Canadian Environmental Law Association
EQUITY. JUSTICE. HEALTH.

July 10, 2026

Ministry of Environment, Conservation and Parks
Client Services and Permissions Branch
135 St Clair Ave West, 1st Floor
Toronto, ON
M4V 1P5
Email: enviropermissions@ontario.ca

Re: ERO #026-0523 – GEPR Energy Canada Inc. Environmental Compliance Approval (air and noise)

The Canadian Environmental Law Association (CELA) has reviewed GEPR Energy Canada Inc.'s (GE) application for a renewal of a site-wide Environmental Compliance Approval (ECA) with Limited Operational Flexibility (LOF) No. 7836-9HDRYN at the GE Vernova Peterborough, Ontario site at 107 Park Street North (the Site). The application for the renewal of the ECA was posted on the Environmental Registry of Ontario (ERO) by the Ministry of Environment, Conservation and Parks (MECP) for public comment on May 20, 2026, for a 45-day comment period.

There is significant public concern about the GE Site due to persisting historical contamination, GE's intention to demolish most of the buildings at the Site, and the adjacent Prince of Wales Public School. CELA is extremely concerned that important information relating to this application to renew the ECA, which will govern air and noise emissions at the site now and after the demolition, was not provided to the public through the Environmental Registry of Ontario (ERO) posting or through the requests of CELA.

CELA therefore requests that the MECP extend the time for public comment until 45 days after unredacted documents are provided to the public and posted on the ERO website, along with a draft of the proposed ECA.

In any event, CELA is of the view that it is not appropriate for GE to be seeking a renewal of its ECA for air and noise emissions at this time. Instead, GE should apply for a new ECA once the demolition has been completed. The conditions at the Site will be significantly different after the proposed demolition. The MECP should, therefore, assess the conditions at the Site after the demolition has been completed and then determine the appropriate terms and conditions to be included in the ECA.

CELA has provided preliminary comments on the application. However, CELA reserves the right to provide additional comments once we receive more information regarding the proposed renewal of the ECA.

A. Background on the Site

i. *Ongoing contamination at the site*

The Site has a lengthy history of contamination from industrial use. It operated from 1892 until 2018 as a major industrial hub for electrical manufacturing and component assembly.[1] Extensive contamination of the buildings at the Site and surrounding soil occurred after the on-site use, storage, and disposal of numerous hazardous substances, often reported to be without proper containment or ventilation standards.[2] There are ongoing efforts at the Site to address environmental contamination. In 2024, the MECP issued an order against GEPR Energy Canada Inc.[3]

The MECP Order #1-228916698 confirmed the Site to be contaminated with PCBs, TCE, and related volatile organic compounds (VOCs).[4] Additionally, the presence of asbestos, heavy metals and other contaminants on the Site are documented in the Report of the Advisory Committee on Retrospective Exposure Profiling of the Production Processes at the GE Production Facility in Peterborough, 1945-2000, published by UNIFOR in 2017; no publicly available material indicates that remedial action has fully addressed the contamination.[5]

Since 2004, a Groundwater Extraction and Treatment System (GETS) has operated on the south side of the Site.[6] The GETS also includes an air stripper to remove harmful contaminants like TCE from the groundwater.[7] Nevertheless, 2024 monitoring reports indicate that contamination exists in the groundwater, surface water, and soil at the Site.[8]

Presently, GE describes itself as providing engineering services through an administrative building and operating a water treatment system with an air stripper.[9] GE shares the Site with

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[1] **Appendix 1:** Ontario, Ministry of the Environment, Conservation and Parks, *Director's Order Number 1-228916698,* (Director's Order), (Peterborough District Office, 6 March 2024), at 6. [MECP, "Director's Order"]
[2] **Appendix 1:** MECP, "Director's Order" *ibid* at 7; **Appendix 2:** Letter from 448 signatories from the community of Peterborough to Chief Executive Officer of Lakelands Public Health, Dr. Thomas Piggott (18 November 2025), at 4 [Multiple signatories, "Public Letter to Lakelands Public Health"].
[3] **Appendix 1:** MECP, "Director's Order", *supra* note 1.
[4] **Appendix 1:** MECP, "Director's Order", *supra* note 1 at 8–9,12.
[5] **Appendix 3:** Robert DeMatteo & Dale DeMatteo, "The Report of the Advisory Committee on Retrospective Exposure Profiling of the Production Processes at the General Electric Production Facility in Peterborough Ontario 1945-2000" (5 February 2017), at 13–16.
[6] **Appendix 4:** AECOM Canada ULC, "2024 Groundwater Extraction and Treatment System Monitoring Report GEPR Energy Canada Inc. (Peterborough)" (27 February 2025), FOI Request A-2025-08327 at 15. [AECOM, "2024 GETS Monitoring Report"]
[7] **Appendix 5:** GEPR Energy Canada Inc., "Emission Summary and Dispersion Modelling Report 107 Park Street North, Peterborough, Ontario" (26 January 2026), at 2. [GE, "ESDM Report"]
[8] **Appendix 4:** AECOM, "2024 GETS Monitoring Report", *supra* note 6 at ii; **Appendix 6:** AECOM Canada ULC, "2024 PCB Monitoring Report for Stormwater and Groundwater GEPR Energy Canada Inc. (Peterborough)" (28 February 2025), FOI Request A-2025-08327 at ii–iv; **Appendix 7:** AECOM Canada ULC, "2024 Soil Vapour Monitoring Report GEPR Peterborough Site GEPR Energy Canada Inc." (27 February 2025) FOI Request A-2025-08327 at i.
[9] **Appendix 8:** GEPR Energy Canada Inc., "ECA Application Form GE Vernova Peterborough" (5 February 2026), FOI Request at 2. [GE, "ECA Application"]

BWXT Nuclear Energy Canada Inc. (BWXT), a nuclear fuel bundle manufacturer, that operates out of four buildings on the west side of the Site.[10]

ii. *Proposed demolition at 107 Park Street North*

GE has notified the municipality of Peterborough and the MECP of its proposed intention to demolish most of the buildings at the Site, although to CELA's knowledge, no demolition plan has been provided. The community, including residents living close to the Site and parents of elementary school children at the Prince of Wales Public School across the street, are extremely concerned about the possibility for further offsite contamination and health impacts from the proposed demolition. A complaint signed by 448 people under the *Health Protection and Promotion Act*, RSO 1990, c H7 was sent to the Medical Officer of Health at the Lakelands Public Health Unit and raised concerns about health hazards at the Site.[11]

B. The Environmental Registry of Ontario Posting did Not Meet the Requirements of the *Environmental Bill of Rights*

The Environmental Bill of Rights (EBR) aims to ensure public participation in environmental decision-making.[12] To fulfill this objective, the public needs to be provided with information about significant environmental decisions that may affect their health and well-being so that they can meaningfully engage in public participation and provide comments. ERO notices are the only mechanism through which Ontarians receive notice and get an opportunity to provide comments on an instrument such as an ECA.

The May 20, 2026 posting of GE's ECA renewal application contains virtually no details about the Site, the proposed ECA, and the contaminants at the Site.

i. *Redactions prevent meaningful public participation*

On June 24, 2026, CELA wrote to the MECP requesting unredacted documents in support of the application, a draft ECA, and an extension of the comment period to ensure that the public could meaningfully comment on the application.

On June 29, 2026, the MECP sent four heavily redacted documents to CELA, without any explanation for why the documents were so heavily redacted, and did not post them on the Environmental Registry of Ontario. In response to a second request for unredacted records, MECP stated that GE had not consented to the release of the redacted portions and directed CELA to submit a *Freedom of Information and Protection of Privacy Act* request for the documents.

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[10] **Appendix 9:** GEPR Energy Canada Inc., "Acoustic Assessment Report 107 Park Street North, Peterborough, Ontario" (5 March 2026), at 20–21. [GE, "AAR"]

[11] **Appendix 2:** Multiple signatories, "Public Letter to Lakelands Public Health", *supra* note 2.

[12] *Greenpeace Canada (2471256 Canada Inc.) v. Ontario (Minister of the Environment, Conservation and Parks)*, 2021 ONSC 4521

The MECP provided redacted copies of the following four documents:

(1) the Environmental Compliance Approval (ECA) Application, dated February 5, 2026,[13]
(2) an Acoustic Assessment Report (AAR), dated March 5, 2025,[14]
(3) an Emission Summary and Dispersion Modeling (ESDM) Report, dated January 23, 2026,[15] and
(4) a Request for Notice Under s.7(1) of Local Air Quality Regulation for Use of a Specified Dispersion Model, dated April 6, 2026.[16]

The following information is redacted:

- The details about specific sources of emissions and noise, including source names, equipment type, and location, have been redacted in three documents.[17]

- In the ECA Application, information about the number of pieces of equipment was redacted.[18] In the Acoustic Assessment Report (AAR), sound power levels (dB) were redacted for all sources.[19]

- In the Emission Summary and Dispersion Modeling Report (ESDM), total facility emission rates, site-specific emission thresholds, equipment flow rates, and natural gas heat ratings were also redacted for all sources.[20]

- References to the GETS, including its planned relocation, were also redacted in the AAR and EDSM reports.[21]

The AAR and the ESDM reports concluded that noise and emissions are below regulatory standards.[22] However, the public cannot assess or verify those conclusions without unredacted versions of these reports.

In PO-1688, the Information and Privacy Commissioner (IPC) stated that there is a compelling public interest in (1) the public being able to evaluate whether the Ministry conducted a full and fair assessment of the proposal before deciding whether to grant approval; (2) knowing the extent to which the proposal will impact the environment; and (3) the role of the public in protecting the environment and participating in environmental decision-making enshrined in the EBR:

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[13] **Appendix 8:** GE, "ECA Application", *supra* note 9.
[14] **Appendix 9:** GE, "AAR", *supra* note 10.
[15] **Appendix 5:** GE, "ESDM Report", *supra* note 7.
[16] **Appendix 10:** GEPR Energy Canada Inc., "Request for Notice Under s.7(1) of Local Air Quality Regulation for Use of a Specified Dispersion Model" (6 April 2026). [GE, Request for Notice Under 7(1)]
[17] **Appendix 8:** GE, "ECA Application", *supra* note 9 at 17, 20; **Appendix 9:** GE, "AAR", *supra* note 10 at 1–2, 6–7, 9, 22–25, 30–36, 38–40, 57–58, 70–75; **Appendix 5:** GE, "ESDM Report", *supra* note 7 at 1–2, 5–7, 16–22, 24, 54–73, 80–82.
[18] **Appendix 8:** GE, "ECA Application", *supra* note 9 at 17, 20.
[19] **Appendix 9:** GE, "AAR", *supra* note 10 at 6–7, 9, 57–58, 70–75.
[20] **Appendix 5:** GE, "ESDM Report", *supra* note 7 at 1, 8–11, 54–57, 61–73.
[21] **Appendix 9:** GE, "AAR", *supra* note 10 at 6; **Appendix 5:** GE, "ESDM Report", *supra* note 7 at 1–2, 11, 80.
[22] **Appendix 9:** GE, "AAR", *supra* note 10 at 11; **Appendix 5:** GE, "ESDM Report", *supra* note 7 at 23.

