiency in facility operations. The increase in throughput results in an increase in both the stack outlet gas temperature and flowrate. This resulted in higher and broader dispersion of the contaminants from the stack, reducing the predicted ambient concentrations for most chemicals at the closest worst-case sensitive receptor locations. For the 140,000 tpy scenarios, stack exhaust temperature and flow rate were taken from the current ESDM report, while for the 160,00 tpy Scenarios, exhaust flow rate and temperature were calculated using observed data from recent stack testing campaigns. The exhaust temperature was taken from Ortech (2021) stack testing data and the exhaust flow rate was calculated by multiplying the measured exhaust flow rate by the ratio of steam production at 160,000 tpy to steam production at the time of source testing (approximately 1.13) (Golder, 2021).

Table 10: Comparison of Modelled Source Parameters

Source	Scenario	Stack Height [m]	Stack Diameter [m]	Exit velocity [m/s]	Exhaust Temperature [K]
Main Stack	1A/1B	87.6	1.7	23.02	405.37
Main Stack	2A/2B	87.6	1.7	26.18	413.5
Carbon Silo Filling – 2A	1B/2B	5.49	0.1	38.42	Ambient
Pozzolan Silo Filling - 2B	1B/2B	4.88	0.1	38.42	Ambient
Portland Silo Filling - 2C	1B/2B	3.96	0.1	38.42	Ambient
Pebble Lime Silo Filing - 2D	1B/2B	12.4	0.1	38.42	Ambient
Stand-by generator Testing	1B/2B	3	0.2	36.92	539

(Table 10 from Golder, 2021)

Subsequent follow-up with the Region of Durham, they indicated that a higher volume of waste allows for a more consistent and sustained combustion process thus resulting higher stable temperature which improves efficiency of steam turbine. In addition, higher throughput of waste results in a greater volume of flue gases being produced which increases the velocity of gases moving through the system, improving draft (enhancement of the movement of air and combustion gases) and airflow. The Regioin will continue to monitor real-time stack temperatures and velocities during stack testing (twice annually), even upon receiving the approval to increase to 160,000 tpy.

Golder (2021) concluded that the increase in annual throughput of DYEC by 20,000 tpy would not be expected to significantly impact local air quality.

Environmental Monitoring

Comprehensive environmental monitoring program is in place including:

- Real-time air emissions monitoring as recorded by the continuous emissions monitoring system (CEMS)
- AMESA (Adsorption Method for Sampling Dioxins and Furans) monitoring
- Air emissions monitoring through source (stack) testing
- Ambient air monitoring
- Groundwater and surface water monitoring
- Noise monitoring
- Odour monitoring
- Soil monitoring

Full reports providing detailed information and raw data for the environmental monitoring program are available from the facility website.

AMESA

- Widely used system for monitoring real time dioxin and furan emissions
- Described as a long-term monitoring system for dioxin emissions from industrial processes based on the adsorption method
- EPA Approved/verified test method
- There is nothing in the literature to indicate that it is not an appropriate system; long-term monitoring is the most relevant metric for the monitoring of dioxins and furans
- AMESA results are well aligned with source testing results

Ambient Air Monitoring

As part of the DYEC's environmental monitoring programs, two ambient air monitoring stations were established in 2013 to monitor ambient air quality in the vicinity of the DYEC. The two stations were sited with input from the MECP and are located at predominately upwind (Courtice) and downwind (Rundle Road) locations to the DYEC. The monitoring program includes the collection of the following at the two monitoring stations:

- Continuous – NOx, SO_2, $PM_{2.5}$
- Every 6 days – metals
- Every 12 days – polycyclic aromatic hydrocarbons (PAHs)
- Every 24 days – dioxins and furans

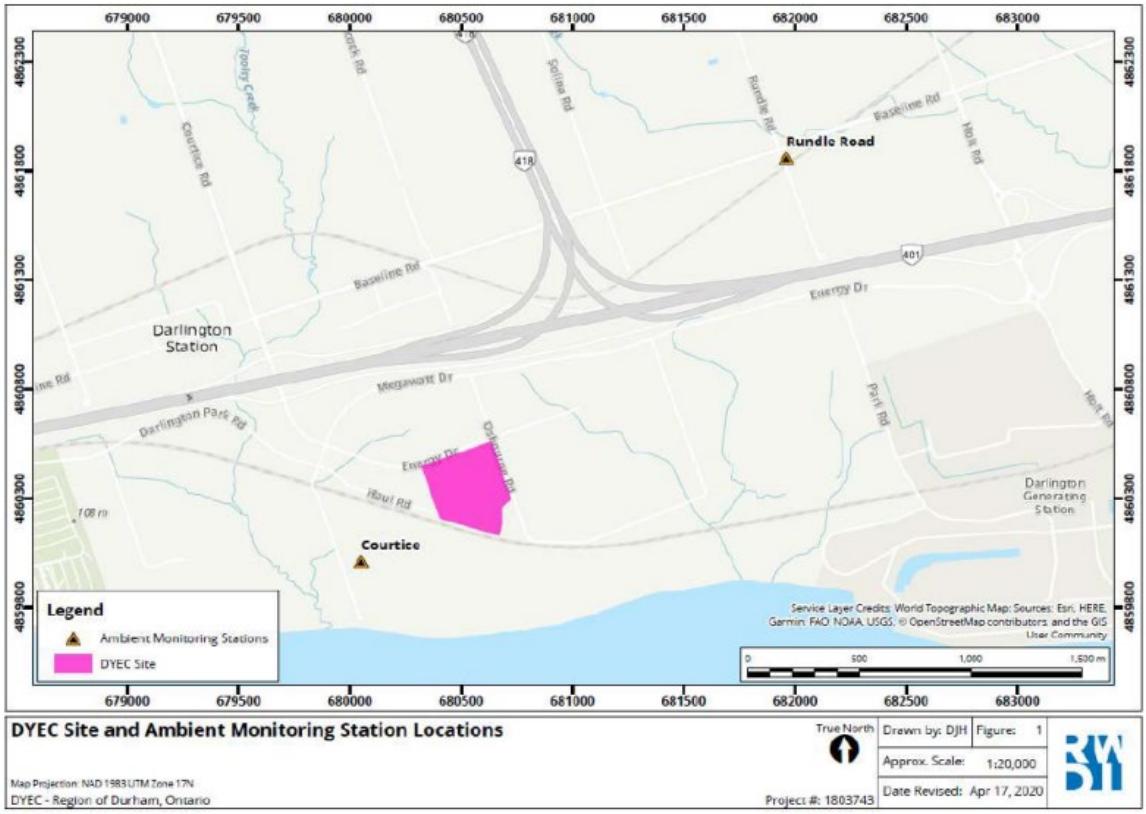


Figure 2 DYEC Ambient Air Monitoring Station Locations

Historical trends in ambient air monitoring results are included in the attached spreadsheet.

Comparison of Dioxin and Furan Congener Fingerprints in Monitoring Data

Polychlorinated dibenzo-p-dioxins and dibenzofurans ("dioxins and furans") are a group of chemicals that are formed during combustion processes such as that used in waste incineration, power generation, metal production, and fuel burning (including forest fires). These compounds are typically found in small amounts in the air, water and soil. While all these chemicals have a similar chemical structure (i.e., planar aromatic compounds with two benzene rings), they vary by the composition of chlorine atoms present and their relative positions attached to the benzene rings. While there are 210 different dioxins and furans (termed "congeners"), typically 17 specific congeners are evaluated when monitoring and assessing the presence of dioxin and furans. These include tetra-chlorinated (TCDD/TCDF), penta-chlorinated (PeCDD/PeCDF), hexa-chlorinated (HxCDD/HxCDF), hepta-chlorinated (HpCDD/HpCDF) and octa-chlorinated (OCDD/OCDF) dioxins and furans.

During a combustion process where chlorine is present, these congeners can be formed in different quantities depending on the nature of the process. This can result in different "fingerprints" being present when one evaluates the relative percentage that each congener group composes of the overall quantity of dioxins and furans. By comparing the isomeric fingerprint from stack testing to the isomeric fingerprint from ambient monitoring, one can determine whether that emission source may be a significant source driving ambient concentrations of dioxins and furans.

For the purposes of this evaluation, average concentration from the 2022 monitoring data from the upwind Courtice and downwind Rundle stations were used to produce relative percentage fingerprints for regional ambient air around the DYEC. This was then compared to the relative percentage fingerprints calculated from the average concentrations measured as part of the 2022 and 2023 DYEC stack testing.

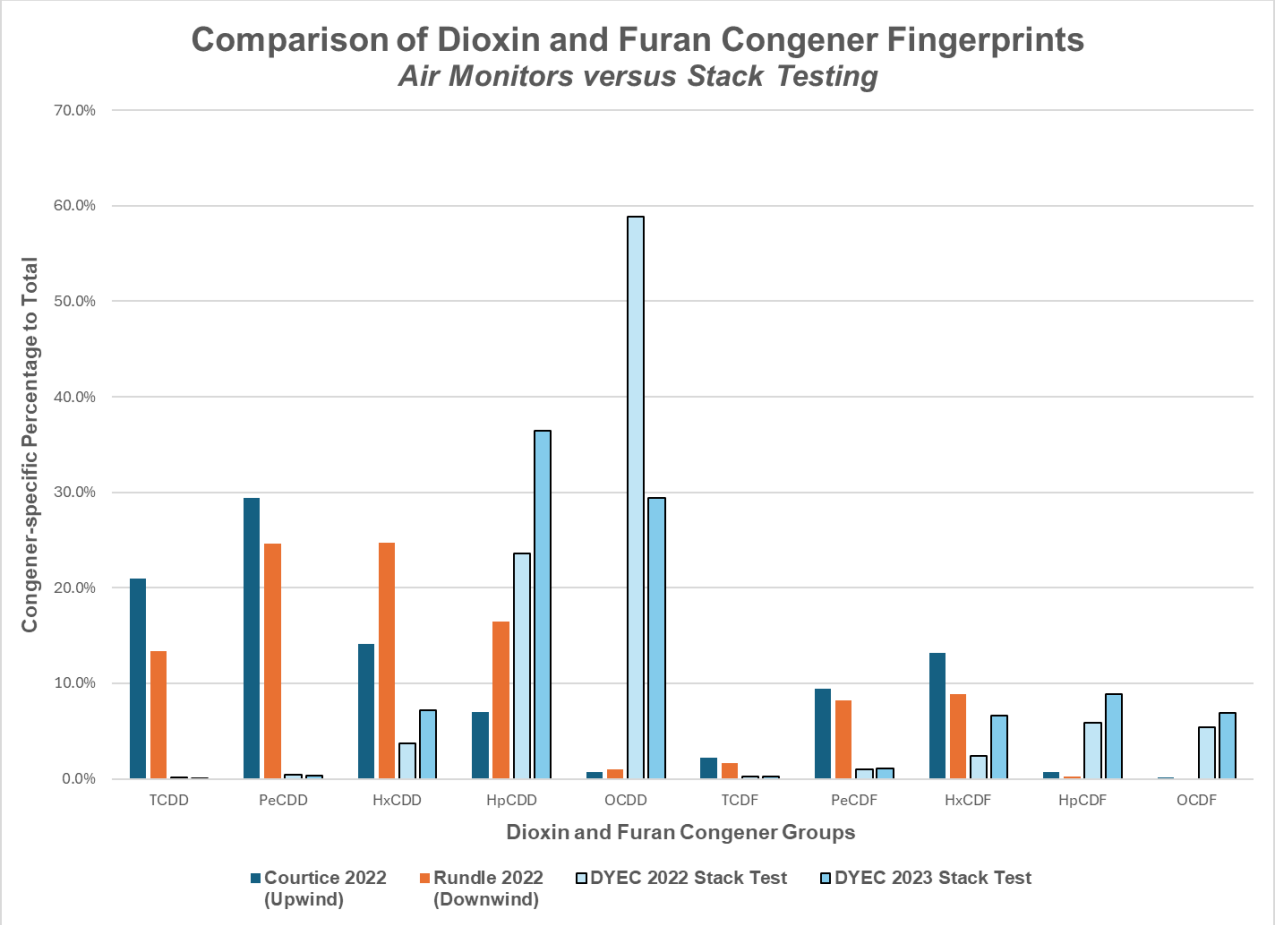


Figure 3 Comparison of Dioxin and Furan Congener Fingerprints in Air Monitoring

As noted above in Figure 3, ambient concentrations of dioxins and furans were dominated by the tetra-, penta-, hexa- and hepta-chlorinated congeners with little to no contribution from the octa-chlorinated congeners (i.e., OCDD and OCDF). However, results of the 2022 and 2023 stack testing indicated that the DYEC was not emitting much of the tetra- and penta-chlorinated congeners, with the emission fingerprint dominated by the hepta- and octa-chlorinated congeners which were not a significant component of what was observed in the environment. It is important to note that in many cases, the concentrations of various congeners in the stack testing were either non-detect (wherein the detection limit was used in this analysis) or well below regulatory emission standards.

The results of this brief dioxin and furan congener fingerprint analysis would appear to indicate that emissions from the DYEC do not play a significant role in regional ambient air concentrations of dioxins and furans. It is important to note that this crude fingerprint analysis is based on a limited dataset but does provide a broad overview of the types of dioxins and furans present in the environment around the DYEC.

Groundwater and Surface Water Monitoring

Both groundwater and surface water has been monitored in the vicinity of the DYEC:

- SW monitoring suspended until 2024 due to highway interchange construction
- The DYEC is a zero-process water discharge facility
- Historical groundwater analysis results for the site suggest that DYEC has NOT had an adverse effect on groundwater quality at the site

Historical trends in groundwater monitoring results are included in the attached spreadsheet.

Soil Monitoring

A soil monitoring program was put in place to provide soil monitoring in the area of the DYEC. Soil sampling occurs at the same locations as the ambient air monitor:

- An upwind site at the Courtice Water Pollution Control Plant, approximately 1 kilometre from the DYEC site;
- A downwind site near Baseline Road and Rundle Road in Clarington, approximately 2.5 kilometres from the DYEC site; and,
- A third station is located inside the property line of the DYEC (only monitored in 2015, 2016 and 2017).

Soil sampling occurred once prior to the commencement of operations, once during each of the first three years of operation, and every three years thereafter.

Historical trends in soil monitoring results are included in the attached spreadsheet.

In general, the soil test results are reassuring. There is a slight upward trend for dioxins and furans noted in the most recent rounds of sampling. Should the subsequent round show a continued increase, a decreased sampling interval (*i.*e., more frequent) might be recommended to further monitor this trend as it could be indicative of a fugitive emission source of dioxins and furans that are not showing up in stack testing data.

Conclusions

Overall, Intrinsik believes that the ESR and specifically the AQIA appear to follow the appropriate approach to evaluating the impacts on air quality that may arise from the proposed increase in waste stream throughput. If one agrees that the increased combustion efficiency linked to the increased production results in an increase in stack temperature and velocity, then it is understandable that the modelling could predict similar or decreased ambient concentrations in the surrounding community despite the increased throughput. Relatedly, if ambient concentrations remain the same or are decreased, then the conclusions that the increase in annual throughput of DYEC by 20,000 tpy would not be expected to significantly impact local air quality would also be correct. Other health-linked streams in the ESR (*i.e.*, surface and groundwater, land, noise, socio-economic, *etc.*) also conclude that the proposed increase in treatment throughput would not result in any adverse health impacts. As such, we would conclude that there is sufficient evidence that the expansion will not result in unanticipated adverse health impacts and the proposed expansion of the DYEC would be safe based on the modelling and data presented to date.