> The public has an interest, from the perspective of protecting the natural environment and protecting public health and safety, in seeing that the Ministry conducts a full and fair assessment before deciding whether or not to grant the appellant a certificate of approval to discharge air emissions into the natural environment. **This necessarily entails disclosure of the relevant data contained in the record. In addition, the public has an interest in knowing the extent to which the appellant's proposal to change its operations, if implemented, will impact the environment.**[23] [emphasis added]

ii. *No reason given for confidentiality*

The MECP did not provide any justification for providing only heavily redacted documents. GE also did claim that the information it provided in support of its ECA application was confidential. Under section 6 in the ECA Application form, applicants must indicate whether the supporting documentation should be considered confidential and GE made no such selection.[24]

CELA notes that other documents recently obtained through a separate and previous *FIPPA* request about the same GE Vernova site did not have any redactions, including the 2024 GETS Monitoring Report. It is concerning that GE application documents are now being redacted.

C. Inappropriate to Renew GE's ECA for Air and Noise Emissions to Cover the Post-Demolition Period

GE has proposed demolishing many of the existing buildings on the Site. The public is extremely concerned about the proposed demolition and possible offsite health and environmental impacts. The demolition is also expected to take a significant length of time given the number of buildings and generate dust pollution, possibly containing asbestos, PCBs, VOCs and other contaminants, next to an elementary school.[25]

CELA understands that this ECA does not include emissions during demolition, however, we are unable to assess whether any meaningful assessment of the site post-demolition has occurred.

CELA, therefore, requests that the MECP decline to renew the ECA at this time and instead require that GE apply for a new ECA once demolition has been completed. Although GE intends for the renewed ECA to address both the site as it exists now ("Current Operation Scenario") and the site post-demolition ("Future Operation Scenario"), its application for a renewed ECA does not sufficiently address the significant changes to the site that will be caused by the proposed demolition.

Additionally, the Request for Notice Under 7(1) notes that the EDSM Report was prepared using an out-of-date air dispersion model (AERMOD v.22112). The reason provided for using the older air dispersion model is that "MECP notice did not provide rollout date in April."[26] As GE

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[23] *Ministry of the Environment* (1999), PO-1688, online: IPCO <https://decisions.ipc.oc.ca/ipc-cipvp/orders/en/item/130807/index.do> at 14-16.
[24] **Appendix 8:** GE, "ECA Application", *supra* note 9 at 21.
[25] **Appendix 2:** "Public Letter to Lakelands Public Health", *supra* note 2 at 7–12.
[26] **Appendix 10:** GE, Request for Notice Under 7(1), *supra* note 16 at 5.

is suggesting that this ECA apply to post-demolition operations, it would be appropriate to remodel the Future Operation Scenario using an updated, approved dispersion model.

D. The BWXT Facilities Must be Covered by an ECA

GE also proposes that the renewed ECA only include the portion of the site that GE occupies, whereas its previous ECA applied to the whole site, including the operating BWXT facilities.[27] There is no indication on the ERO that BWXT is also concurrently applying for an ECA renewal for its portion of the Site or how the portion of the site occupied by BWXT will continue to be subject to an ECA. Until the MECP clarifies what instrument will govern the BWXT facilities, the ECA should remain applicable to the entire site.

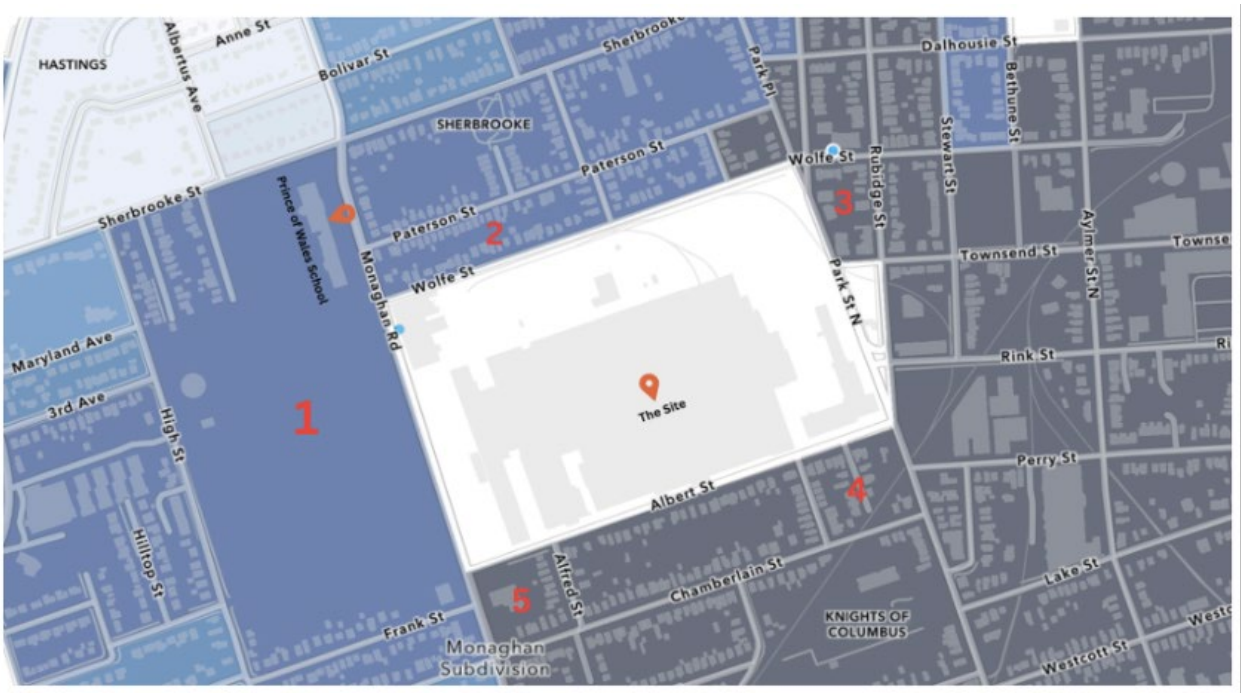
E. Preliminary Comments on GE's Application to Renew its ECA

i. Surrounding neighbourhoods face high cumulative burdens

Neighbourhoods surrounding the Site face an elevated combination of environmental, social, and health-related stressors. The *Mapping For Change* map provides a "Cumulative Burden Index" for neighbourhoods across Peterborough and raises serious concerns about the health equity implications of this Site.[28] The map shows that the areas surrounding the Site already experience some of the highest cumulative burden scores in the city (the darker the colour, the higher the cumulative burden index score).

Cumulative Index Map (courtesy of https://www.mapping4change.org/)

[27] **Appendix 9:** GE, "AAR", *supra* note 10 at 1; **Appendix 5:** GE, "ESDM Report", *supra* note 7 at 1.
[28] Mapping for Change, "Cumulative Burden Index" (n.d.), online: *Mapping for Change* < https://experience.arcgis.com/experience/7cac03eb1ff2419fbdc085d9d4d7dfbf/page/Home?views=Features%2CLayers#widget_136=text:107%20Park%20St%20N%2C%20Peterborough%2C%20ON%20K9J%203V6>

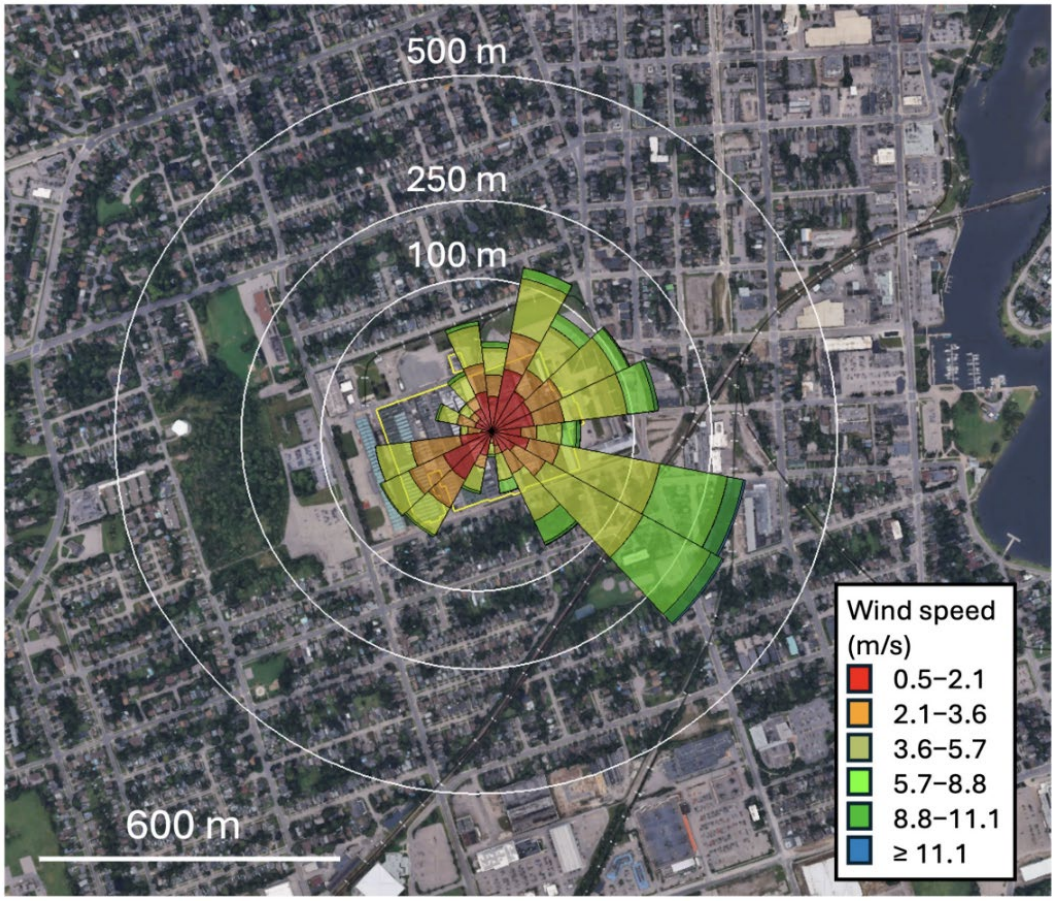


According to the map above, the cumulative burden index scores for neighbourhoods adjacent to the Site are:

Neighbourhood	Overall Burden Percentile	Social Vulnerability Percentile	Health Vulnerability Percentile	Environmental Vulnerability Percentile
1	84th	80%	89%	60%
2	89th	75%	47%	91%
3	100th	99%	93%	97%
4	98th	85%	63%	98%
5	95th	85%	63%	94%

Any burden percentile above 80% is considered very high, underscoring health equity concerns and the heightened vulnerability of local residents to additional social, health, and environmental stressors. Of particular concern, the Prince of Wales Public School is in Neighbourhood 1, with a high health vulnerability percentile.

A spatial and wind rose analysis conducted by Dr. Julian Aherne to illustrate the potential for widespread exposure to environmental hazards from the proposed demolition within the community.



The spatial analysis shows that approximately 145 homes are within 100-metres of the Site and an additional approximately 290 homes are within 250-metres of the Site. The wind rose analysis, based on meteorological data collected between November 2024 and October 2025, indicates the potential spatial impact of airborne contaminants from the demolition on the local community.[29] Although the ECA does not cover the proposed demolition, the impacted community must be considered in any decision on an ECA for air and noise emissions which will be in place before and after any demolition activities.

ii. *Changes to the GETS Should be Better Explained*

The GETS provides a hydraulic barrier inhibiting the flow of contaminated groundwater beyond the central and eastern portions of the southern property boundary of the Facility; this prevents a plume of TCE and other VOCs moving from the Site and contaminating the surrounding properties.[30] The GETS was planned in a remedial action plan approved by the MECP in 2001 and began full operation in 2004.[31] The Director's Order Number 1-228916698 notes that as a subsurface soil and groundwater contaminant, TCE may become gaseous and pose a public health risk to indoor air of buildings located in the area of the off-site plume.[32]

[29] **Appendix 2:** Multiple signatories, "Public Letter to Lakelands Public Health", *supra* note 2 at 5–7.
[30] **Appendix 4:** AECOM, "2024 GETS Monitoring Report", *supra* note 6 at 14.
[31] Ibid at 117–118.
[32] **Appendix 1:** MECP, "Director's Order", *supra* note 1 at 8.

The redacted ESDM report indicates that GE plans to relocate the GETS.[33] The GETS is a primary component of ongoing remediation efforts at the Site; the air stripper, which relates to this ECA, acts to remove TCE and related VOCs from groundwater.[34] GE should identify the precise new location for the GETS and demonstrate how it will remain effective at a new location.

Additionally, GE did not indicate if, or how, their modeling factored in how demolition activities may increase TCE and VOC air emissions at the Site. In the ESDM Report, the Future Operations Summary Table shows an expected increase in the maximum TCE ground level POI concentration ($\mu g/m^3$) of nearly double, from 3.4 $\mu g/m^3$ to 6.2 $\mu g/m^3$.[35] However, the GETS system was modelled at the current location. Further detail is needed to meaningfully assess this application.

F. Conclusion

There is a lengthy history of contamination at the Site, including the existence of asbestos, polychlorinated biphenyls (PCBs), trichloroethylene (TCE) and related volatile organic compounds (VOCs), and heavy metals. Many of the buildings on the Site are slated for demolition and the public is concerned that this will result in the release of contaminants into the surrounding community, which includes the Prince of Wales Public School.

Despite a high level of public concern regarding the site, the MECP has disclosed very little information about GE's proposal to renew the ECA. We, therefore, maintain our request for an extension of time for the public to comment on this proposal until 45 days after the unredacted documents and a draft ECA are posted to the ERO.

Furthermore, the MECP should require GE to apply for a new ECA once the demolition is completed, given that the Site will have dramatically changed. This will ensure that the MECP is able to impose appropriate terms and conditions in the new ECA to reflect the altered Site conditions.

Please do not hesitate to contact the undersigned at (416) 960-2284 ext. 7213, if you have any questions or comments with respect to the above.

Sincerely,
CANADIAN ENVIRONMENTAL LAW ASSOCIATION



Nicola Duyker
Summer Law Student



Jacqueline Wilson
Counsel

[33] **Appendix 4:** GE, "ESDM Report", *supra* note 7 at i, 1–2.
[34] **Appendix 1:** MECP, "Director's Order", *supra* note 1 at 10.
[35] **Appendix 4:** GE, "ESDM Report", *supra* note 7 at iii, 24.

Appendix 1: Ontario, Ministry of the Environment, Conservation and Parks, *Director's Order Number 1-228916698*

Director's Order

Director's Order Number

1-228916698

Director's Order Issued To

GEPR ENERGY CANADA INC.
1919 MINNESOTA CRT SUITE 100, MISSISSAUGA, ON, L5N 0C9

Site

General Electric
107 PARK ST N, PETERBOROUGH, ON, K9J 3V6

Refer to the Definitions section in Part B of this Director's Order, for the meaning of all the capitalized terms that are used in this Director's Order.

PART A - WORK ORDERED

This work is ordered pursuant to my authority under **EPA | 132 | (1), EPA | 18 | (1), EPA | 197 | (1)**, I order you to do the following:

Item No. 1

Within fifteen days of service of this Order, submit written confirmation to the Director by email to david.bradley@ontario.ca and environment.peterborough@ontario.ca that the Qualified Consultant that was retained to comply with the requirements of Director's Order GE-PTBO DO001FA continues to be retained to conduct the work required by this Order. The written confirmation shall include confirmation from the Qualified Consultant that they have, (1) received a copy of this Order; (2) been retained to carry out the work; and (3) the experience and qualifications to carry out such work.

Item No. 2

Within thirty days of service of this Order, arrange for the Qualified Consultant retained as a result of Item No. 1 to commence the activities and tasks associated with Contaminants of Concern at the Site as detailed in Appendices A and B, and arrange for the Qualified Consultant to continue to undertake the activities and tasks identified in Appendices A and B in accordance with the timelines set out in the appendices until the Director revokes or amends this Order.

Item No. 3

Within thirty days of service of this Order, submit to the Director by email to david.bradley@ontario.ca and environment.peterborough@ontario.ca for acceptance, a Financial Assurance evaluation in accordance with the Ministry's Financial Assurance Guideline F-15, which shall specify the amount of Financial Assurance to be provided to the Ministry to provide sufficient funds to implement and complete the ongoing work required by Item No. 2 of this Order and detailed in Appendices A and B. The Financial Assurance evaluation shall include written analyses, detailed and itemized calculations, and, if necessary, accounting documents to provide a justification of the proposed amount.

Item No. 4

Within sixty days of receipt of the Director's acceptance of the Financial Assurance evaluation submitted pursuant to Item No. 3 of this Order, submit to the Director in accordance with the instructions set out in the acceptance, payment of the accepted amount of Financial Assurance.

Item No. 5

Commencing on October 31, 2027, and every four years thereafter until the Initial Financial Assurance submitted as a result of Item No. 4 has been returned, submit to the Director a re-evaluation of the amount of Initial Financial Assurance (Re-evaluated Financial Assurance). The re-evaluation shall be done in accordance with the Ministry's Financial Assurance Guideline F- 15, and shall include written analyses, detailed and itemized calculations, and, if necessary, accounting documents to provide a justification of the proposed amounts.

Item No. 6

Within twenty-one days of receipt of the Director's acceptance of the Re-evaluated Financial Assurance evaluation submitted pursuant to Item No. 5 of this Order, submit to the Director in accordance with the instructions set out in the acceptance payment of the accepted amount of Re-evaluated Financial Assurance.

Item No. 7

Upon service of this Order, GEPR Energy Canada Inc. and any other person with an interest in the Site shall, before dealing with the Site in any way, give a copy of this Order, including any amendments thereto, to every person who will acquire an interest in the Site as a result of the dealing.

Item No. 8

Within fifteen days of receipt of an acknowledgment and direction form signed by the Director enclosing a certificate of withdrawal, register the certificate of withdrawal issued under s. 197 of the EPA on title to Site 1, Site 2, Site 3 and Site 4, in the appropriate land registry office.

Item No. 9

Within fifteen days of receipt of an acknowledgment and direction form signed by the Director enclosing a certificate of requirement, register the certificate of requirement issued under s. 197 of the EPA on title to Site 1 and Site 2 in the appropriate land registry office.

Item No. 10

Within five days of registration of each of the Certificates of Withdrawal and Requirement as required by Items No. 8 and 9, provide written verification to the Director that the Certificates of Withdrawal and Requirement have been registered on title to each of Site 1, and Site 2, and that the Certificates of Withdrawal have been registered on title for each of Site 1, Site 2, Site 3 and Site 4, respectively.

PART B - BACKGROUND AND REASONS

This Director's Order is being issued for the reasons set out below.

Definitions

For the purposes of this Director's Order, the following capitalized terms shall have the meanings set out below:

"CGECL" means Canadian General Electric Canada Limited (Ontario Corporation Number 000001701), a predecessor corporation of General Electric Canada Company (Ontario Corporation Number 001796028), a previous owner of the Site.

"Contaminants of Concern" includes but is not necessarily limited to the following compounds and any associated degradation compounds:
i) polychlorinated biphenyls (PCBs)
ii) trichloroethylene (TCE)
iii) dichloroethylene (DCE)
iv) vinyl chloride (VC).

"Director" means the undersigned or any other person appointed for purposes of s. 18, 132, and 197 of the EPA.