Finally, the facility employs a sophisticated environmental monitoring program which has not demonstrated any evidence of impacts from the facility to the surrounding environment since it began operations. Based on our research, the AMESA program appears to be the most common dioxin and furan stack monitoring technology used in facilities such as this one. It should be noted that it is really intended for monitoring long-term trends of dioxin and furan stack emissions and not real-time monitoring presentations. As such, we agree with its current presentation in annual reports and compared to stack monitoring test results to ensure ongoing compliance with dioxin and furan emission standards.

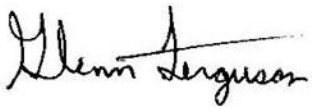
We believe the current environmental monitoring program is well designed and provides a good evaluation of the potential impacts of the facility on the surrounding environment, and we agree that an increase of 20,000 tpy in the facility throughput would not change the conclusions of the original health assessment.

CLOSURE

Intrinsik appreciates the opportunity to assist Durham Health in this matter. If you require any further information or clarification on any aspect in this memo, please do not hesitate to contact either of the signatories below.

INTRINSIK CORP.

Elliot Sigal, B.Sc. (Hon.), QP$_{RA}$, UKRT, ERT
Vice President / Senior Toxicologist



Glenn Ferguson, Ph.D., QP$_{RA}$
Vice President / Senior Environmental Health Scientist

References

Golder. 2021. Air Quality Impact Assessment – Durham York Energy Centre. Golder Associate Ltd. December 2021.

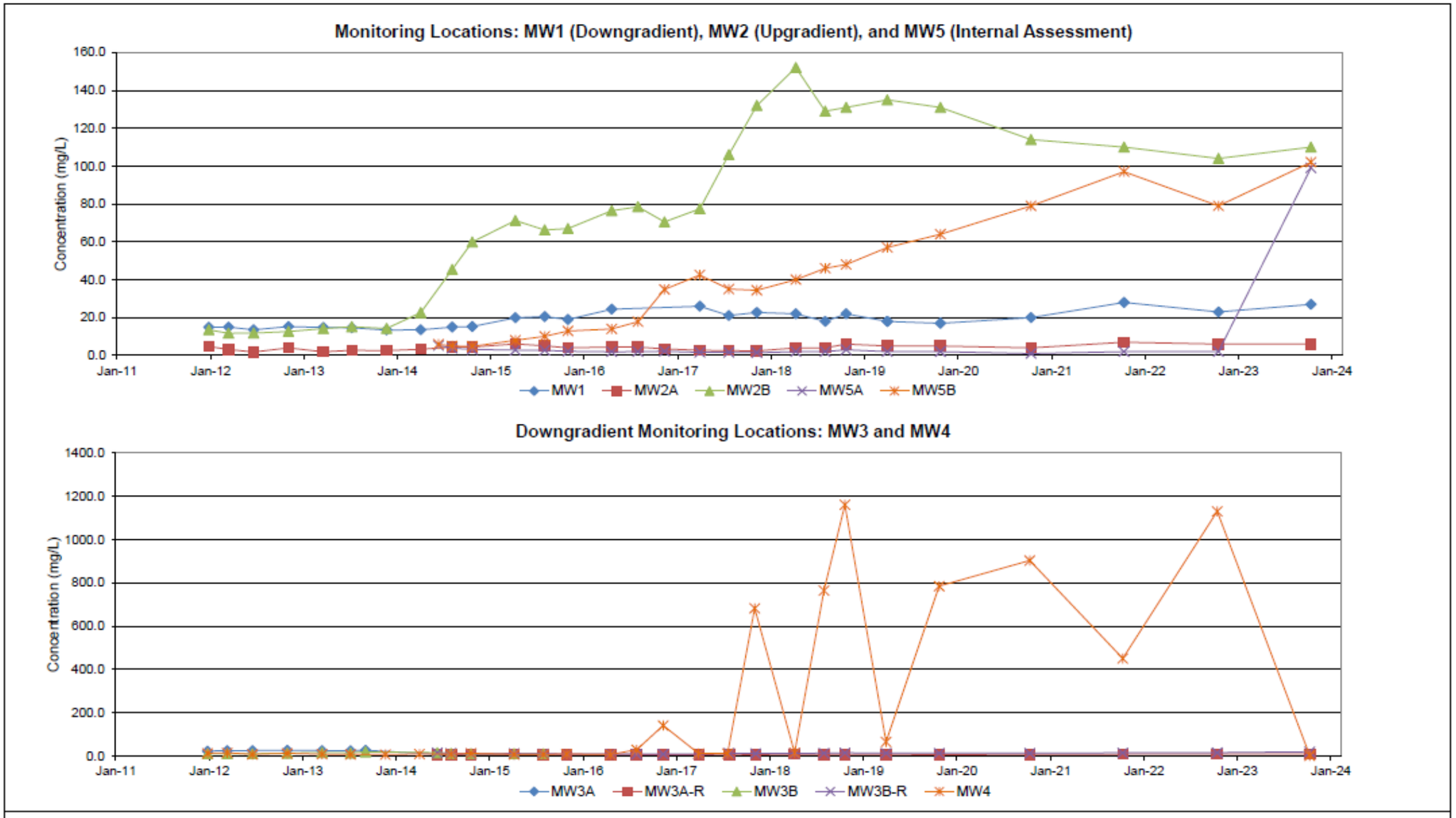
Durham and York Regions. 2021. Durham York Energy Centre Environmental Screening Report. Durham Region and York Region. December 2021.

DURHAM YORK ENERGY CENTRE

GROUNDWATER QUALITY TRENDS

2013-2024

Source: REGIONAL MUNICIPALITY OF DURHAM
DURHAM YORK ENERGY CENTRE: 2023 ANNUAL GROUNDWATER AND SURFACE WATER MONITORING REPORT
RWDI #2301083 April 18, 2024



1. mg/L denotes milligrams per litre.

CONCENTRATION VS. TIME PLOT
CHLORIDE

2023 ANNUAL MONITORING REPORT

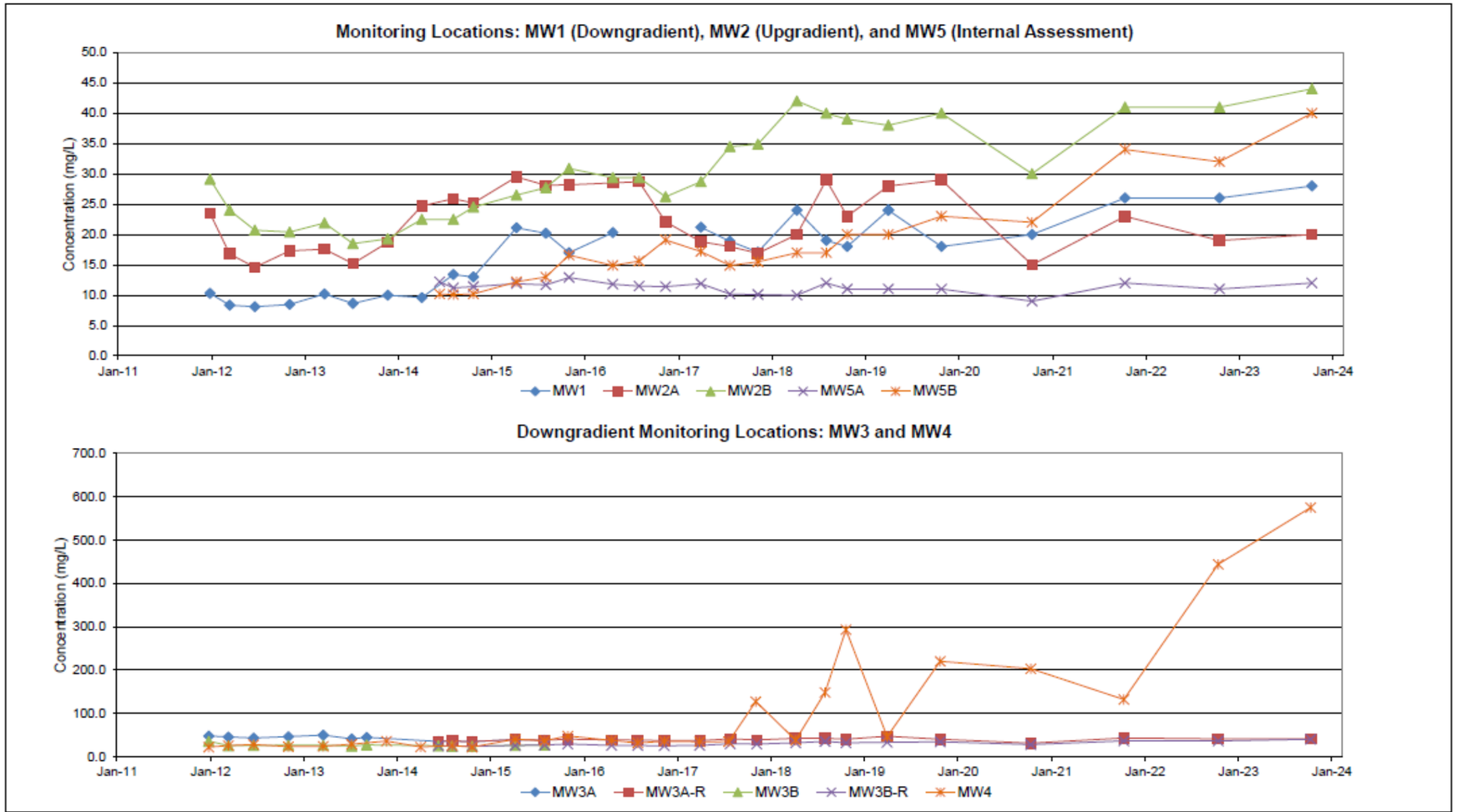
REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-1	**2301083**
APPROX. SCALE	DATE REVISED
NTS	**Dec 6, 2023**

FILE LOCATION: \\rwdgroup\guelph\Jobs_1\2301083\04Deliverables\41WasteManagement\08DYEC\AnnualReport\03Appendices\Appendix D - GW Chem\[Table D-2 Figs D-1 to D-8 - GroundwaterChemistry2023.xlsx]MW4

DATE PLOTTED: February 8, 2024

Note: The increasing chloride and sodium concentrations are interpreted to be attributed to the application of de-icing salt during the winter season to Energy Drive, Osborne Road, and/or the on-site roadways/parking lots.



1. mg/L denotes milligrams per litre.

CONCENTRATION VS. TIME PLOT
SODIUM

2023 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

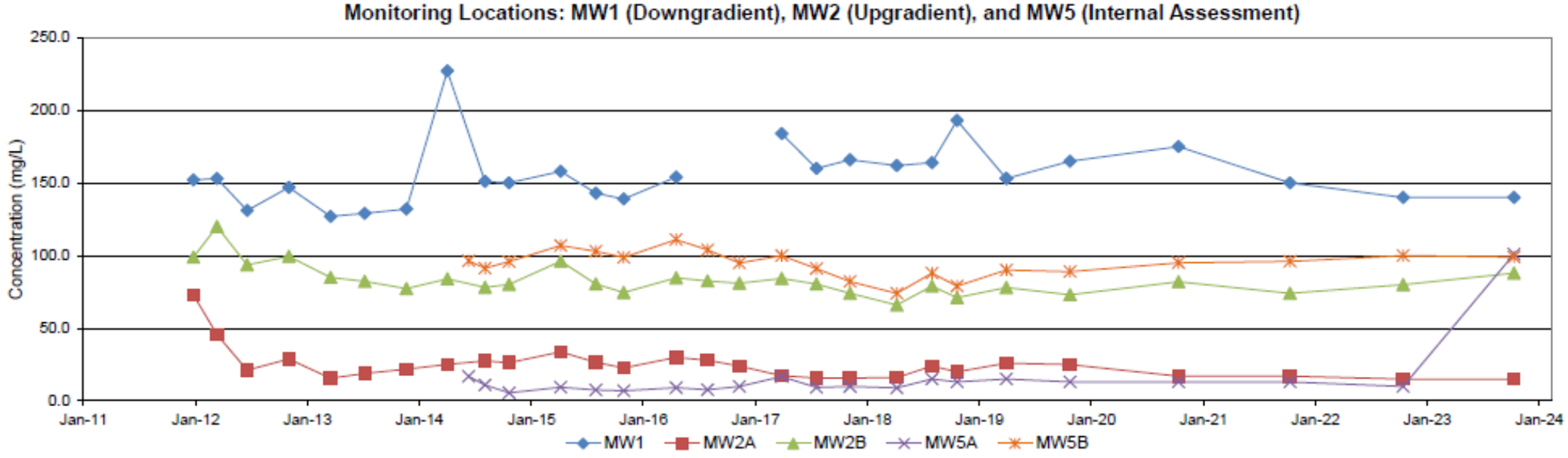
FIGURE NUMBER	PROJECT NUMBER
D-2	**2301083**
APPROX. SCALE	DATE REVISED
NTS	**Dec 6, 2023**

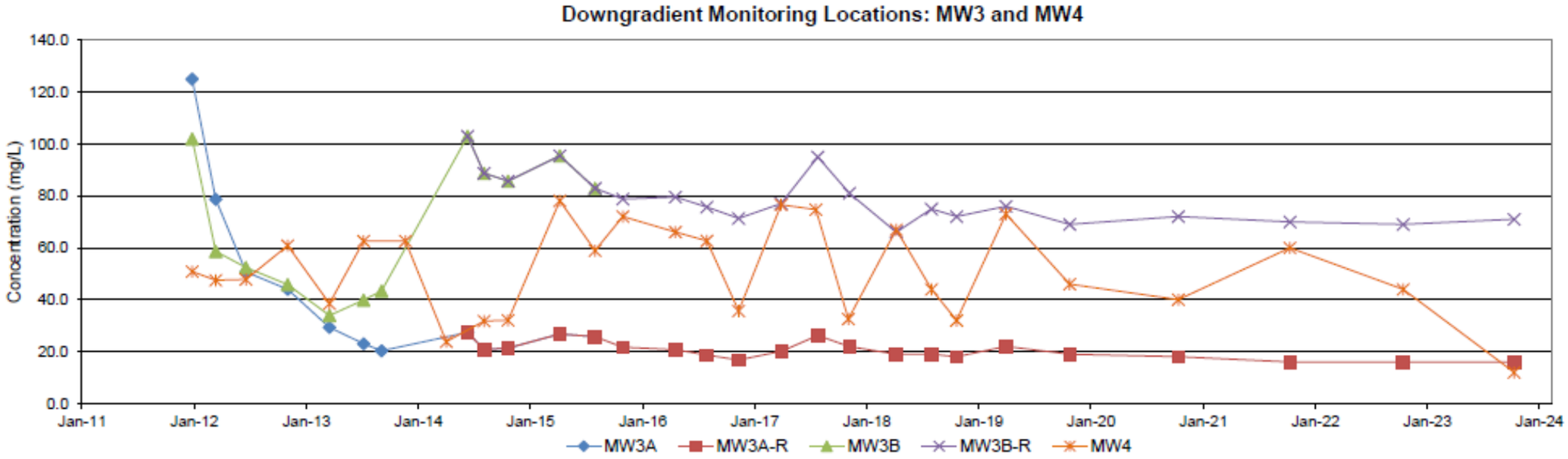
FILE LOCATION: \\rwdgroup\guelph\Jobs_1\2301083\04Deliverables\41WasteManagement\08DYEC\AnnualReport\03Appendices\Appendix D - GW Chem\[Table D-2 Figs D-1 to D-8 - GroundwaterChemistry2023.xlsx]MW4

DATE PLOTTED: February 8, 2024

Note: The increasing chloride and sodium concentrations are interpreted to be attributed to the application of de-icing salt during the winter season to Energy Drive, Osborne Road, and/or the on-site roadways/parking lots.

In 2023, the groundwater analytical results for the required parameters of analysis satisfied their respective ODWS, except for the sodium concentration within the groundwater at monitoring well MW4. Based on the interpreted groundwater flow direction and the analytical results for sodium at downgradient monitoring wells in closer proximity to the DYEC facility, there is no indication that the elevated concentrations of sodium within the groundwater at MW4 migrated downgradient as a result of DYEC waste treatment operations.





1. mg/L denotes milligrams per litre.

CONCENTRATION VS. TIME PLOT
SULPHATE

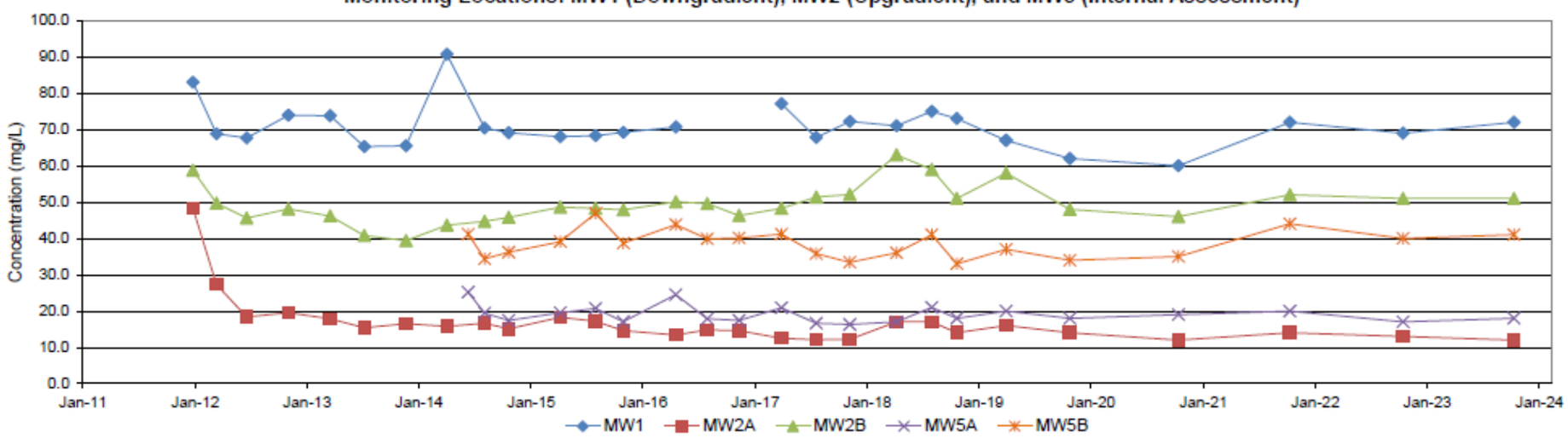
2023 ANNUAL MONITORING REPORT

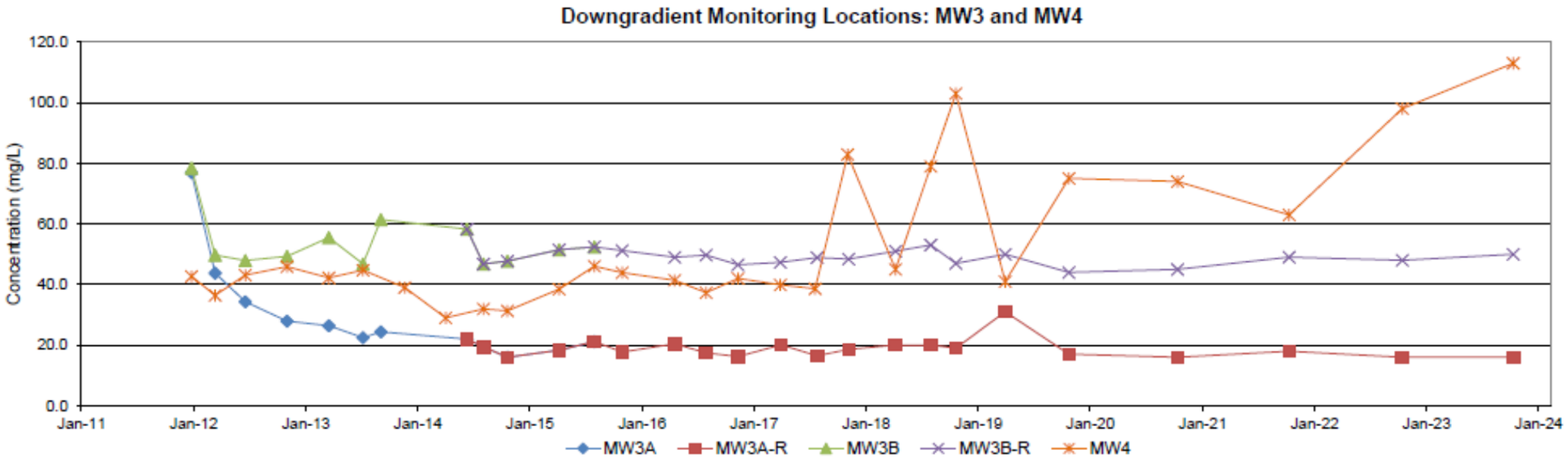
REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-3	**2301083**
APPROX. SCALE	DATE REVISED
NTS	**Dec 6, 2023**

FILE LOCATION: \\rwdgroup\guelph\Jobs_1\2301083\04Deliverables\41WasteManagement\08DYEC\AnnualReport\03Appendices\Appendix D - GW Chem\[Table D-2 Figs D-1 to D-8 - GroundwaterChemistry2023.xlsx]MW4

DATE PLOTTED: February 8, 2024





NOTES:

1. mg/L denotes milligrams per litre.

CONCENTRATION VS. TIME PLOT
CALCIUM

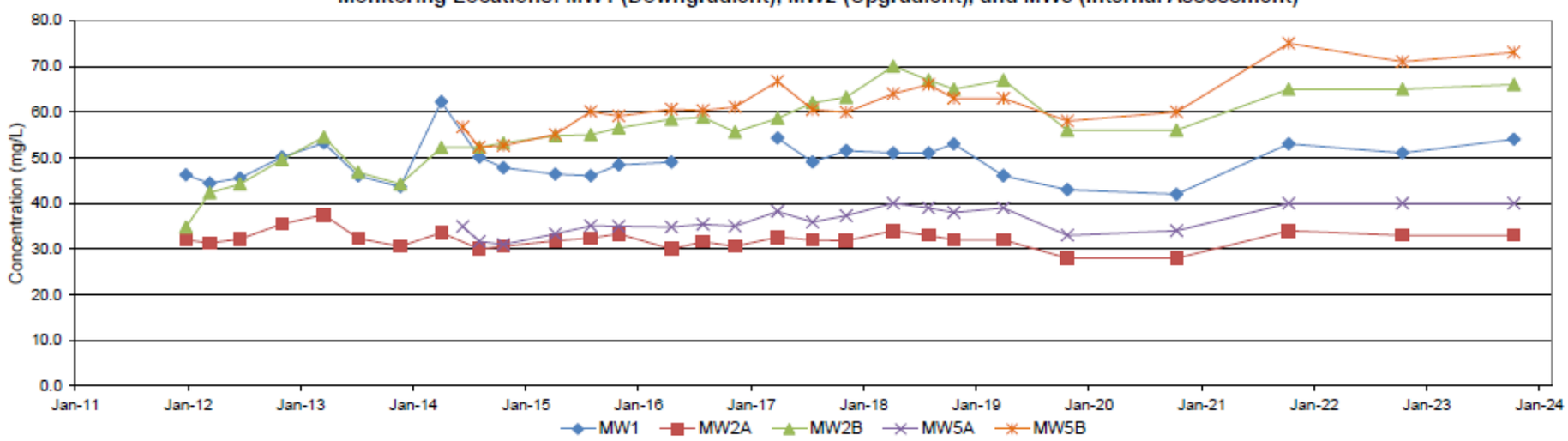
2023 ANNUAL MONITORING REPORT

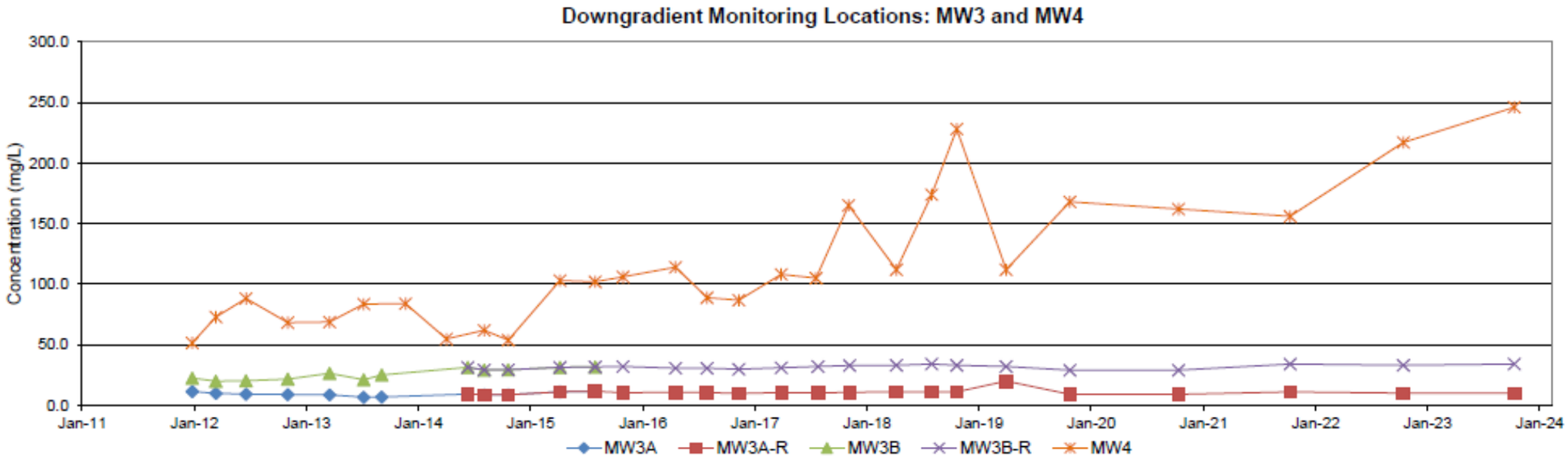
REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-4	**2301083**
APPROX. SCALE	DATE REVISED
NTS	**Dec 6, 2023**

FILE LOCATION: \\rwdgroup\guelph\Jobs_1\2301083\04Deliverables\41WasteManagement\08DYEC\AnnualReport\03Appendices\Appendix D - GW Chem\[Table D-2 Figs D-1 to D-8 - GroundwaterChemistry2023.xlsx]MW4

DATE PLOTTED: February 8, 2024





1. mg/L denotes milligrams per litre.

CONCENTRATION VS. TIME PLOT
MAGNESIUM

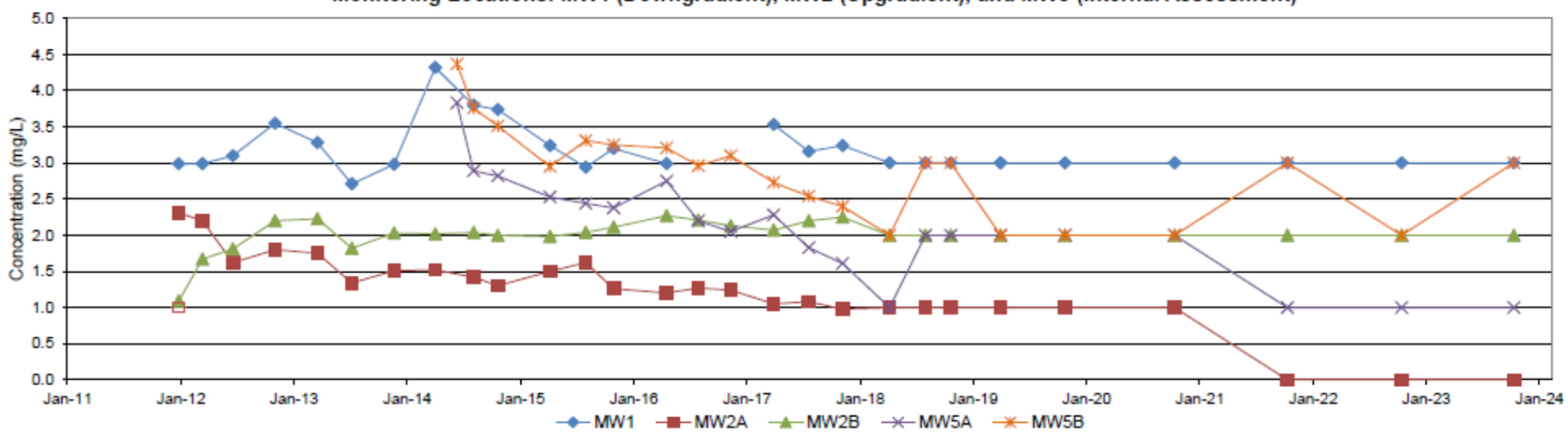
2023 ANNUAL MONITORING REPORT

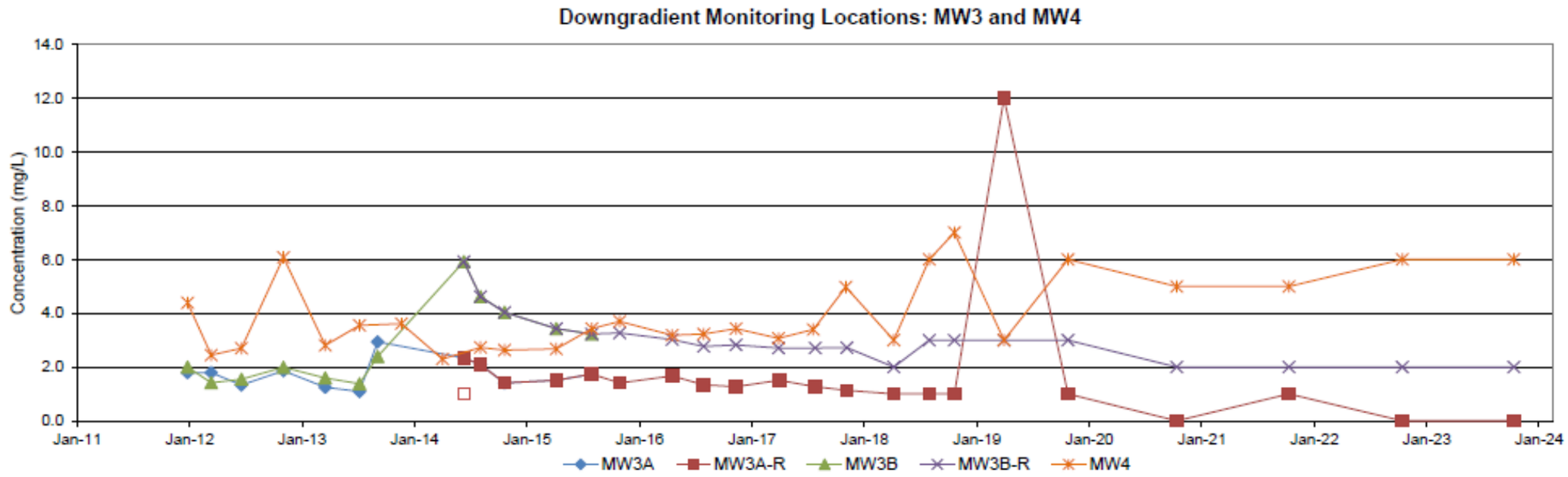
REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-5	**2301083**
APPROX. SCALE	DATE REVISED
NTS	**Dec 6, 2023**

FILE LOCATION: \\rwdgroup\guelph\Jobs_1\2301083\04Deliverables\41WasteManagement\08DYEC\AnnualReport\03Appendices\Appendix D - GW Chem\[Table D-2 Figs D-1 to D-8 - GroundwaterChemistry2023.xlsx]MW4

DATE PLOTTED: February 8, 2024





1. mg/L denotes milligrams per litre.
2. Markers with no fill indicate the parameter was below laboratory Method Report Limit (MRL).