"Director's Order GE-PTBO-DO001FA" means the Director's Order that was issued on December 10, 2018, under the EPA, to General Electric Canada Company and General Electric Canada Property Inc.

"EPA" means the Environmental Protection Act, R.S.O. 1990, c. E.19.

"Financial Assurance" or "FA" has the same meaning as in section 131 of the EPA,

"GECC" means General Electric Canada Company, the successor company to Canadian General Electric Corporation Limited (Ontario Corporation Number 000001701) and, General Electric Canada Inc. (Ontario Corporation Numbers 000576365 and 000875925).

"GECPI" means General Electric Canada Property Inc., the previous owner of the Site.

"GEPR" means GEPR Energy Canada Inc., the current owner of the Site.

"Ministry" or "MECP" means the Ontario Ministry of the Environment, Conservation and Parks.

"PCBs" means polychlorinated biphenyls.

"PWQO" means Ontario's Provincial Water Quality Objectives.

"Qualified Consultant" means a person who has obtained the appropriate education and training and has demonstrated experience and expertise in the areas relating to the work required to be carried out by this Order. For the purposes of this Order, the person shall also meet the qualifications set out in Section 5 of O. Reg. 153/04, made under the EPA.

"Site" means the two properties located within the city of Peterborough, Ontario consisting of Site 1 and Site 2, as defined below.

"Site 1" means the property with two municipal addresses of 107 Park Street and 1160 Monaghan Road, Peterborough, ON with the following Property Identifier Number 28081-0123.

"Site 2" means the property with two municipal addresses of 1063 and 1091 Monaghan Road, Peterborough, ON with the following Property Identifier Number 28067-0046.

"Site 3" means the property located at 297 Rink Street, Peterborough, ON with the following Property Identifier Number 28091-0139, which was subject to the previous Director's Order GE-PTBO-DO001FA but is not subject to this Order.

"Site 4" means the property located at 107 Rubidge Street, Peterborough, ON with the following Property Identifier Number 28091-0137, which was subject to the previous Director's Order GE-PTBO-DO001FA but is not subject to this Order.

"TCE" means trichloroethylene.

"VOCs" means volatile organic compounds.

Description of Person(s) Subject to the Director's Order

GEPR Energy Canada Inc. is a federally incorporated company, corporation number 1394805-6, incorporated on April 12, 2022. GEPR is a successor to the previous owner the Site, along with Site 3 and Site 4, whereby ownership of the four properties were transferred to GEPR on January 3, 2023, from General Electric Canada Property Inc. which owned of the four properties since 2004. GEPR was created as part of the corporate restructuring process of General Electric (parent company of General Electric Canada Company (GECC)) to subdivide the company into three separate corporations which commenced at the beginning of 2023 with spinoff of GE's Health Care business (GE Healthcare).

The separation of the two remaining businesses (GE Aerospace and GE Vernova) is still underway and planned to be completed during 2024. GEPR is a subordinate company within GE Vernova which designs and manufactures various types of energy production and management systems. As part of the restructuring, GEPR has assumed the responsibilities for the Site, including any off-site impacts, that GECC and CECPI are or were responsible for under the EPA.

GECC is the successor corporation to various former corporate entities which previously owned

and had management and control of the four properties (Site 1, 2, 3 and 4) for decades. More specifically, GECC and its predecessor corporations owned and had management and control of all or significant portions of the four properties as follows: Site 1 since in or around 1893; Site 2 since in or around 1947; Site 3 since in or around 1910/11; and since in or around 1928 for at least a portion of Site 4 and since 1980 in terms of Site 4 in its entirety.

Description of the Site and/or System/Facility

The Site is located within the City of Peterborough where there are various land uses in the surrounding areas, including predominantly residential, as well as some commercial and industrial uses, and a school (Prince of Wales Public School).

The Site that is the subject of this Order consists of two separate properties defined as Site 1 and Site 2. The previous Director's Order GE-PTBO-DO001FA was issued with respect to four properties which included two additional properties, Site 3 and Site 4. On March 16, 2023, GEPR requested that Site 3 and Site 4 be removed from this Director's Order. Those two properties were included in the previous order as there are monitoring wells located on them that are part of the Site monitoring program. However, the monitoring wells are being replaced with new monitoring wells to be located on adjacent off-property locations by GEPR, which is acceptable to the Ministry, and therefore it is appropriate to remove them as reflected in this Order.

Site 1 was used for manufacturing purposes between 1891 and 2018. In or around 1891, a large manufacturing plant was constructed at Site 1 consisting of three buildings with a total manufacturing area of 74,000 square feet. Industrial manufacturing of dynamos, motors for stationary power and electrical railway purposes, mining locomotives, underground conductors, electrical instruments, appliances, electric cables and insulated wire took place in the early years of manufacturing at the Site. Over the years, manufacturing continued and changed. During the First World War, manufacturing shifted to the production of artillery, shells and guns. In or around 1946, separate buildings were developed for the fractional motors and porcelain departments. Industrial manufacturing in the form of large electrical motors and other components continued at Site 1 until the manufacturing activities were ceased by GECC in late 2018. Some buildings at Site 1 continue to be used for office space by a limited number of GEPR employees.

Site 2 consists largely of undeveloped land, however, there are several parking lot areas on the eastern portion of the property, along Monaghan Road, that are used by employees of GEPR and a formerly associated business. Some activities related to the industrial manufacturing businesses at Site 1 may have occurred on Site 2 over time, based on the presence of contaminants there, including PCBs. Site 2 has one building that is located near its southeastern corner (at the corner of Frank Street and Monaghan Road) and one building located in the northwestern corner along High Street.

Site 3 (297 Rink Street) and Site 4 (107 Rubidge Street) are small vacant properties located immediately east of Site 1 that are currently used as parking areas. A railway line passes along the southeastern side of Site 3 where a former rail spur, that served the GECC plant facility on Site 1, splits off and passes through the northern part of Site 4, along its route to the plant

facility. Groundwater monitoring wells were located on Sites 3 and 4 that were sampled as part of GECC's Site monitoring program in relation to the TCE contamination issue. These monitoring wells are in the process of being replaced by new wells to be established on adjacent off-property locations, which is acceptable to the Ministry.

Through various industrial and related activities that occurred over time at the Site, contamination of soil and groundwater resulted, including PCBs and TCE. PCBs and TCE (along with associated degradation compounds, such as dichloroethylene and vinyl chloride) are the primary Contaminants of Concern at the Site.

PCBs were once widely deployed in the industrial sector within dielectric and coolant fluids in electrical apparatus and in heat transfer fluids.

TCE has typically been used in the industrial sector as a solvent for degreasing metal materials and parts during the manufacture of products.

Both Sites 1 and 2 are the subject of ongoing environmental monitoring/sampling, assessment and remedial/mitigative activities undertaken by GEPR to manage these contamination issues and to mitigate contaminant discharges and potential adverse effects. These environmental monitoring/sampling, assessment and remedial/mitigative activities have been ongoing since at least
the 1980's.

The two sites are serviced with storm water sewers (Site 1 extensively, and Site 2 to a limited extent on-site, but with surface water runoff directed to surrounding municipal storm water sewer lines) that connect to the municipal storm water sewer system in the surrounding areas which is owned by the City of Peterborough. The municipal storm water sewer system in the immediate vicinity of the Site drains eastwardly along Rink Street into Little Lake which is situated on the Otonabee River within the city.

Little Lake and the Otonabee River system are the subject of ongoing environmental monitoring and assessments in regard to accumulated sediment that contains PCBs (and other contaminants, such as polycyclic aromatic hydrocarbons and metals) and associated environmental impacts by the Ontario Ministry of the Environment, Conservation and Parks, and by Parks Canada Agency, an agency of the federal Crown which owns the water lot section of the Otonabee River and Little Lake that is part of the Trent-Severn Waterway.

Reasons for the Director's Order

This Order revokes and replaces Director's Order GE-PTBO-DO001FA that was issued on December 10, 2018, for the purpose of updating various information and requirements, and replaces Director's Instructions issued by the ministry on June 21, 1995. It also addresses the in-situ management of PCB impacted soils that have previously been managed in accordance with Director's Instructions issued under Regulation 362 under the EPA. More specific details are provided below.

Environmental Concerns associated with the Site Contamination

The two primary contaminants of concern for the purposes of this Order are PCBs and TCE, as described in the following sections.

a) Polychlorinated Biphenyls (PCBs)

The main concern regarding potential off-Site environmental impacts associated with the PCB contamination at the Site is for PCB molecules to be transported off-site via water discharges into the municipal storm water sewer system which flows eastward along Rink Street and discharges into Little Lake and the Otonabee River.

Little Lake and the Otonabee River also subject to recreational water activities, and exposure to PCB contaminated waters and sediment may represent a human health risk. PCBs also transfer up the ecological food chain to other aquatic, terrestrial and avian species within which the contaminants may bioaccumulate and result in ecological impacts. As such, further inputs of PCBs to Little Lake and the Otonabee River system should be mitigated.

Various studies have shown that deposits of PCB contaminated sediments are present in Little Lake and further downstream along the Otonabee River and in Rice Lake, which the Otonabee flows into, located approximately 20 kilometres south of the City of Peterborough. Studies have shown that PCBs are present within the tissues of sport fish collected from the Otonabee River and Rice Lake at concentrations that have caused fish consumption advisories to be issued and which should be followed for the protection of human health; refer to the MECP's online 'Guide to Eating Ontario Fish'. The Hiawatha First Nation community is located on the north shore of Rice Lake and community members, as well as other sport fishers, consume fish from the lake.

Since the City of Peterborough, including the Site and its vicinity, is serviced with municipal water supply obtained from the Otonabee River some distance upstream of the Site and Little Lake, potential human health impacts associated with PCB groundwater contamination at the Site are unlikely.

GEPR undertakes an annual PCB monitoring and mitigation program for surface water and sediments in storm water sewers, and for groundwater, as part of its management of the PCB contamination issues at the Site. The PCB monitoring program and findings are described in more detail in sections below.

b) Trichloroethylene (TCE)

TCE is a chlorinated volatile organic compound. As a subsurface soil and groundwater contaminant (as is the case for the Site), the chemical may volatilize (become gaseous) into the subsurface soil vapour zone with the potential to infiltrate into the airspaces of buildings, including houses. TCE can then cause human health impacts to residents who may inhale the vapours, given sufficient concentration and time exposure. TCE may also degrade within the subsurface environment to form other volatile organic compounds, such as dichloroethylene

and vinyl chloride, which have similar properties and environmental concerns.