CONCENTRATION VS. TIME PLOT
POTASSIUM

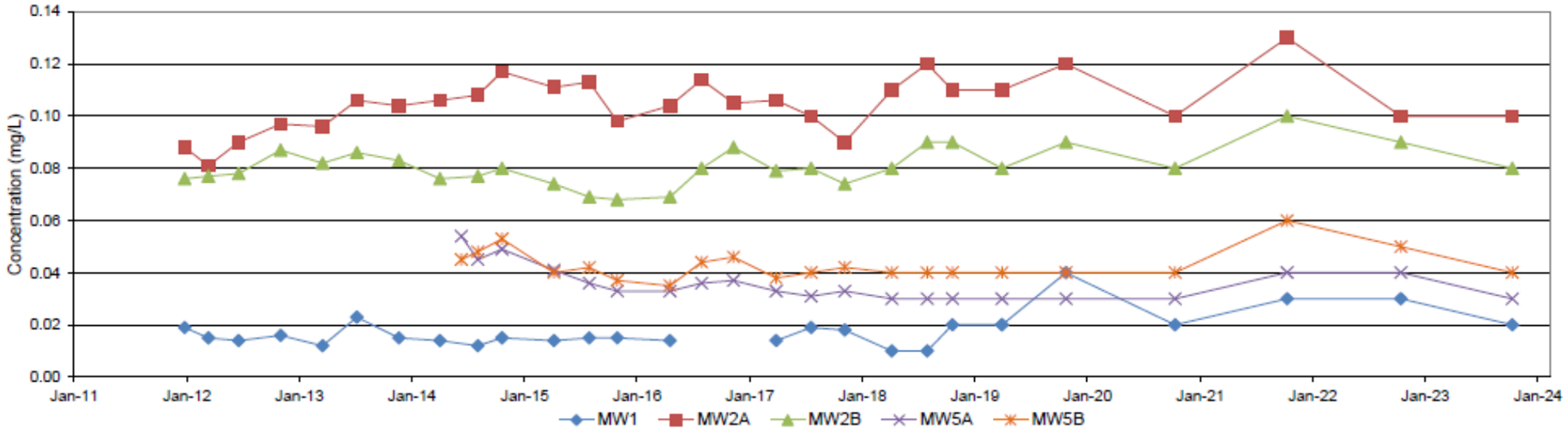
2023 ANNUAL MONITORING REPORT

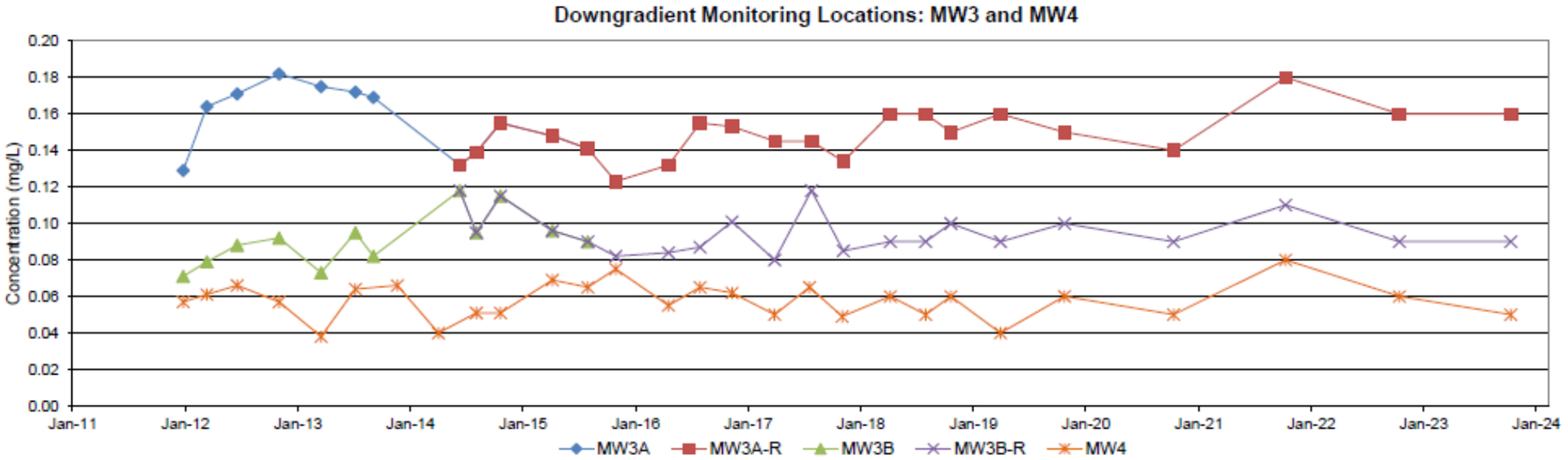
REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-6	**2301083**
APPROX. SCALE	DATE REVISED
NTS	**Dec 6, 2023**

FILE LOCATION: \\rwdgroup\guelph\Jobs_1\2301083\04Deliverables\41WasteManagement\08DYEC\AnnualReport\03Appendices\Appendix D - GW Chem\[Table D-2 Figs D-1 to D-8 - GroundwaterChemistry2023.xlsx]MW4

DATE PLOTTED: February 8, 2024





1. mg/L denotes milligrams per litre.

CONCENTRATION VS. TIME PLOT
BORON

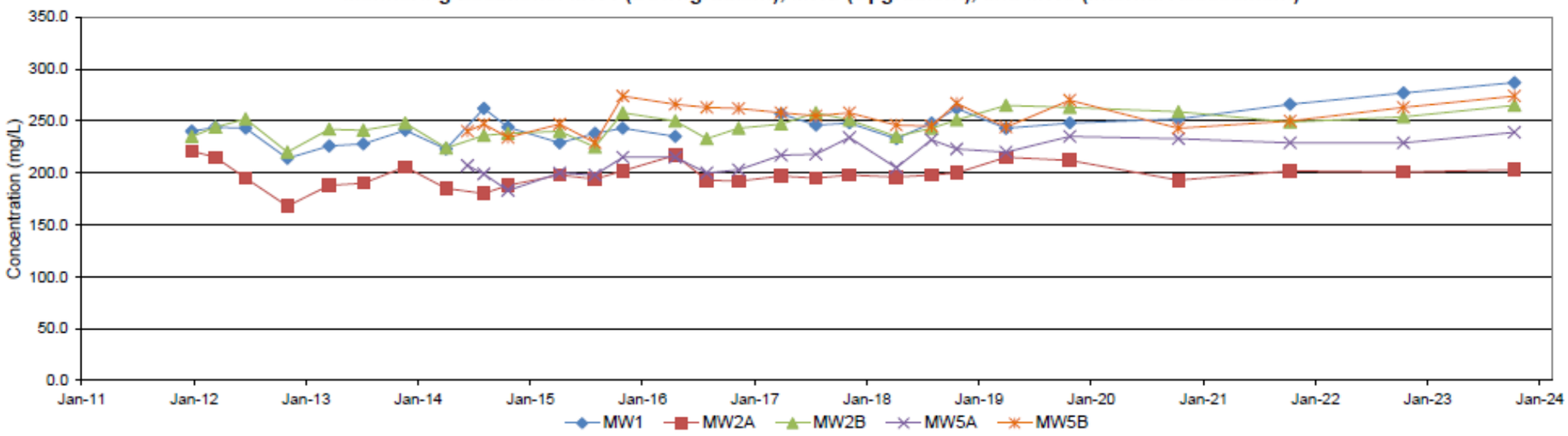
2023 ANNUAL MONITORING REPORT

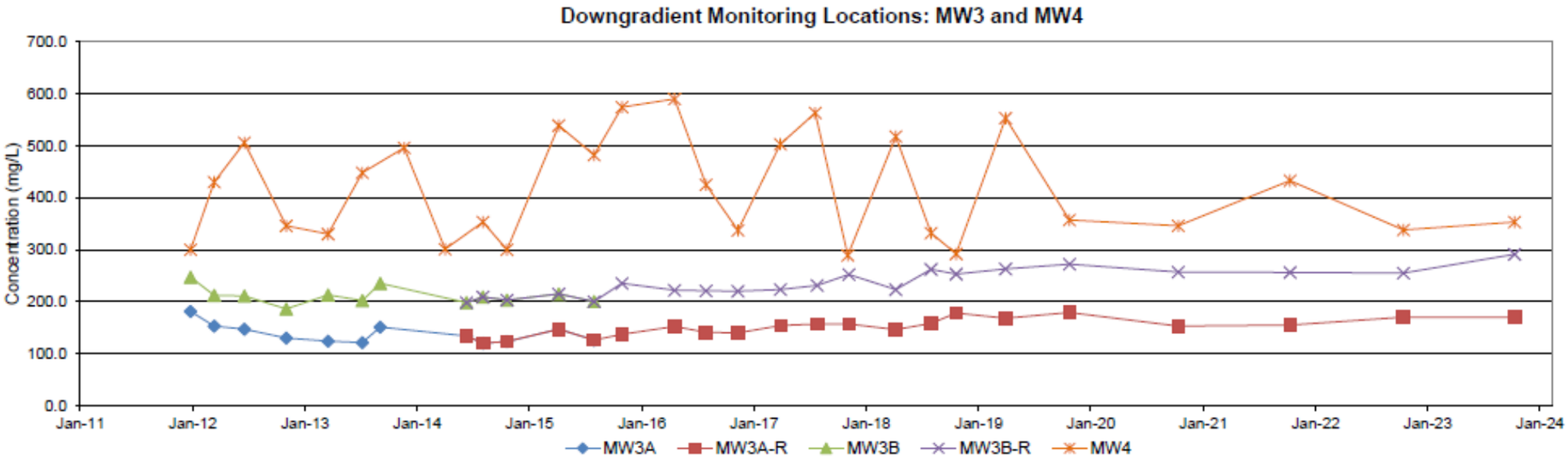
REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-7	**2301083**
APPROX. SCALE	DATE REVISED
NTS	**Dec 6, 2023**

FILE LOCATION: \\rwdgroup\guelph\Jobs_1\2301083\04Deliverables\41WasteManagement\08DYEC\AnnualReport\03Appendices\Appendix D - GW Chem\[Table D-2 Figs D-1 to D-8 - GroundwaterChemistry2023.xlsx]MW4

DATE PLOTTED: February 8, 2024





1. mg/L denotes milligrams per litre.

CONCENTRATION VS. TIME PLOT
BICARBONATE

2023 ANNUAL MONITORING REPORT

REGIONAL MUNICIPALITY OF DURHAM
Durham-York Energy Centre

FIGURE NUMBER	PROJECT NUMBER
D-8	**2301083**
APPROX. SCALE	DATE REVISED
NTS	**Dec 6, 2023**

FILE LOCATION: \\rwdgroup\guelph\Jobs_1\2301083\04Deliverables\41WasteManagement\08DYEC\AnnualReport\03Appendices\Appendix D - GW Chem\[Table D-2 Figs D-1 to D-8 - GroundwaterChemistry2023.xlsx]MW4

DATE PLOTTED: February 8, 2024

DURHAM YORK ENERGY CENTRE

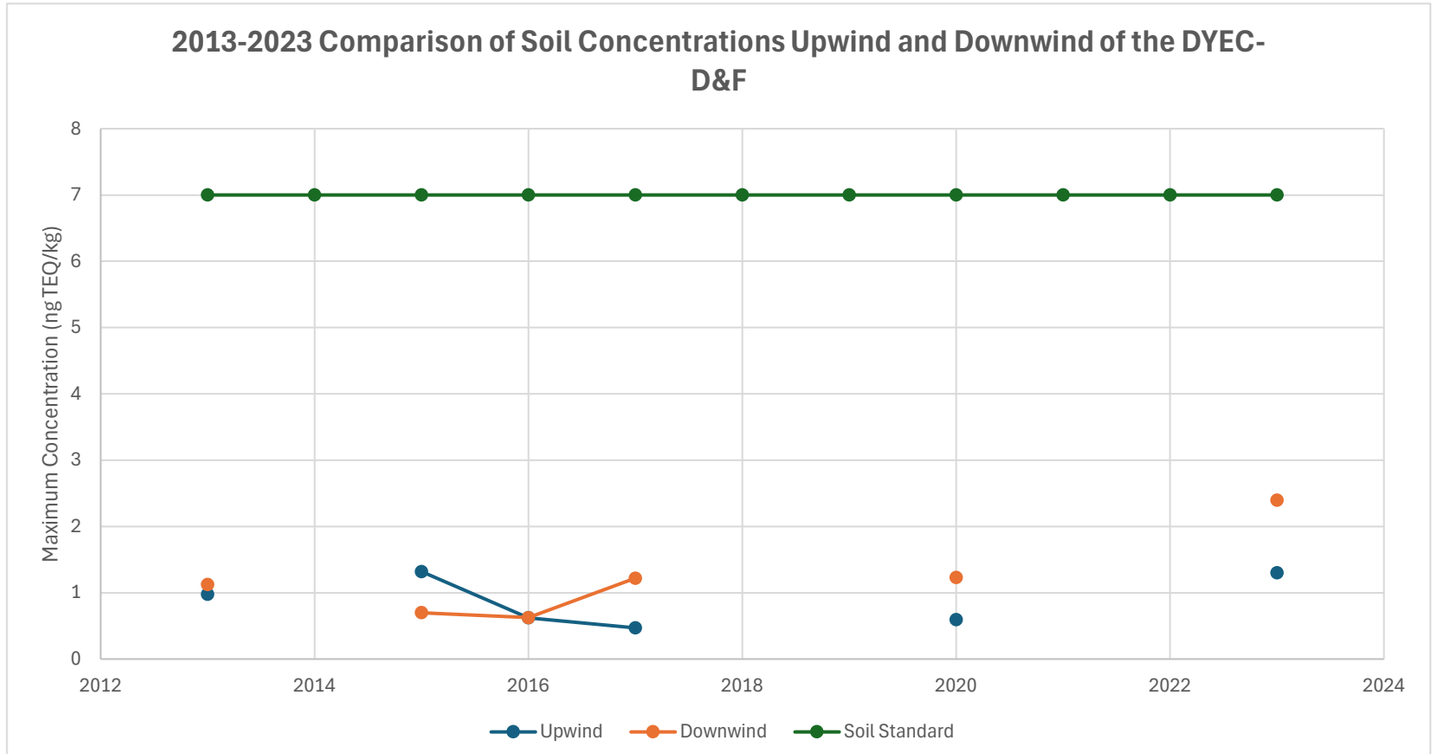
SOIL QUALITY TRENDS

2013-2023

Source: REGIONAL MUNICIPALITY OF DURHAM
WHITBY, ONTARIO
DURHAM YORK ENERGY CENTRE: 2023 SOIL TESTING REPORT
RWDI #2301083 November 15, 2023

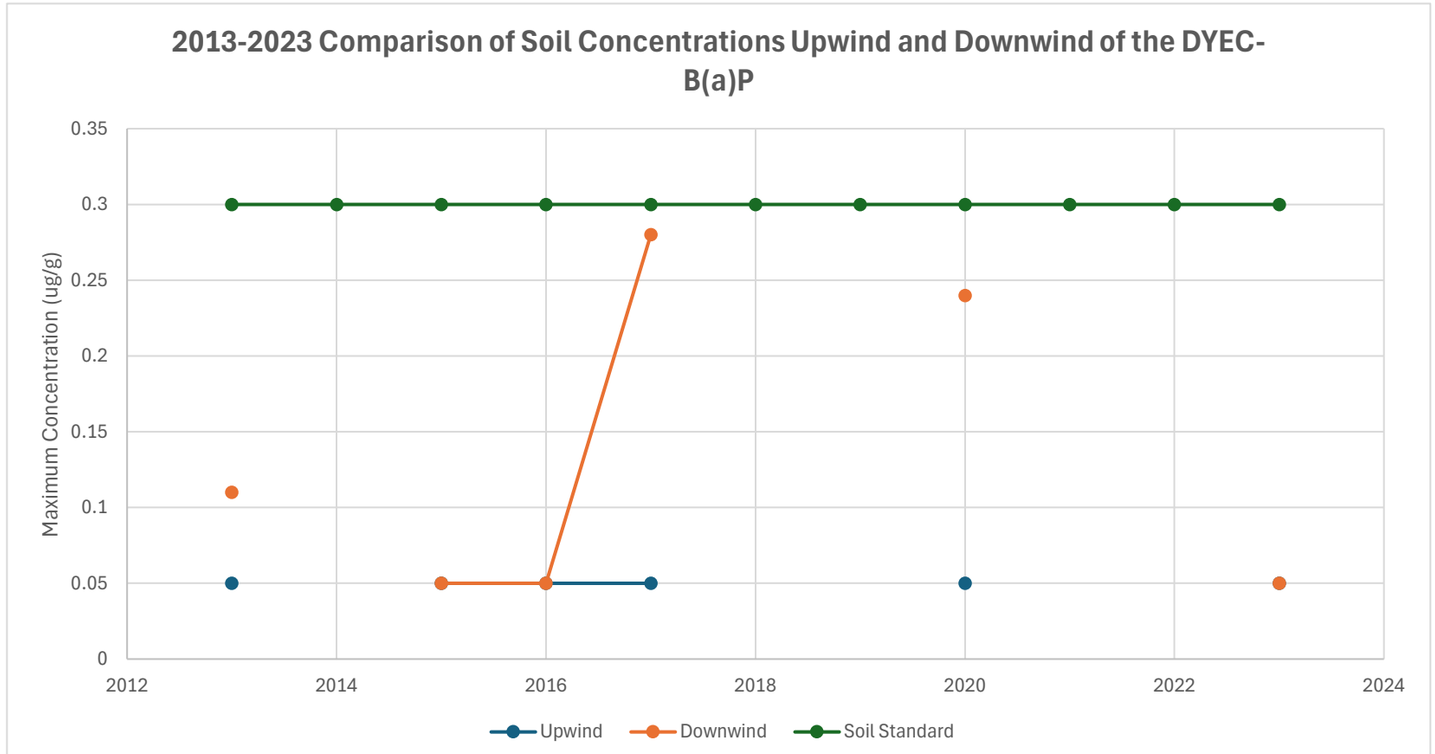
2013-2023 Comparison of Soil Concentrations Upwind and Downwind of the DYEC-D&F

Year	Upwind	Downwind	Soil Standard
2013	0.977	1.123	7
2014			7
2015	1.32	0.7	7
2016	0.622	0.626	7
2017	0.47	1.22	7
2018			7
2019			7
2020	0.596	1.23	7
2021			7
2022			7
2023	1.3	2.4	7



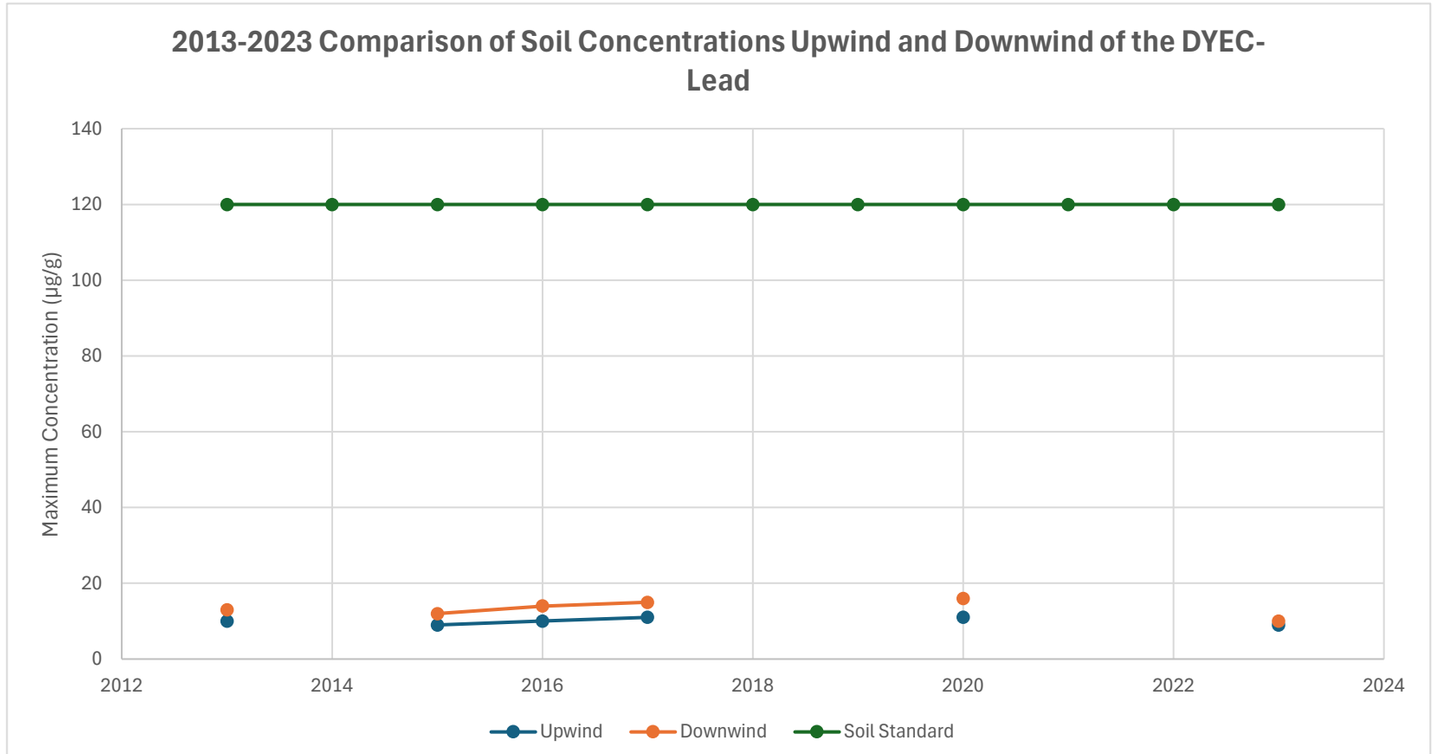
2013-2023 Comparison of Soil Concentrations Upwind and Downwind of the DYEC-B(a)P

Year	Upwind	Downwind	Soil Standard
2013	0.05	0.11	0.3
2014			0.3
2015	0.05	0.05	0.3
2016	0.05	0.05	0.3
2017	0.05	0.28	0.3
2018			0.3
2019			0.3
2020	0.05	0.24	0.3
2021			0.3
2022			0.3
2023	0.05	0.05	0.3



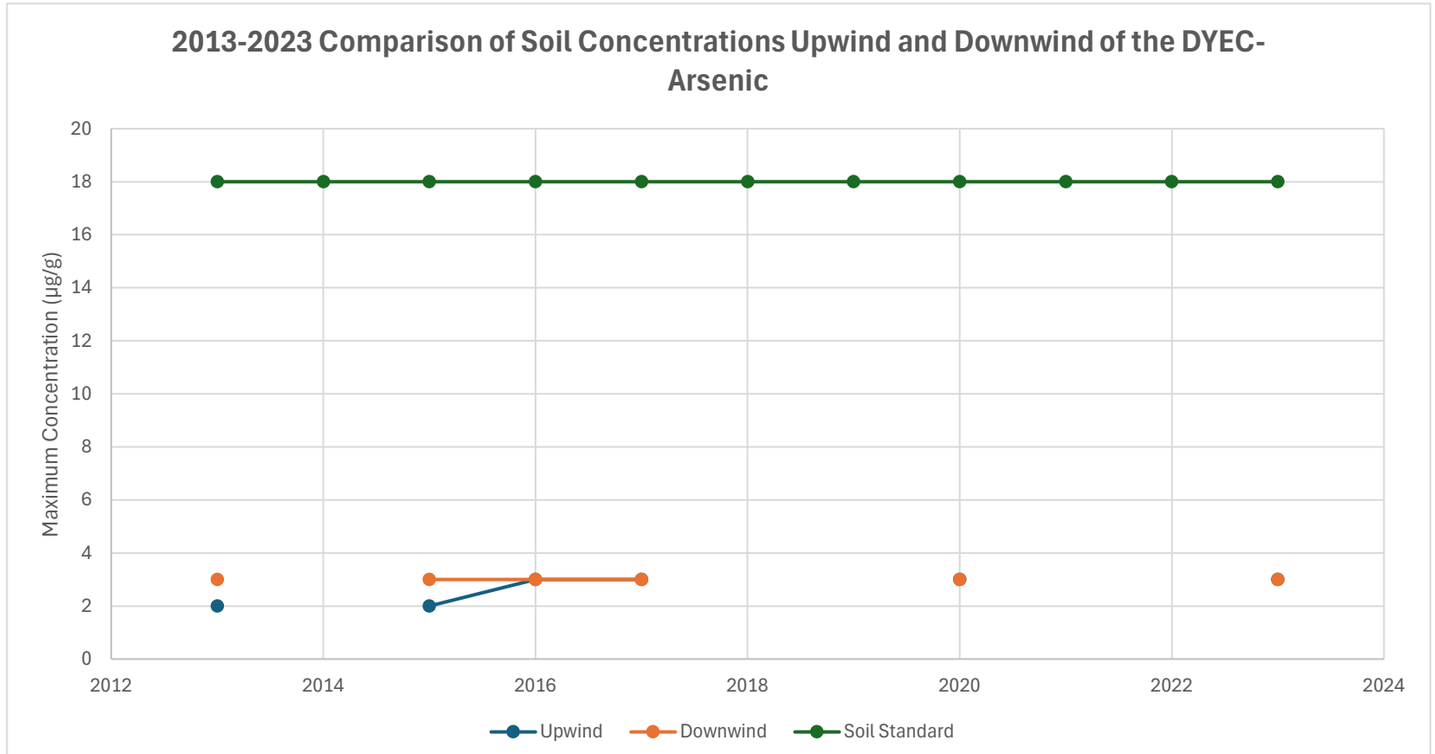
2013-2023 Comparison of Soil Concentrations Upwind and Downwind of the DYEC-Lead

Year	Upwind	Downwind	Soil Standard
2013	10	13	120
2014			120
2015	9	12	120
2016	10	14	120
2017	11	15	120
2018			120
2019			120
2020	11	16	120
2021			120
2022			120
2023	9	10	120



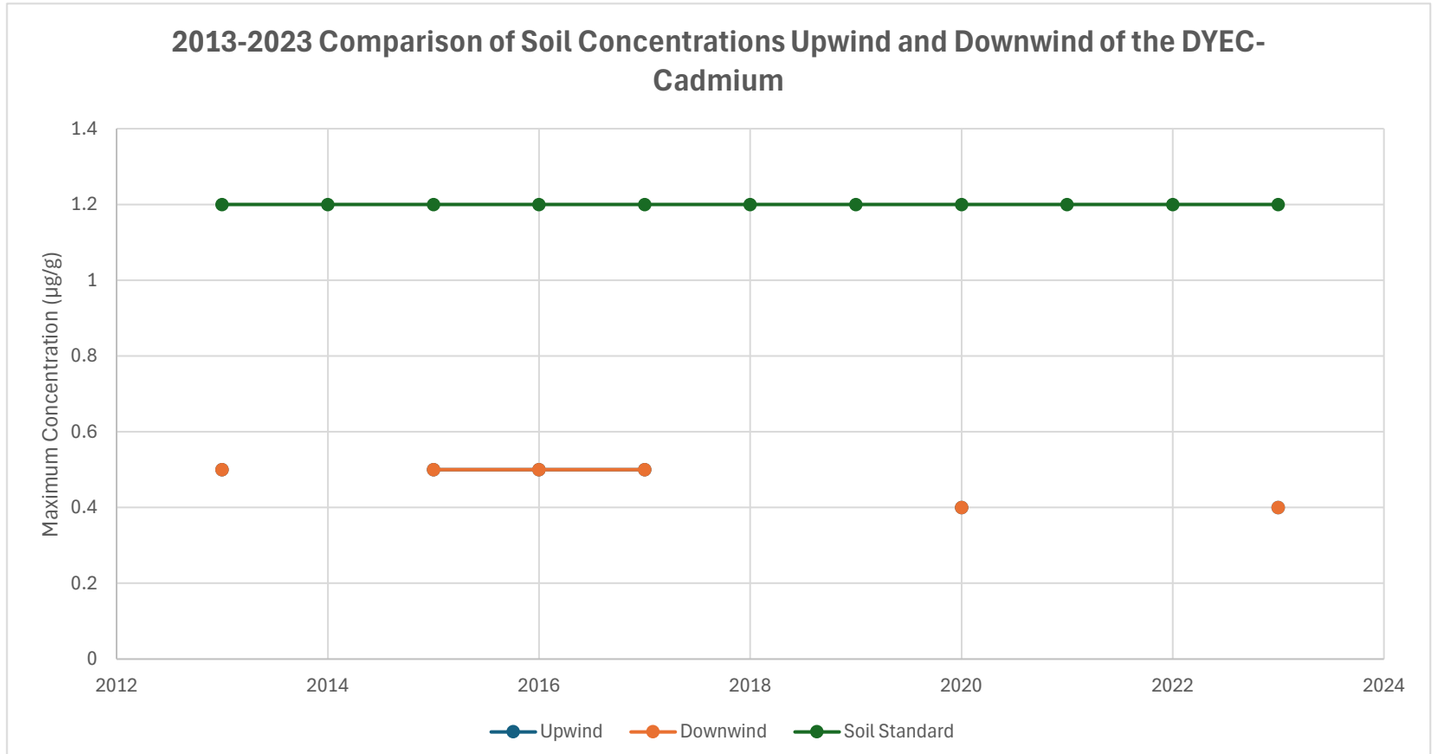
2013-2023 Comparison of Soil Concentrations Upwind and Downwind of the DYEC-Arsenic

Year	Upwind	Downwind	Soil Standard
2013	2	3	18
2014			18
2015	2	3	18
2016	3	3	18
2017	3	3	18
2018			18
2019			18
2020	3	3	18
2021			18
2022			18
2023	3	3	18



2013-2023 Comparison of Soil Concentrations Upwind and Downwind of the DYEC-Cadmium

Year	Upwind	Downwind	Soil Standard
2013	0.5	0.5	1.2
2014			1.2
2015	0.5	0.5	1.2
2016	0.5	0.5	1.2
2017	0.5	0.5	1.2
2018			1.2
2019			1.2
2020	0.4	0.4	1.2
2021			1.2
2022			1.2
2023	0.4	0.4	1.2