Since the City of Peterborough and local area is serviced with municipal water supply, consumption of impacted groundwater is not likely to occur, and since the contamination is within the subsurface environment, it should not represent a public health risk via direct contact with, or ingestion of, impacted soil or groundwater; however, the volatilization of these VOCs in the soil may pose a risk to indoor air of buildings located in the area of the off-site TCE plume.

History and Background

a) PCB Monitoring Program History

GECC submitted a report entitled "Storm Sewer Monitoring Program, 2012 Annual Report (Conestoga-Rovers & Associates, April 2013)" which provides the following background description regarding the operational history and PCB occurrence for Site 1 and Site 2 (the two properties subject to this Order):

"The Site was originally developed for manufacturing operations in the late 1880s. Historical and/or current operations conducted at the Site include capacitor manufacturing, large motor manufacturing, small AC motor manufacturing, and AC traction motor manufacturing. PCBs were historically used in the manufacturing of capacitors. Wastes oils, some containing PCBs, were also used as a dust suppressant at the Site and Monaghan Road Parking Lot. Monitoring of the PCB impacts on storm water, sediment, and groundwater has been conducted since 1992…"
Note: the reference to 'Site' in the above excerpt is regarding Site 1, and the reference to the Monaghan Road Parking Lot is regarding part of Site 2.

These historical activities at Site 1 and Site 2 resulted in PCB contamination of soils and other surfaces. PCB soil contamination was identified in the southern parking lot area of Site 2, which has been managed 'in-place' by GECC/GEPR since the mid-1990s through Director's Instructions issued by the ministry on June 21, 1995 (which revised previous Director's Instructions, dated November 2, 1993).

The Director's Instructions provided for the establishment and operation of an interim PCB Waste Management site by ensuring a protective cap layer is maintained over the impacted soils, along with a requirement to implement a groundwater and surface water monitoring program.

In 2011, an expanded annual PCB Site monitoring program (in addition to that required by the Director's Instructions, noted above) was implemented which, included the collection of water and sediment samples (in the spring, summer and fall seasons) from storm sewers outfalls from Site 1. The outline of the program, including the Site evaluation criteria for surface water and sediment discharges, was set out in a document prepared by the Ministry, entitled 'Storm Sewer Monitoring Program for PCBs, General Electric Canada - Peterborough, February 2, 2011'.

A work plan was submitted to the Ministry in May 2012, which consolidated the annual PCB monitoring and reporting activities for the Site. Since 2012, GECC/GEPR has undertaken an annual maintenance and monitoring program, including the clean-out of PCB-impacted sediments from their storm sewers in response to instances of elevated PCB sampling results, as well as various activities to investigate and mitigate sources of PCBs, including soil sampling and the implementation of Best Management Practices (e.g., the cleaning of exterior surfaces such as paved areas). These annual site monitoring and management activities are detailed in an annual report submitted to the Ministry each year.

b) In-Situ Management of PCB-Impacted Soils at the Monaghan Road Parking Lot

As noted above, the regulatory authority and requirements that provide for the PCB-contaminated soils at the Monaghan Road Parking Lot soils, located on Site 2, to be managed 'in-situ' through the implementation of appropriate risk management measures, is being transferred from the previous Director's Instructions (1995) to this Order.

The PCB-contaminated soils are being managed through the use of an asphalt cap (barrier) to prevent the erosion and migration of PCB contaminants in surface water runoff. PCB molecules are considered to have a relatively low mobility within the subsurface groundwater system due to their nature to bind to soil particles.

The inspection and maintenance details of the risk management measures required of GEPR for the management of the PCB-impacted soils at the Monaghan Road Parking Lot are set out in Appendix A.

GEPR undertakes a surface water, sediment and groundwater monitoring program with respect to the management of the PCB-impacted soils at the Monaghan Road Parking Lot to ensure the risk management measures are effective in preventing the mobilization of PCBs and their exposure to the natural environment and human receptors. The details of the monitoring and management program component for this area are contained in Appendix B.

c) TCE Monitoring Program and Groundwater Extraction and Treatment System

Environmental investigations of the Site by GECC began in 1981, with the installation of groundwater wells and implementation of a monitoring and sampling program. Subsequent investigations resulted in the characterization of the subsurface hydrology and delineation of an area impacted by VOCs, where TCE and its degradation products were the primary concern.

In 2001, a remedial action plan was approved by the Ministry, which included:
i) the implementation of a groundwater extraction and treatment system to hydraulically contain and mitigate the off-site migration of the VOC plume;
ii) the investigation and assessment of the TCE source, including removal of free product; and
iii) the completion of a site-specific risk assessment and the ongoing assessment of monitored natural attenuation of off-site TCE groundwater impacts.

The site-specific risk assessment was accepted by the Ministry in September 2002, which provided site-specific groundwater criteria for existing on-site and off-site VOC impacts.

The groundwater extraction and treatment system (GETS) was activated in October 2004. Since then, annual summary reports detailing the geologic and hydrogeologic conditions, and the performance of the GETS and monitoring activities, have been completed and submitted to the Ministry by GECC.

In addition to groundwater monitoring and sampling, GECC/GEPR has undertaken soil vapour sampling in the area of the off-site TCE plume beginning in 2000 and submits annual Soil Vapour Monitoring reports to the ministry.

GEPR is currently in the process of replacing and updating the GETS during 2023.

d) Current Status of Site Operations and Monitoring Requirements

In late August 2017, GECC announced that it would be ceasing its industrial manufacturing activities at its Peterborough plant located at the Site in the fall of 2018.

Ongoing monitoring and remediation programs of the Contaminants of Concern have been undertaken on a voluntary basis by GECC. Financial Assurance was previously required by Director's Order GE-PTBO-DO001FA that was issued on December 10, 2018, for any of the ongoing environmental programs or activities that were the subject of that Order, and the corresponding Financial Assurance continues to be in place, subject to the issuance of this Order.

In regard to the PCB storm water sewers (water and sediment) and groundwater monitoring programs, MECP Eastern Region Technical Support Section reviews annual monitoring reports and provides comments that are reviewed with GEPR to guide further monitoring activities and site management actions. The reviews to date have recommended continuation of the ongoing monitoring program.

Considering the long-term and wide-spread nature of the PCB contamination at the Site, and the ongoing instances of PCB contaminant concentrations in storm water discharges from the Site, it is expected that the PCB monitoring program will continue to be required of GEPR for many years to monitor the effectiveness of its actions to control, prevent and mitigate PCB discharges from the Site to the natural environment.

Similarly, the ministry's Eastern Region Technical Support Section reviews the annual GETS monitoring reports and recommends the continued operation of the GETS and continuation of the ongoing groundwater and soil vapour TCE monitoring programs.

The specifications of the PCB and TCE monitoring and remedial programs described above are summarized in the GEPET_60698930T_4011_03_002_02 - Monitoring Program Summary (20230726) - [10 pages, dated 2023/07/26] that is attached as Appendix B and forms part of this Order.

Authority to Issue the Director's Order

I am issuing this Director's Order under my authority as a Director under the following legislation, which also includes the authority to take intermediate action and/or procedural steps:

I am issuing this Director's Order under my authority as a Director under the following legislation, which also includes the authority to take intermediate action and/or procedural steps:

Sections 18, 132 and 197 of the EPA.

Based on the foregoing, I am of the opinion that GEPR is the current owner of the Site and is the successor to the prior corporate owners of the Site who were previously in management or control of the Site and/or of activities undertaken on the Site that is contaminated with Contaminants of Concern.

Based on the foregoing, I am of the opinion that it is reasonable to believe that the Site is currently contaminated and has been contaminated for some time.

The Site is a source of the Contaminants of Concern which have migrated off the Site and onto adjacent properties.

If the TCE groundwater remediation and containment program and other monitoring and mitigation programs described in Appendices A and B and as they may be amended or revised from time to time do not continue, groundwater and/or surface water contaminated with the Contaminants of Concern may continue to migrate off the Site and onto adjacent properties where adverse effects may occur or have already occurred.

I reasonably believe that the requirements of this Order are necessary and advisable to prevent or reduce the risk of a discharge of groundwater and/or surface water impacted with the Contaminants of Concern into the natural environment from the Site and to prevent, decrease or eliminate any adverse effects that may result from such a discharge or from the presence or discharge of the Contaminants of Concern in, on or under the Site related to soil vapour, groundwater and surface water impacts.

I am of the opinion that it is reasonable and appropriate, and consistent with my authority under section 132 of the EPA and the Ministry's Financial Assurance Guideline F-15, specifically sections 4.4 and 4.4.5 of that Guideline, that Financial Assurance be provided by the GEPR so that funds are available for the MECP, in the event that the GEPR is unable or becomes unable or unwilling to provide ongoing care, monitoring and control of contamination issues related to the Site.

Director's Order GE-PTBO-DO001FA that was issued on December 10, 2018 is hereby revoked.

Attachments

The attachments listed below, if any, form part of this Director's Order:

Appendix A: Requirements for the In-situ Management of PCB-Impacted Soils at the Monaghan Road Parking Lot on Site 2

Appendix B: GEPET_60698930T_4011_03_002_02 - Monitoring Program Summary (20230726)

ISSUING DIRECTOR

Name: David Bradley

Job Title: District Manager

Badge Number:

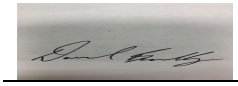
Address: 300 WATER ST 2ND FLR, PETERBOROUGH, ON, K9J 3C7

Director Email: david.bradley@ontario.ca

Office Email: Environment.Peterborough@ontario.ca

Date: Mar 6, 2024

Signature:



APPEAL TO THE ONTARIO LAND TRIBUNAL INFORMATION

REQUEST FOR HEARING

You may require a hearing before the Ontario Land Tribunal if, within 15 days of service of this Director's Order, you serve written notice of your appeal on the Ontario Land Tribunal and the Director as indicated in the Contact Information below. Your notice of appeal must state the portions of this Director's Order for which a hearing is required and the grounds on which you intend to rely at the hearing. Unless you receive leave (permission) from the Ontario Land Tribunal, you are not entitled to appeal a portion of this Director's Order or to rely on grounds of appeal that are not stated in the notice of appeal.