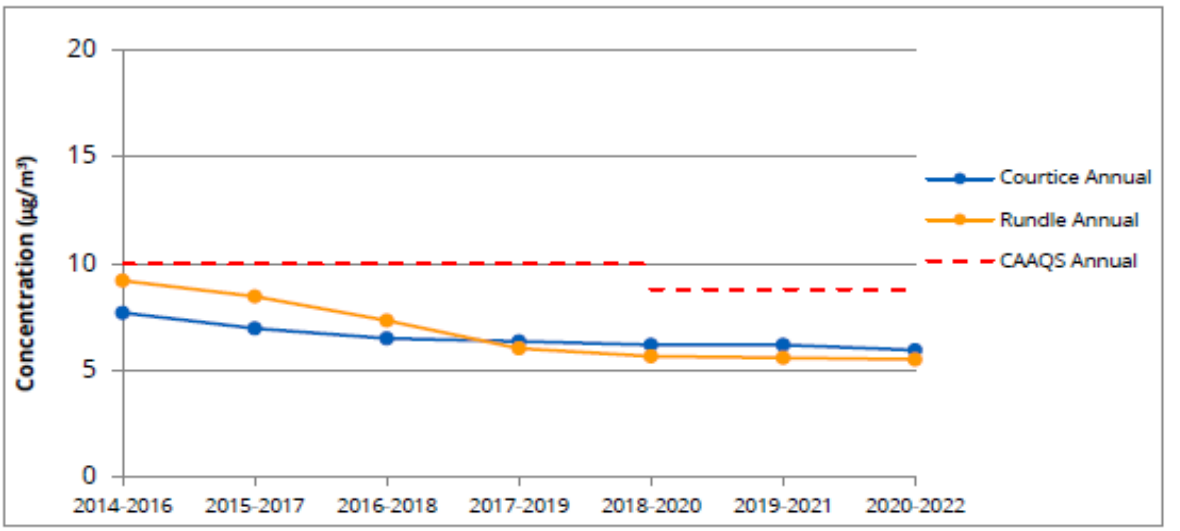
DURHAM YORK ENERGY CENTRE

AMBIENT AIR QUALITY TRENDS

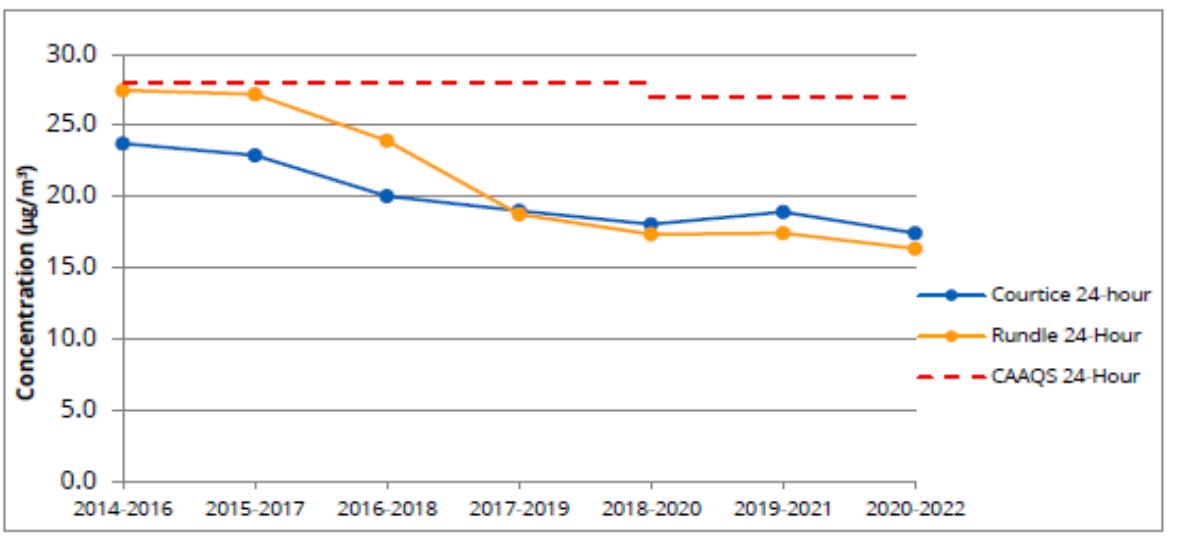
2013-2022

Source: DURHAM YORK ENERGY CENTRE
DURHAM, ONTARIO
2022 ANNUAL AMBIENT AIR QUALITY MONITORING REPORT:
CONTINUOUS & PERIODIC MONITORING PROGRAM
RWDI #2205149
April 27, 2023

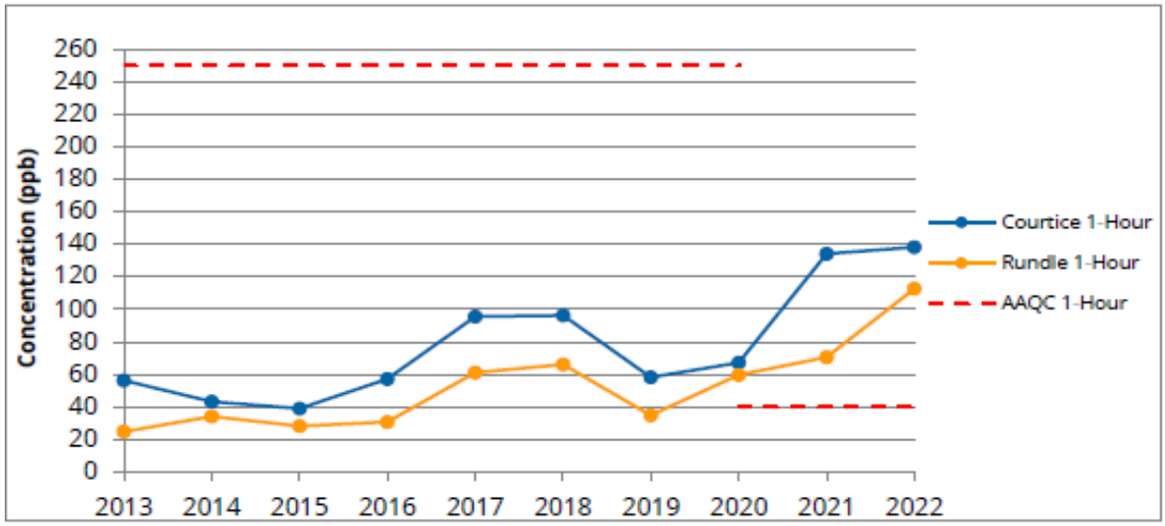
3-Year Averages of Annual PM2.5 Arithmetic Means (of 1-Hour Average Concentrations) by 3-Year Grouping



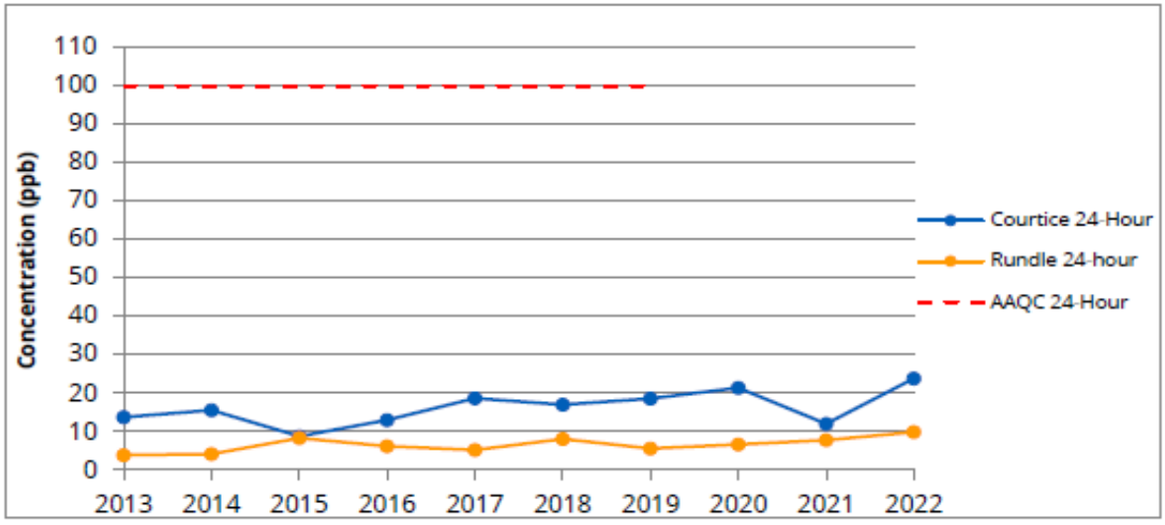
3-Year Averages of Annual 98th Percentile 24-Hour PM2.5 Mean Concentrations by 3-Year Grouping



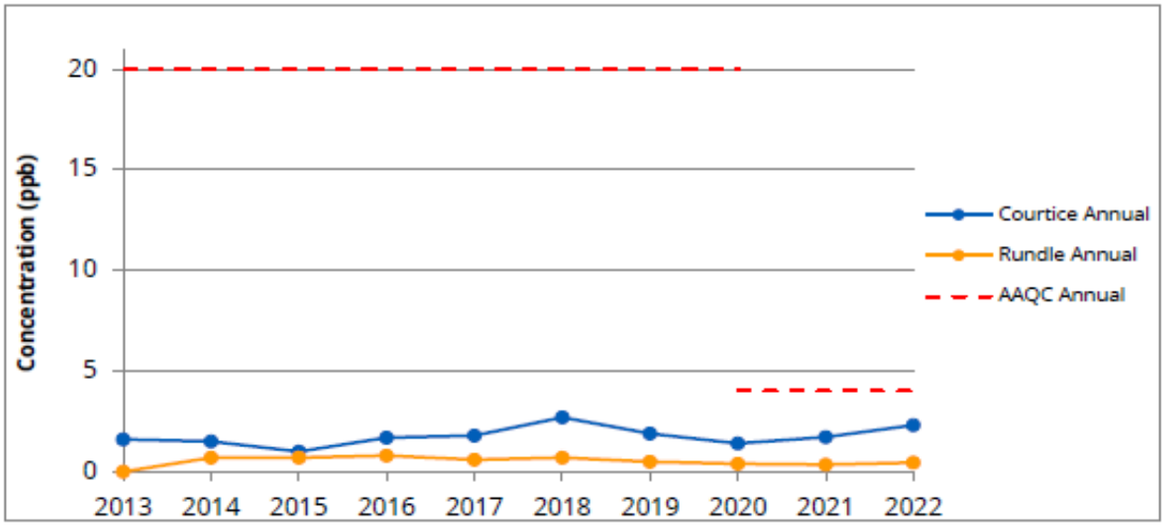
Maxiumum Measured 1-hour Mean SO_2 Concentration by Year



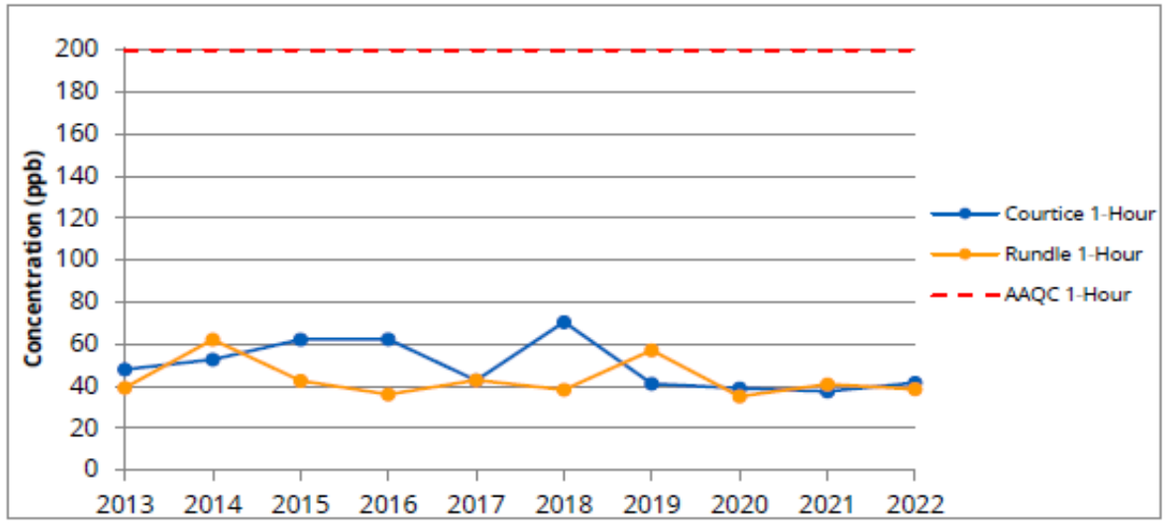
Maxiumum Measured 24-hour Mean SO_2 Concentration by Year



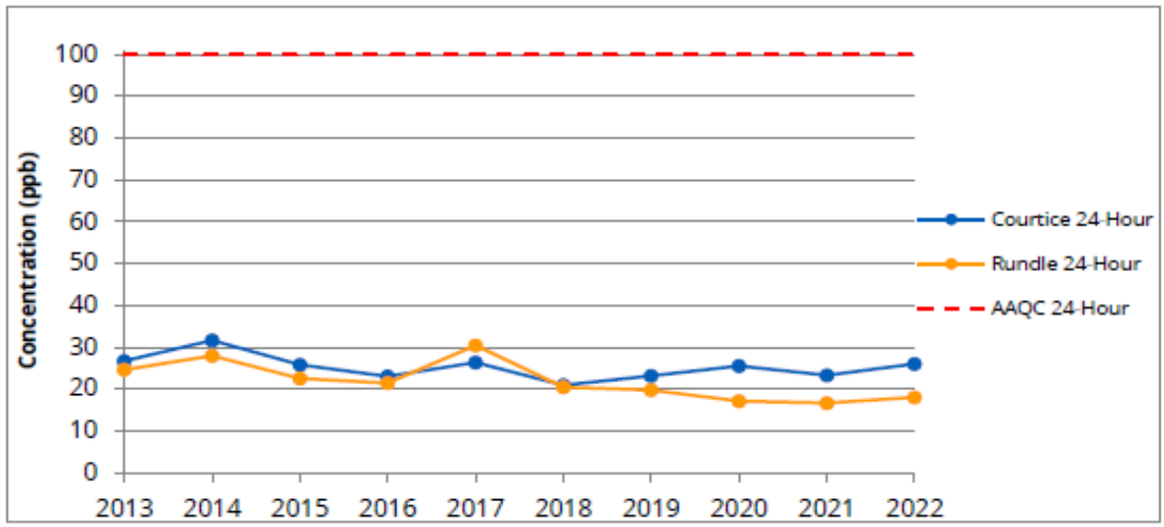
Maxiumum Measured Annual Mean SO_2 Concentration by Year



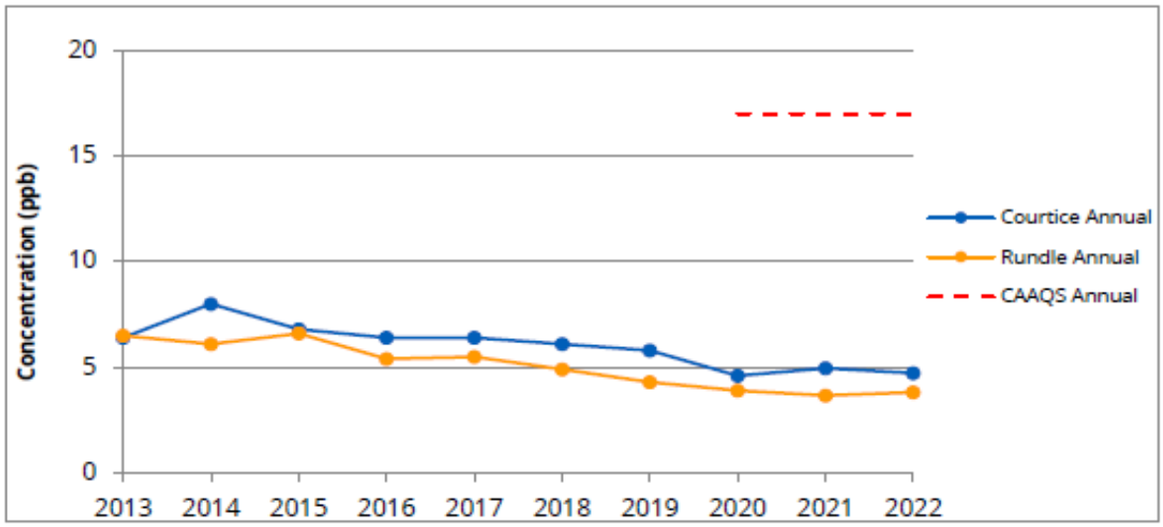
Maxiumum Measured 1-hour Mean NO_2 Concentration by Year



Maxiumum Measured 24-hour Mean NO_2 Concentration by Year



Maxiumum Measured Annual Mean NO_2 Concentration by Year

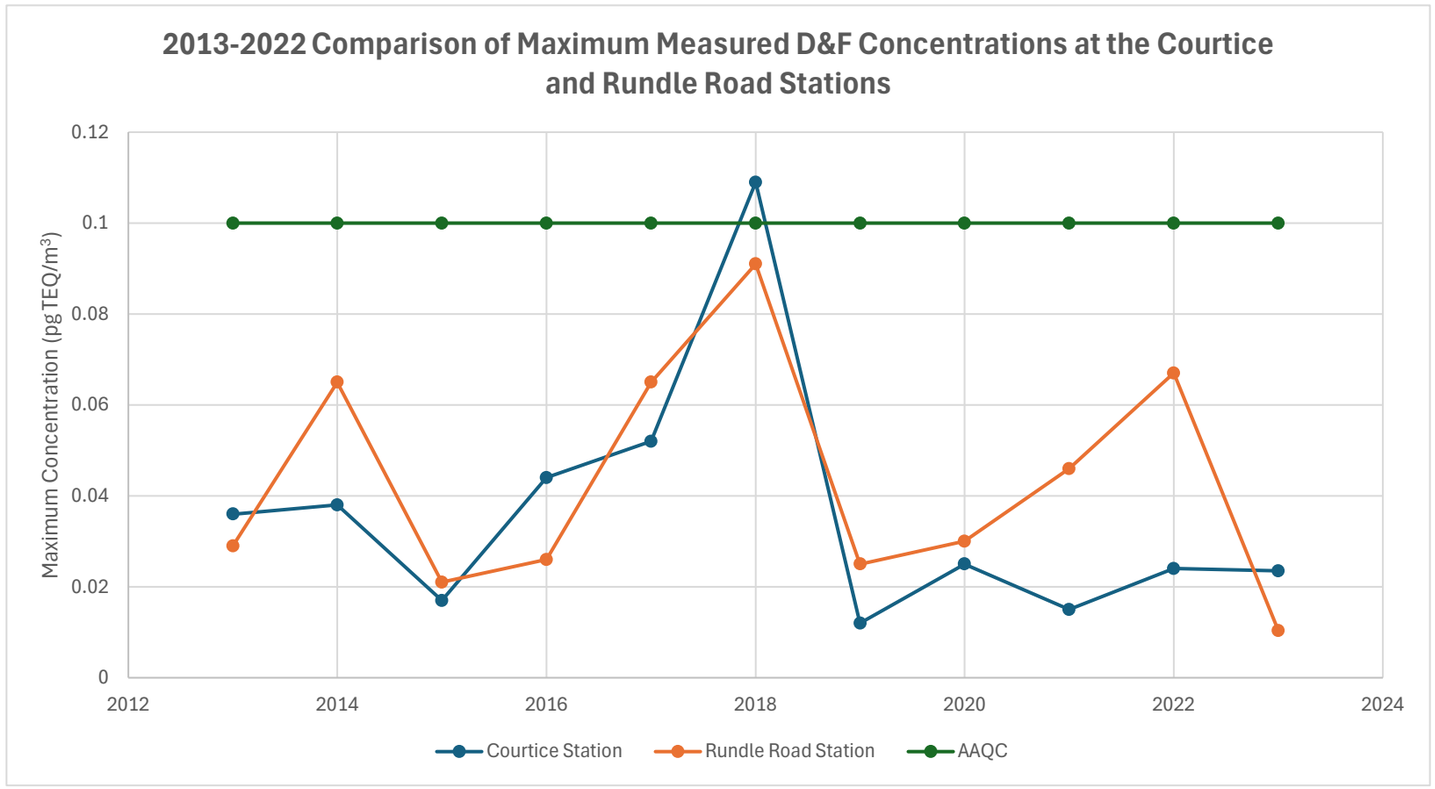


2013-2022 Comparison of Maximum Measured D&F Concentrations at the Courtice and Rundle Road Stations

Year	Courtice Station	Rundle Road Station	AAQC
2013	0.036	0.029	0.1
2014	0.038	0.065	0.1
2015	0.017	0.021	0.1
2016	0.044	0.026	0.1
2017	0.052	0.065	0.1
2018	0.109	0.091	0.1
2019	0.012	0.025	0.1
2020	0.025	0.03	0.1
2021	0.015	0.046	0.1
2022	0.024	0.067	0.1
2023	0.0235	0.0104	0.1

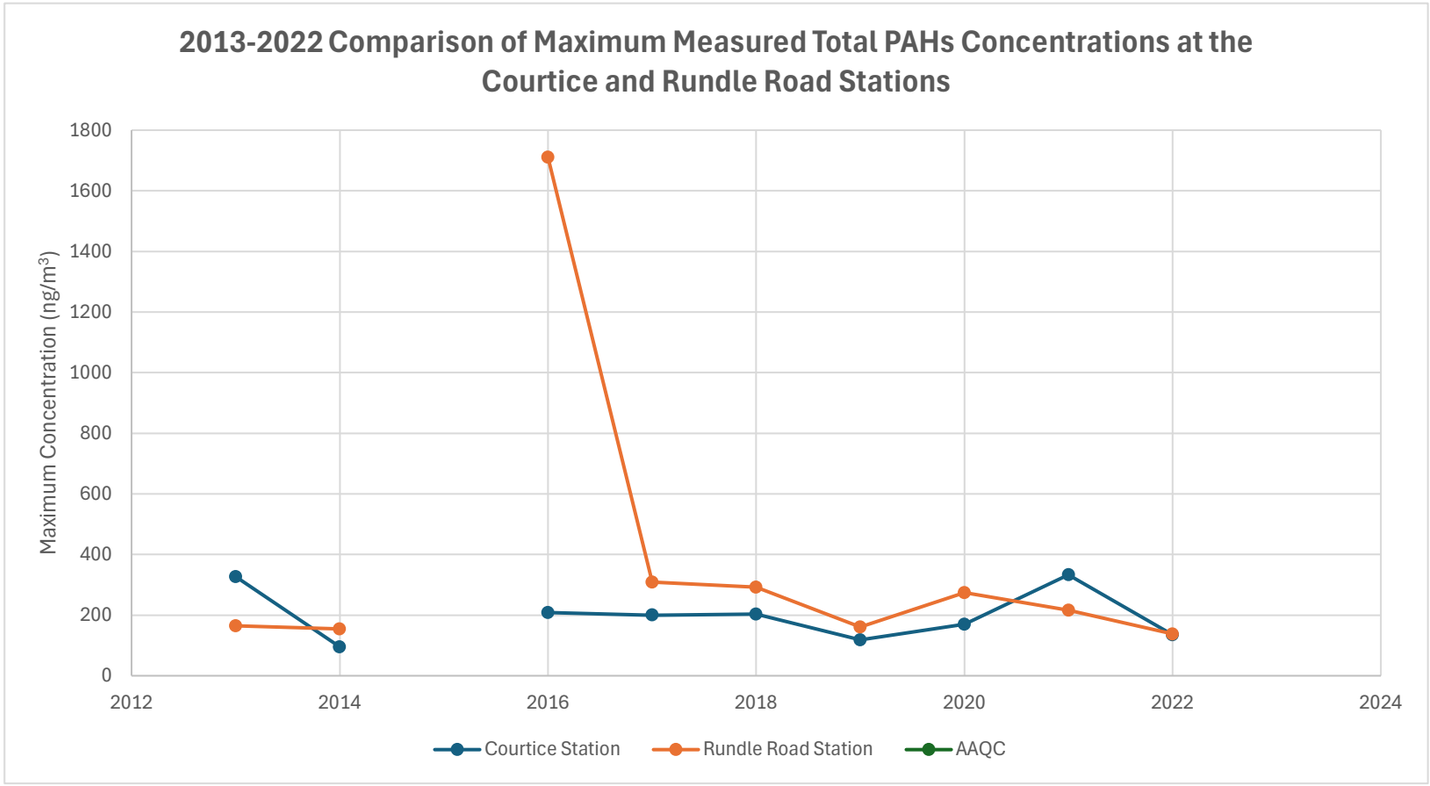
NOTE: arithmetic mean for D&F at Courtice in 2018 was 0.0191 pg/m3

There was one (1) exceedance of the maximum measured toxic equivalent D&F concentration AAQC at the Courtice Monitoring Station in 2018, but none in 2013-2017 or 2019-2020. The maximum measured toxic equivalent D&F concentrations at the Rundle Road Station were all below the applicable AAQC from 2013-2020. An investigation into DYEC performance was undertaken upon the exceedance. The exceedance was determined not to be a result of DYEC facility operations. During the monitoring period the predominant winds were blowing from the southwest and west which places the Courtice station upwind of the Durham York Energy Centre.



2013-2022 Comparison of Maximum Measured Total PAHs Concentrations at the Courtice and Rundle Road Stations

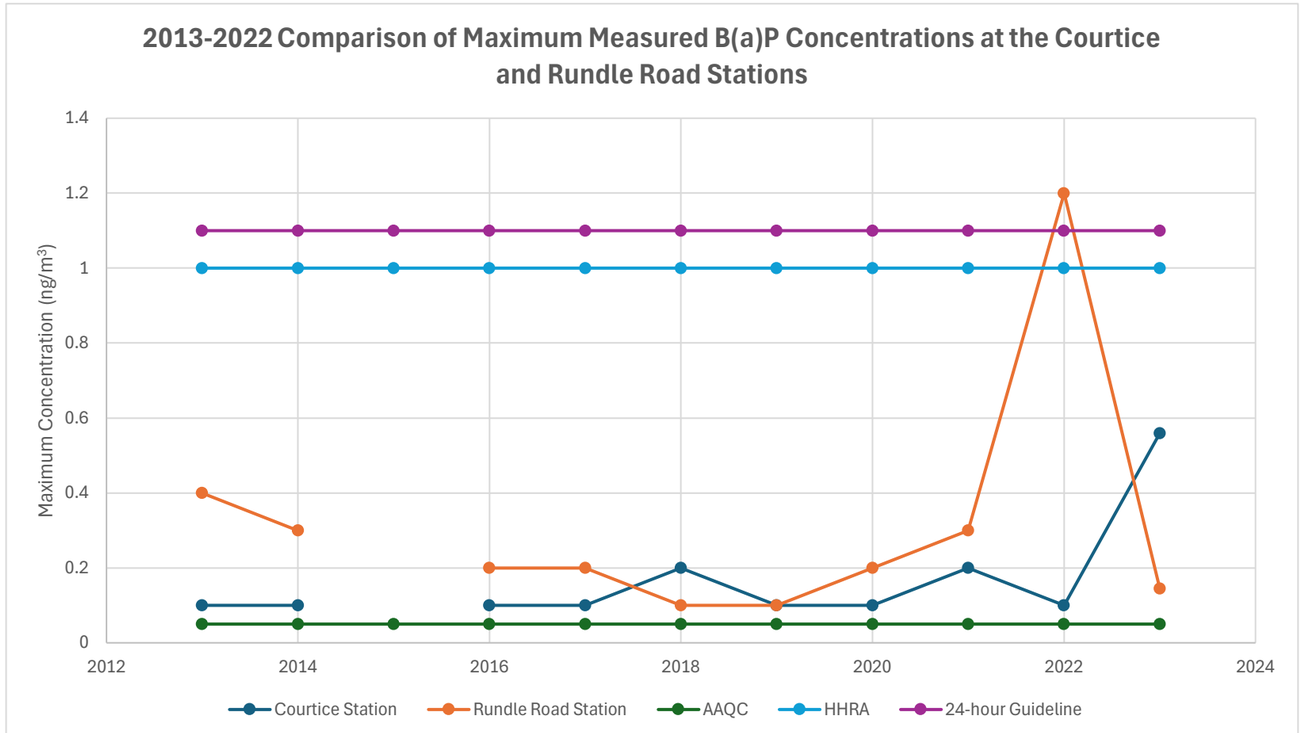
Year	Courtice Station	Rundle Road Station	AAQC
2013	327	165	
2014	95	153.9	
2015			
2016	208.7	1710.2	
2017	200	309	
2018	203.6	292.1	
2019	117.9	160.3	
2020	170.2	274.2	
2021	333	216.3	
2022	135.4	138.1	
2023			



2013-2022 Comparison of Maximum Measured B(a)P Concentrations at the Courtice and Rundle Road Stations

Year	Courtice Station	Rundle Road Station	AAQC	24-hour Guideline	HHRA
2013	0.1	0.4	0.05	1.1	1
2014	0.1	0.3	0.05	1.1	1
2015			0.05	1.1	1
2016	0.1	0.2	0.05	1.1	1
2017	0.1	0.2	0.05	1.1	1
2018	0.2	0.1	0.05	1.1	1
2019	0.1	0.1	0.05	1.1	1
2020	0.1	0.2	0.05	1.1	1
2021	0.2	0.3	0.05	1.1	1
2022	0.1	1.2	0.05	1.1	1
2023	0.559	0.145	0.05	1.1	1