CONTACT INFORMATION

The contact information for the Director and the Ontario Land Tribunal is the following:

Registrar
Ontario Land Tribunal
655 BAY STREET, SUITE 1500
TORONTO, ON M5G 1E5
Email: OLT.Registrar@ontario.ca

and

Director
Ministry of the Environment, Conservation and Parks
Peterborough District Office
300 WATER ST, 2ND FLR
PETERBOROUGH, ON K9J 3C7
Office Email: Environment.Peterborough@ontario.ca
Fax: (705) 755-4321

The contact information of the Ontario Land Tribunal and further information regarding its appeal requirements can be obtained directly from the Tribunal at:

Tel: (416) 212-6349, Toll Free: 1(866) 448-2248 or www.olt.gov.on.ca

SERVICE INFORMATION

Service of the documentation referred to above can be made personally, by mail, by fax (in the case of the Director only), by commercial courier or by email in accordance with the legislation under which this Director's Order is made and any corresponding Service Regulation.

ADDITIONAL INFORMATION

Unless stayed by the Director or the Ontario Land Tribunal, this Director's Order is effective from the date of service.

Failure to comply with a requirement of this Director's Order constitutes an offence. Unless otherwise indicated, the obligation to comply with a requirement of this Director's Order continues on each day after the specified compliance date until the obligation has been satisfied.

The requirements of this Director's Order are minimum requirements only and do not mean that you are not required to comply with any other applicable legal requirements, including any:

- statute, regulation, or by-law;
- federal, provincial, or municipal law; or
- applicable requirements that are not addressed in this Director's Order.

The requirements of this Director's Order are severable. If any requirement of this Director's Order, or the application of any requirement to any circumstance, is held invalid, such finding does not invalidate or render unenforceable the requirement in other circumstances. It also does not invalidate or render unenforceable the other requirements of this Director's Order.

Further orders may be issued in accordance with the legislation as circumstances require.

This Director's Order is binding upon any successors or assignees of the persons to whom this Director's Order is issued.

The procedures to request a hearing and an appeal of this Director's Order and other information provided above are intended as a guide. The legislation should be consulted for additional details and accurate reference. Further information can be obtained from e-Laws at www.ontario.ca/laws.

Appendix A

Requirements for the In-situ Management of PCB-Impacted Soils at the Monaghan Road Parking Lot on Site 2

Appendix A

Requirements for the In-situ Management of PCB-impacted Soils at the Monaghan Road Parking Lot on Site 2

In conjunction with the Site monitoring program as outlined in Appendix B to this Order, GEPR shall implement the following inspection and maintenance actions for the management of the PCB-impacted soils at Site 2:

i. All locations within the defined area of PCB-impacted soils at Site 2, which were previously determined as containing soils with PCB concentrations greater than 5 micrograms per gram (ug/g), shall remain covered with a minimum of 5 centimetres of asphalt and the cover shall be maintained at all times. The currently defined area of the in-situ PCB-impacted soils at Site 2 that is subject to these requirements is outlined in Figure 1B of Appendix B.

ii. The defined area shall be inspected by authorized personnel on a monthly basis and written records will be maintained of these inspections, including inspection date and condition of the asphalt cover. The records shall be signed digitally by an authorized inspector and a copy maintained at the Site. Any problem identified that may impact the environmental integrity of the in-situ management of the PCB-impacted soils at Site 2 shall be reported to the Peterborough District Manager or designate forthwith.

iii. A summary of the inspections conducted, problems cited, and corrective actions taken shall be included in the annual report specified in Appendix B.

Appendix B

GEPET_60698930T_4011_03_002_02 – Monitoring Program Summary (20230726)

Groundwater Monitoring & Sampling Program

Groundwater monitoring wells shall be monitored and sampled one time per year in spring subject to well accessibility and condition, ***Table 1***.

Monitoring includes groundwater level measurements.

Groundwater shall be sampled for Total PCB or Select VOCs (1,1 DCE; trans- 1,2 DCE; cis- 1,2 DCE, TCE, VC) annually and for Monitored Natural Attenuation (MNA) parameters every five years.

The groundwater monitoring program shall be reviewed annually by the Qualified Person (QP) and any recommendations for change or amendments shall be submitted to the Ministry for review. Any recommendations accepted by the Ministry shall be implemented and shall form part of Appendix E as amended.

Monitoring results and recommendations shall be reported annually under the titles *PCB Monitoring Report for Storm Water and Groundwater* and *Groundwater Extraction and Treatment System Monitoring Report.*

Table 1 – Groundwater Monitoring and Sampling Program

Well ID	**PCB** *Facility*	**PCB** *Monaghan Rd*	**Select VOCs** *RAP/SSRA*	**MNA** *RAP/SSRA*
EW1			X	
EW2			X	
EW3			X	
EW4			X	
EW5			X	
EW6			X	
EW7			X	
MW05R			X	
MW11R2			X	X
MW25	X			
MW26	X			
MW28	X			
MW32			X	
MW33			X	
MW35		X		
MW37A		X		
MW38		X		
MW49			X	
MW50			X	
MW51			X	
MW52			X	
MW53			X	
MW58			X	
MW59R			X	X
MW60R			X	X
MW61			X	X
MW62			X	
MW63R			X	X
MW64			X	X
MW65			X	X
MW66			X	X
MW67			X	
MW68			X	X
MW71			X	X
MW73		X		
MW102		X		
MW103		X		
MW104		X		

Soil Vapour Monitoring Program

Soil vapour probes shall be sampled once per year in the summer subject to well accessibility and condition, ***Table 2***.

Waterloo Membrane Samplers (WMS) shall be used to collect soil gas samples.

Samples shall be analyzed for select VOCs (*1,1 DCE; trans- 1,2 DCE; cis- 1,2 DCE, TCE, VC*)

The soil vapour monitoring program shall be reviewed annually by the QP and any recommendations for change or amendments shall be submitted to the Ministry for review. Any recommendations accepted by the Ministry shall be implemented and shall form part of Appendix E as amended.

Monitoring results and recommendations shall be reported annually under the title *Soil Vapour Monitoring Report*.

Table 2 – Soil Vapour Monitoring and Sampling Program

Well ID	WMS
GP3-12	X
GP5-12	X
GP7-12	X
GP18-12	X
GP19-12	X
GP21-12	X

Storm Sewer Monitoring Program

Storm Sewer Outfalls including three City of Peterborough Storm Sewer manholes shall be monitored and sampled three times per year (except as noted below) during or immediately following a rain event (10mm) subject to outfall accessibility and condition, ***Table 3***.

Monitoring shall include a visual inspection of the CB / MH and measurement of sediment thickness.

Where present, sediment shall be sampled for Total PCB (including Aroclors) and TOC.

Where present, stormwater shall be sampled for Total PCB (including Aroclors) and TSS.

The Monaghan Road Parking Lot shall be inspected by an authorized person on a monthly basis and written records will be maintained of these inspections, including inspection date and condition of the asphalt cover.

The storm sewer monitoring program shall be reviewed annually by the QP and any recommendations for change or amendments shall be submitted to the Ministry for review. Any recommendations accepted by the Ministry shall be implemented and shall form part of Appendix E as amended.

Monitoring results and recommendations shall be reported annually under the title *PCB Monitoring Report for Storm Water and Groundwater*.

Table 3 – Storm Sewer Monitoring and Sampling Program

MH/CB ID	Facility Outfalls	Monaghan Rd Outfalls	City of Peterborough	Little Lake
MHR1	X			
MHR35	X			
MHR41	X			
CBR35	X			
CBR73	X			
CBR82	X			
C.STM.MH	X			
CBR90	X			
CBR94	X			
CBR107	X			
CBR111	X			
CBR112	X			
CBMHR113	X			
CBMHR130		X		
CBR137		X		
CBR140 *		X		
CBR142 *		X		
MH135686			X	
MH135683			X	
MH136551			X	
MH166902			X	
MH135703 **			X	
LL-15				X

* *Catch basin not connected to City storm sewer system. These locations will be monitored but will not be considered representative of storm water outfall from Site.*

** *Location shall be monitored and sampled **six** times per year during or immediately following a rain event (10mm) subject to outfall accessibility and condition*

Groundwater Extraction and Treatment System

The Groundwater Extraction and Treatment System (GETS) operates in the southeast corner of the Site to provide hydraulic containment along a network of seven groundwater extraction wells, EW1 through EW7, located along the southern property boundary.

The GETS operates under the following permits:

i) Permit to Take Water (PTTW) No. 6551-BCWQSV, Ministry of the Environment, Conservation and Parks (MECP);
ii) Environmental Compliance Approval (ECA) 7896-9HDRYN, MOECC: for treatment of groundwater via air stripping; and,
iii) Slug Discharge Permit, City of Peterborough (City): for discharge of treated groundwater to the City's sanitary sewer.

In accordance with PTTW, daily water taking from all extraction wells are reported annually on a calendar year basis.