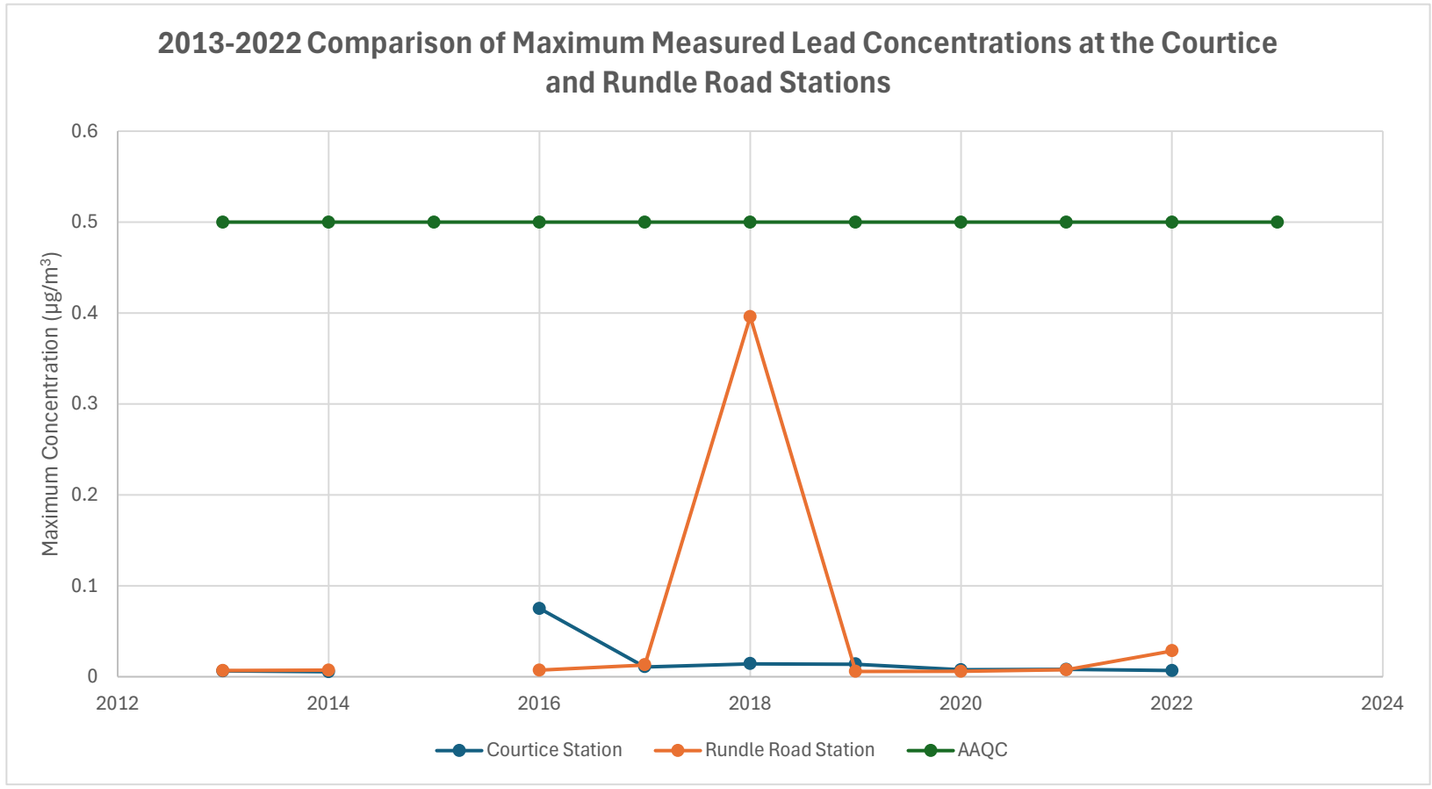
NOTE: arithmetic mean for B(a)P at Rundle Road in 2022 was 0.072 ng/m3



2013-2022 Comparison of Maximum Measured Lead Concentrations at the Courtice and Rundle Road Stations

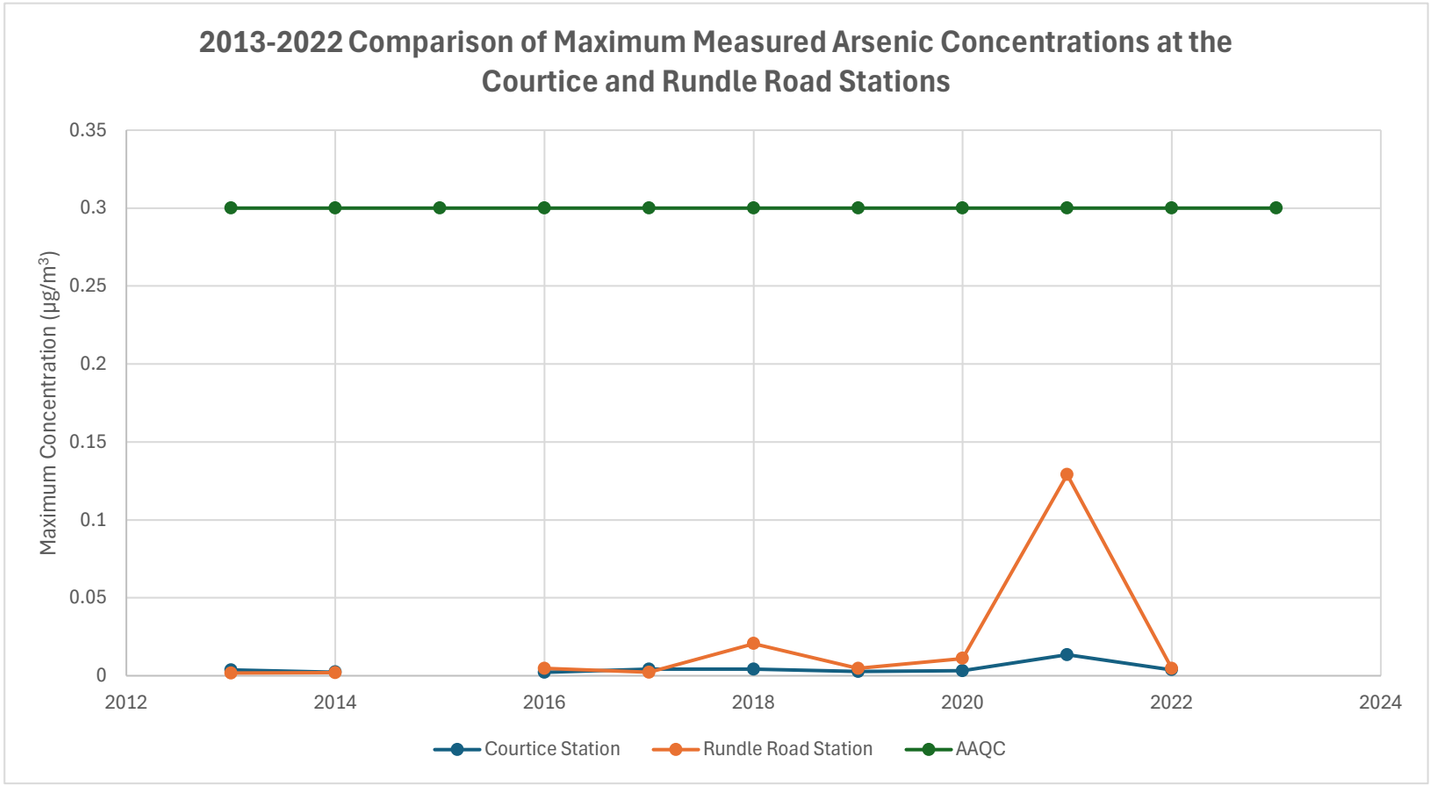
Year	Courtice Station	Rundle Road Station	AAQC
2013	0.00647	0.0068	0.5
2014	0.0055	0.00734	0.5
2015			0.5
2016	0.0752	0.00725	0.5
2017	0.0109	0.013	0.5
2018	0.0143	0.396	0.5
2019	0.0139	0.00581	0.5
2020	0.00781	0.00593	0.5
2021	0.00797	0.00756	0.5
2022	0.00698	0.0285	0.5
2023			0.5

NOTE: arithmetic mean for lead at Rundle Road in 2018 was 0.0102 µg/m3



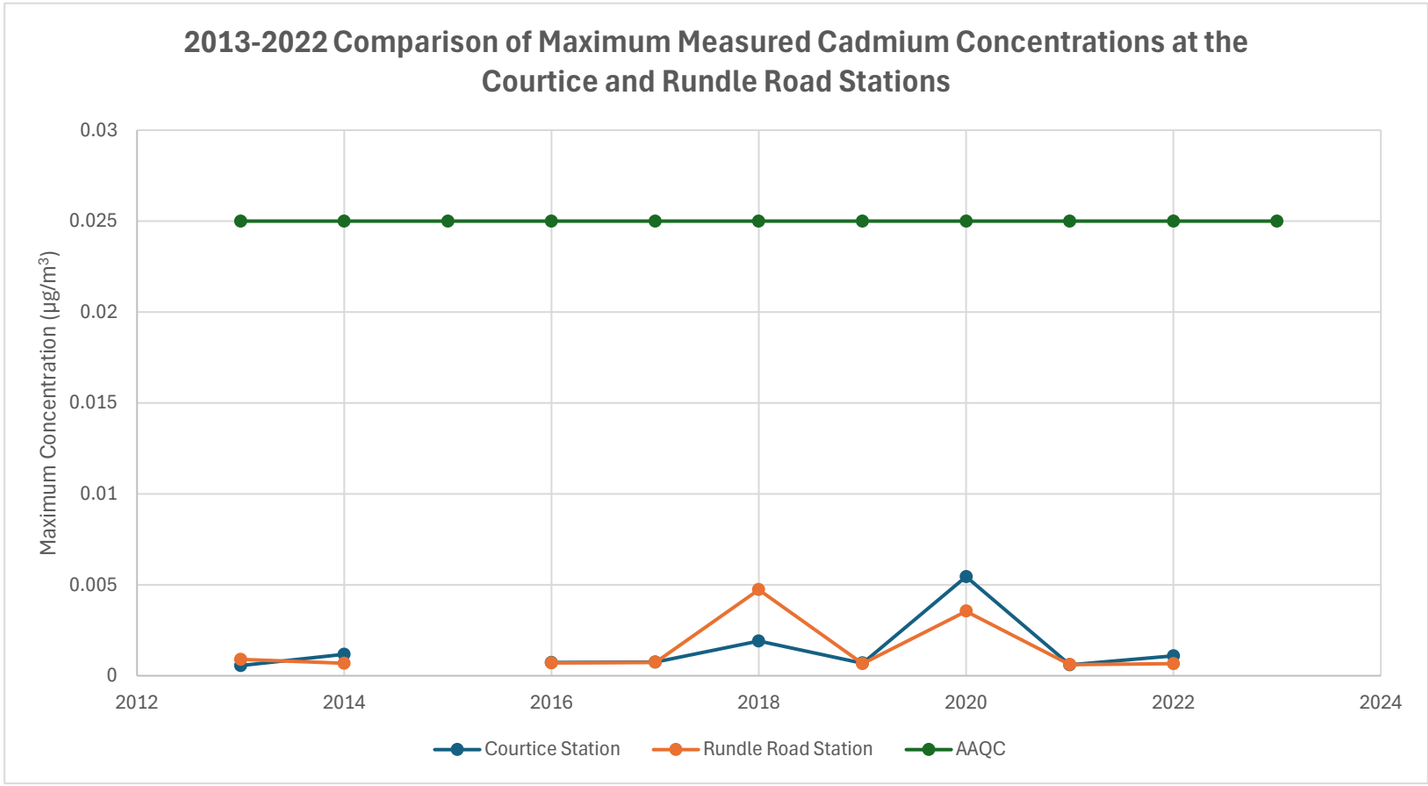
2013-2022 Comparison of Maximum Measured Arsenic Concentrations at the Courtice and Rundle Road Stations

Year	Courtice Station	Rundle Road Station	AAQC
2013	0.00379	0.00176	0.3
2014	0.00235	0.00205	0.3
2015			0.3
2016	0.0022	0.00472	0.3
2017	0.00414	0.00221	0.3
2018	0.00429	0.0206	0.3
2019	0.00276	0.00479	0.3
2020	0.00328	0.0111	0.3
2021	0.0135	0.129	0.3
2022	0.00383	0.004792	0.3
2023			0.3



2013-2022 Comparison of Maximum Measured Cadmium Concentrations at the Courtice and Rundle Road Stations

Year	Courtice Station	Rundle Road Station	AAQC
2013	0.000559	0.000899	0.025
2014	0.00118	0.000683	0.025
2015			0.025
2016	0.000734	0.000713	0.025
2017	0.000745	0.000738	0.025
2018	0.0019	0.00473	0.025
2019	0.000695	0.000654	0.025
2020	0.00545	0.00355	0.025
2021	0.000596	0.00061	0.025
2022	0.0011	0.000657	0.025
2023			0.025



Ray Copes, MD, MSc

Environmental & Occupational Health

MEMO

October 2, 2024

To: Dr. Robert Kyle, Medical Officer of Health,

Durham Region Health Department

Cc: Anthony Di Pietro

Dianne San Juan

From: Ray Copes, MD, MSc

Re: Review of Intrinsik report of September 5, 2024; regarding Durham York Energy Centre expansion

As requested, I have performed an independent review of the above Intrinsik report as it relates to potential impacts on public health.

Elements of the Intrinsic report that are of public health relevance include assessment of impacts on air pollutant concentrations, noise, odour, soil and water.

Air Pollution

Air dispersion modelling of DYEC emissions was done under 4 scenarios: 1) current maximum operating conditions (140,000tpy), 2) future maximum operating conditions (160,000tpy), 3) current operating conditions plus silo filling and testing of the diesel fired emergency generators and 4) future maximum operating conditions plus silo filling and testing of the diesel fired emergency generators. The model used was approved by the US EPA and Ontario MECP. Input data were reviewed and approved by MECP prior to modelling. Existing or background concentrations were added to the modelling of DYEC emissions.

The results of modelling for all chemicals of concern were below provincial and federal guidelines with the exceptions of benzo(a)pyrene and oxides of nitrogen (NO_x). The benzo(a)pyrene

concentrations were attributed primarily to traffic from Highway 401, with less than 1% coming from DYEC. The NO_x concentrations were primarily attributable to existing background concentrations; there were no significant differences between the current and future operating scenario. For many of the pollutants, the model predicted a decrease in maximum concentrations under the future operating scenario (160000tpy) due to an increase in efficiency (increased outlet temperature and flowrate).

A review of ambient air monitoring at the Courtice and Rundle stations indicates that both 24h and annual $PM_{2.5}$ concentrations have declined since 2014-16. The same is not true for SO_2, although the Courtice station which is regarded to be upwind of the DYEC shows higher concentrations than the downwind Rundle station. Annual NO_x concentrations have trended lower during the period 2013-2022; although 24h and 1h maxima are essentially unchanged.

Noise

The increase in capacity was not expected to result in any increase in noise. It is stated there have been no noise complaints attributed to the facility since it started in 2016.

Odour

It is stated that based on the initial EA, odour mitigation design features and recent sampling no negative impacts on odour will occur from the capacity increase.

Surface and groundwater

The DYEC does not discharge any process water. Groundwater monitoring results to date do not indicate any impacts from the facility. Surface water monitoring has been suspended until 2024 due to a highway project.

Traffic

It is stated that the additional capacity may result in up to 4 additional trucks per day to the DYEC. Figures on current background traffic in the area have not been provided but it is concluded this number of additional trucks will not have negative effects on local traffic.

Soil

Soil monitoring is done in the vicinity of the DYEC. Although results to date have generally been good, there has been a recent upward trend for dioxins and furans. Although the Intrinsik report does not link this to the DYEC, additional monitoring to determine the source is suggested if the trend continues in the next round of results.

Conclusion

The review by Intrinsik appears to be comprehensive in its coverage of potential human health risks associated with the increase in capacity of the DYEC from 140,000 tpy to 160,000tpy. I concur with

their conclusion that the expansion in capacity is not likely to result in adverse effects on human health. This conclusion relies heavily on the results of the air dispersion modelling which predicts no increase, and in many cases a decrease, in ambient air concentrations of pollutants from the DYEC. While there is always a degree of uncertainty associated with modelling predictions, it is the best approach to evaluate the potential impacts of future emissions. It is also noted that ambient air monitoring for common air pollutants in the vicinity of the DYEC has not shown any negative impacts on air pollutant concentrations attributable to the facility since its start-up in 2016. Given the experience to date with the facility, it seems implausible that the proposed increase in capacity of roughly 15% will have any appreciable impact on pollutant concentrations at nearby monitoring stations. However, a continued air monitoring program is essential to verify these predictions.