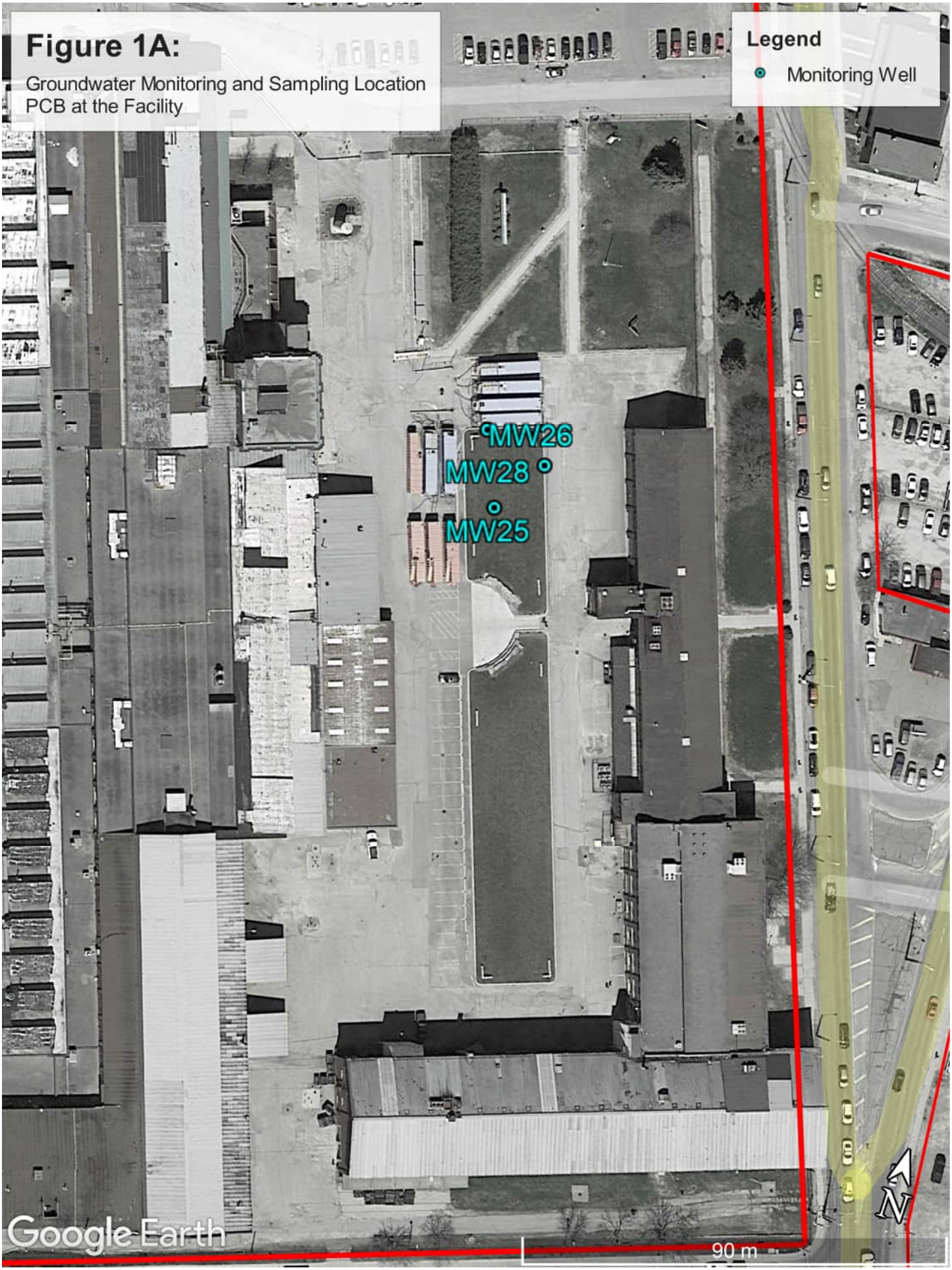
There is no specific monitoring required under the ECA. The ECA is part of a Site-wide ECA.

Operation of the PTTW (including any sampling) is subject to maintenance and repairs as required.

A consolidated summary of GETS operation and performance monitoring is reported annually under a report titled *Groundwater Extraction and Treatment System Monitoring Report*.

Annual Reporting Details

Each of the annual reports referred to in this document will be submitted to the Ministry by the end of February each year in the form of three paper copies and an electronic copy.


Figure 1A:
Groundwater Monitoring and Sampling Location
PCB at the Facility
Legend
Monitoring Well
MW26
MW28
MW25
Google Earth
90 m
N

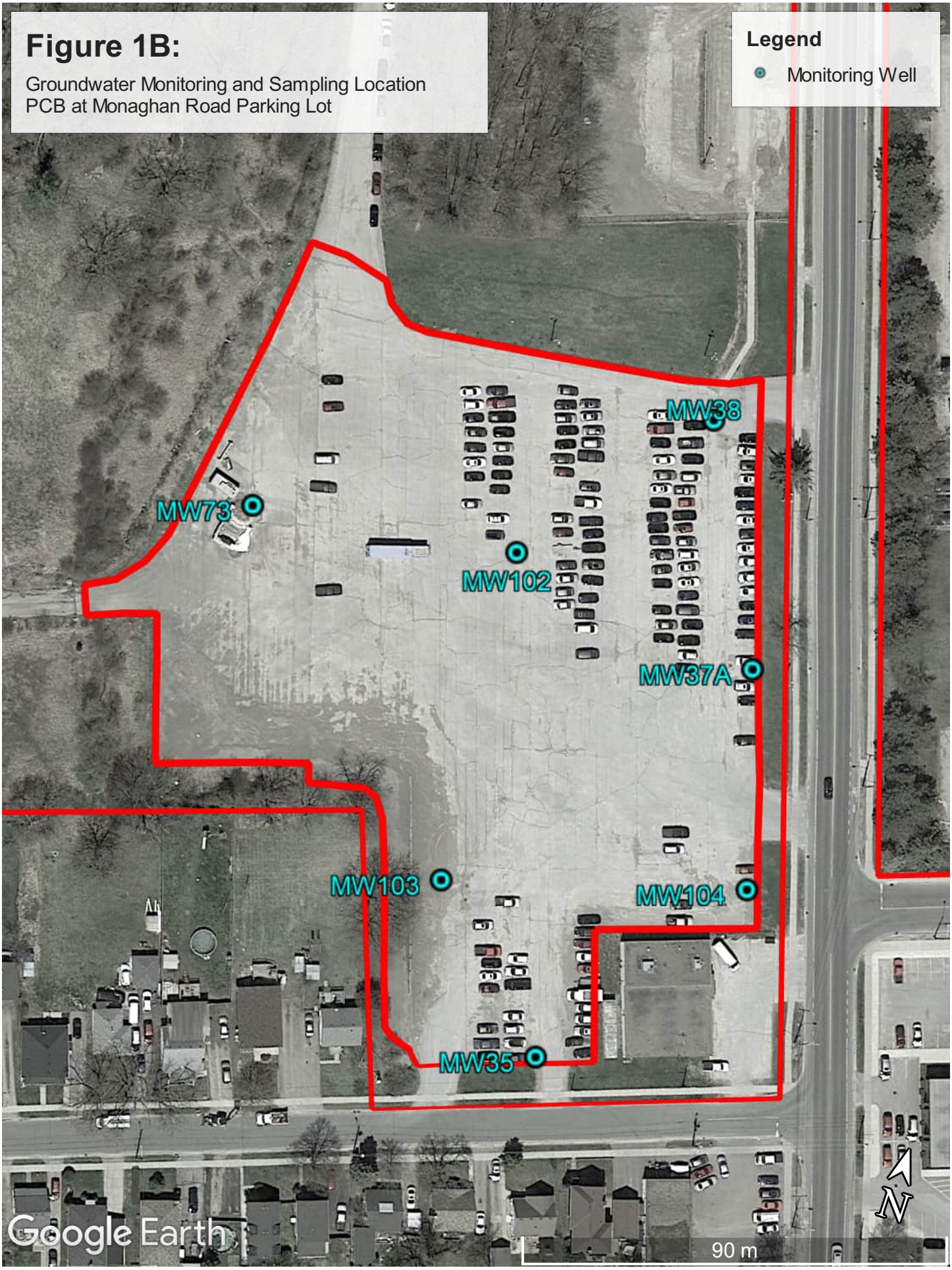

Figure 1B:
Groundwater Monitoring and Sampling Location
PCB at Monaghan Road Parking Lot
Legend
Monitoring Well
MW38
MW73
MW102
MW37A
MW103
MW104
MW35
N
Google Earth
90 m

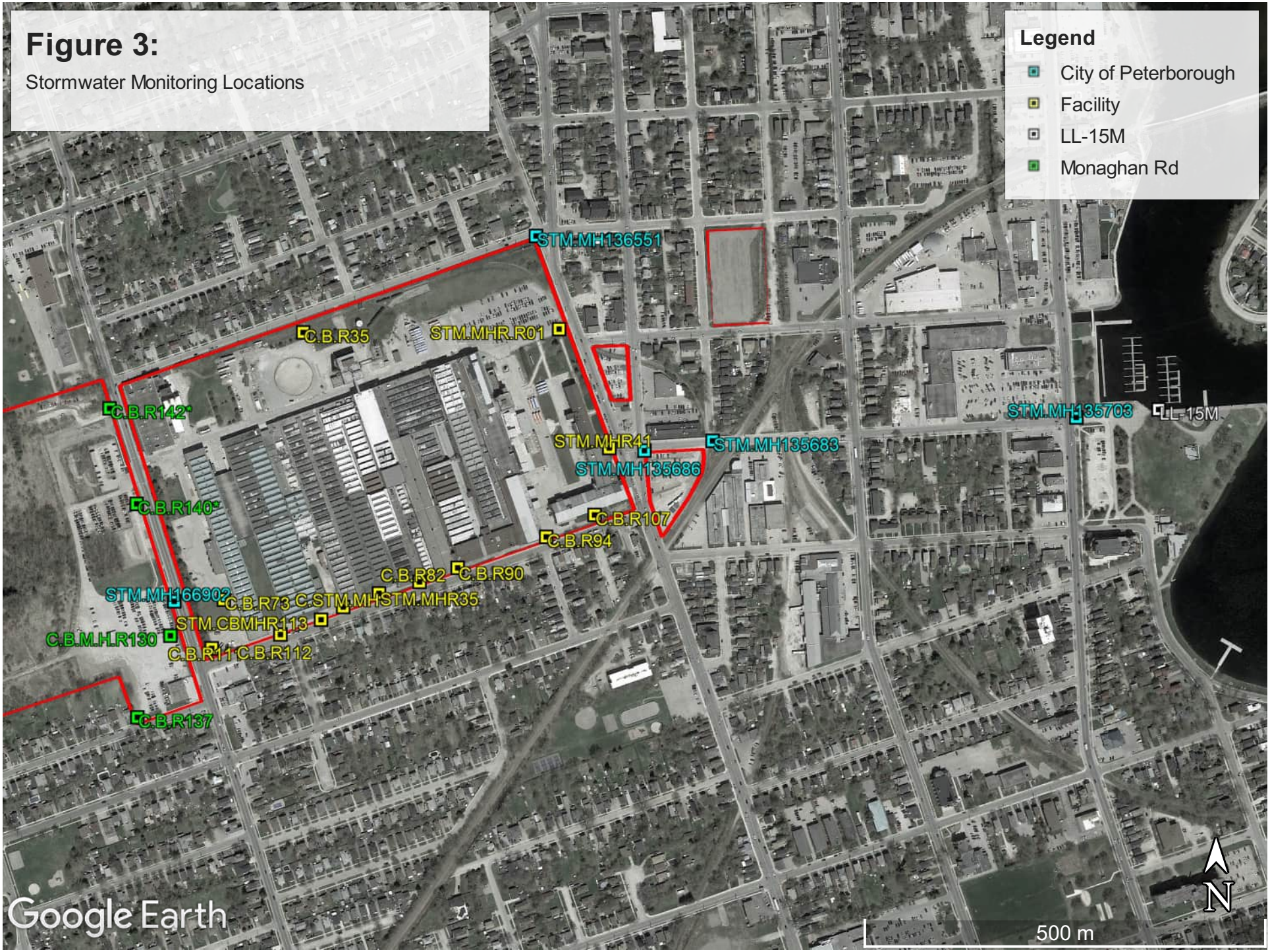

Figure 1C:
Groundwater Monitoring and Sampling Location
Select VOCs for RAP/SSRA
Legend
Extraction Well
Monitoring Well
MW32
MW33
MW11R2
MW05R
MW53
MW62
MW59R
MW58
MW52
EW-1
MW67
MW61
MW51
EW-2
EW-3
MW60R
EW-4
EW-5
MW68
EW-6
MW50
MW71
MW49
MW66
MW65
MW64
MW63R
N
Google Earth
300 m


Figure 1D:
Groundwater Monitoring and Sampling Location
Monitored Natural Attenuation
Legend
Monitoring Well
MW11R2
MW59R
MW61
MW60R
MW68
MW71
MW66
MW65
MW64
MW63R
N
300 m
Google Earth


Figure 2:
Soil Vapour Monitoring Locations
Legend
Soil Vapour Monitoring Locations
GP3-12
GP5-12
GP19-12
GP18-12
GP7-12
GP21-12
Google Earth
300 m
N

Figure 3:

Stormwater Monitoring Locations



Appendix 2: Letter from 448 signatories from the community of Peterborough to Chief Executive Officer of Lakelands Public Health, Dr. Thomas Piggott (without attachments)

Dr. Thomas Piggott
Medical Officer of Health & Chief Executive Officer
Lakelands Public Health
185 King St
Peterborough, ON
K9J 2R8

November 18, 2025

Dear Dr. Piggott:

Re: Request for inspection under the *Health Protection and Promotion Act* of the former General Electric factory complex at 107 Park Street North, City of Peterborough, Ontario (K9J 7B5)

This letter is an urgent complaint pursuant to section 11 of the *Health Protection and Promotion Act* ("*HPPA"*). We request that you exercise your authority under the *HPPA,* including notification of the Ministry of Environment, Conservation and Parks ("MECP") and inspection of the former General Electric ("GE") Factory Complex (hereinafter, "Site") located at 107 Park Street North, before its demolition. Due to the uncertainty of the demolition date, but given its reported imminence, we request that the Medical Officer of Health exercise his powers without delay.

Specifically, we request that the Medical Officer of Health ensures that there is a detailed inventory and testing of the contaminants on the Site. GE's demolition plans must be reviewed by the public and by experts to ensure that the health of nearby residents, children attending Prince of Wales Public School, and workers is protected. The public is concerned about the lack of transparency to date and wish to be provided with an opportunity for review and input into GE's demolition plans.

Accordingly, we encourage Lakelands Public Health to work with the MECP in seeking:

- **An inventory and testing of all hazardous materials and substances that are currently present on the Site;**

- **A detailed demolition plan, which must include at a minimum:**

    - **Measures proposed to safely contain or remove contamination from the Site;**
    - **Measures proposed to prevent offsite contamination and exposure to nearby residents, children and workers during and after demolition; and**

- **Public review and comment on GE's demolition plans prior to demolition.**

To the public's knowledge, the Site remains contaminated with asbestos, PCBs, TCE, heavy metals, and other toxic compounds, and has not been significantly remediated. For these reasons, we are raising urgent concerns about the high likelihood of offsite environmental impacts to the

local community if the demolition proceeds without clear and transparent plans in place to prevent health hazards. In support of this request, this letter will provide the following:

(1) A summary of the legal basis for an inspection under the *HPPA*;
(2) An overview of relevant context, facts, and documented exposure risks associated with the Site; and
(3) The rationale as to why an inspection and action by Lakelands Public Health, in partnership with MECP, is urgently needed.

(1) Legal basis for inspection under the *HPPA*

The *HPPA* provides a robust statutory framework authorizing a Medical Officer of Health to inspect, investigate, and, if necessary, intervene to prevent the release of harmful contaminants both prior to, during and after the demolition of buildings at the Site.

Section **10(1)** of the *HPPA* provides that a Medical Officer of Health shall inspect or cause an inspection of the health unit in order to prevent, eliminate or decrease the effects of a health hazard:

> Every medical officer of health shall inspect or cause the inspection of the health unit served by him or her for the purpose of preventing, eliminating and decreasing the effects of *health hazards* in the health unit.[1]

The *HPPA* defines a health hazard to include the condition of a premises and any solid, liquid or gas which is likely to have an adverse effect on the health of any person:

> "health hazard" means,
> (a) a condition of a premises,
> (b) a substance, thing, plant or animal other than man, or
> (c) a solid, liquid, gas or combination of any of them,
> that has or that is likely to have an adverse effect on the health of any person.[2]

Further, section **11(1)** of the *HPPA* creates a mandatory duty for the Medical Officer of Health to notify the government of Ontario ministry primarily responsible for the health hazard related to environmental health and a mandatory duty to investigate a complaint to determine whether the health hazard exists. Section 11(1) provides authority for the public health unit to work with the MECP to ensure protection of community health from offsite environmental hazards:

> Where a complaint is made to a board of health or a medical officer of health that a health hazard related to occupational or environmental health exists in the health unit served by the board of health or the medical officer of health, the medical officer of health shall notify the ministry of the Government of Ontario that has primary responsibility in the matter and, in consultation with the ministry, the medical officer of health shall investigate the complaint to determine whether the *health hazard* exists or does not exist.[3]

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[1] *Health Protection and Promotion Act*, RSO 1990, c H.7 at s 10(1) ["*HPPA*"].
[2] *HPPA* at s 1(1).
[3] *HPPA* at s 11(1).

In essence, these sections give the Medical Officer of Health power to cause or initiate an inspection when a potential *health hazard* exists. Given the Site's long history of industrial contamination and long history of occupational chemical exposures to workers, there is ample evidence of a potential *health hazard* to the community if a demolition of the proposed buildings at the Site is undertaken without careful planning. In particular, there is a well-founded concern that demolition of this Site will cause the release of contaminants into the surrounding community.

The *HPPA* also grants power to the Medical Officer of Health to gather information:

- A Medical Officer of Health shall keep himself informed in respect of matters related to occupational and environmental health.[4]
- There is a mandatory requirement for the MECP, the Ministry of Labour and the municipality to provide any requested information to a Medical Officer of Health in respect of any matter related to occupational or environmental health, so long as it is not prohibited by law to disclose it.[5]

The public is not aware of any GE report which provides an inventory or testing of the contamination at each building proposed to be demolished or expert reports outlining how GE anticipates demolishing the buildings safely and without impact to the local community, including children at Prince of Wales Public School. Should you require any further information about environmental hazards on site, prior to demolition, section 12 allows you to obtain and assess any relevant environmental and occupational health information from other ministries or the City of Peterborough. This information may assist in evaluating whether the Site presents a current or imminent health hazard prior to its demolition.

Order-Making Power – Section 13

The Medical Officer of Health possesses order-making authority to require a person to take or to refrain from taking any action that is specified in the order with respect to a health hazard.[6] An order is made only where a Medical Officer of Health or a public health inspector is of the opinion, upon reasonable and probable grounds, that a health hazard exists in the health unit and that the requirements specified in the order are necessary in order to decrease the effect of or to eliminate the health hazard.[7]

Based on your assessment of the evidence of contamination at the Site, and a review of demolition plans, there is authority to ensure that the local community and workers are not exposed to environmental health hazards. For instance, if you are unable to gather satisfactory information before the scheduled demolitions, section 13 allows you to temporarily suspend demolition until adequate hazard control measures are in place.

[4] *HPPA* at s 12(1).
[5] *HPPA* at s 12(2).
[6] *HPPA* at s 13(1).
[7] *HPPA* at s 13(2).

(2) Relevant Context, Facts, and Documented Exposure Risks Associated with the Site

Context

The Site opened in 1891 and operated from 1892 until 2018, serving as a major industrial hub for electrical manufacturing and component assembly.[8] Throughout its 126-year history, numerous hazardous substances were used, stored, and disposed of at the Site, often without modern containment or ventilation standards. The result was extensive contamination of the buildings and surrounding soil.[9] This legacy of contamination raises serious concerns about the potential health and environmental impacts of the Site's impending demolition - especially because the public is not aware of any detailed information about what contamination remains on site or how GE will prevent offsite exposures during and after demolition.

Neighbourhood and Local Community Vulnerability

The Site is surrounded by densely populated urban neighbourhoods, including homes – one of which is only approximately **25.11 metres** away from the south end of Building 22, which is scheduled for demolition.[10] The neighbourhood also includes small businesses and the Prince of Wales Public School, which hosts approximately 650 students ranging from junior kindergarten through grade 8, and is situated approximately **174.13 metres** from the north side of Building 22.[11] Overall, the very close proximity of the Site to its neighbours means that any release of contaminants during or after demolition could directly affect a large and diverse local population, including children, older adults, and individuals with pre-existing health conditions. Regarding the school, it could also further impact young children at the school as the timing of the demolition could result in students having to remain inside during demolition during their regularly scheduled lunch and recess hours.

The *Mapping for Change* map of the local area provides a "Cumulative Burden Index" for neighbourhoods across Peterborough and raises serious concerns about the health equity implications of this proposed demolition. The map shows that the areas surrounding the Site already experience some of the highest cumulative burden scores in the city (the darker the colour, the higher the cumulative burden index score). In practical terms, this means that the neighbourhoods that surround the Site are *already* facing an elevated combination of environmental, social, and health-related stressors. Demolition of the Site may further exacerbate these stressors.

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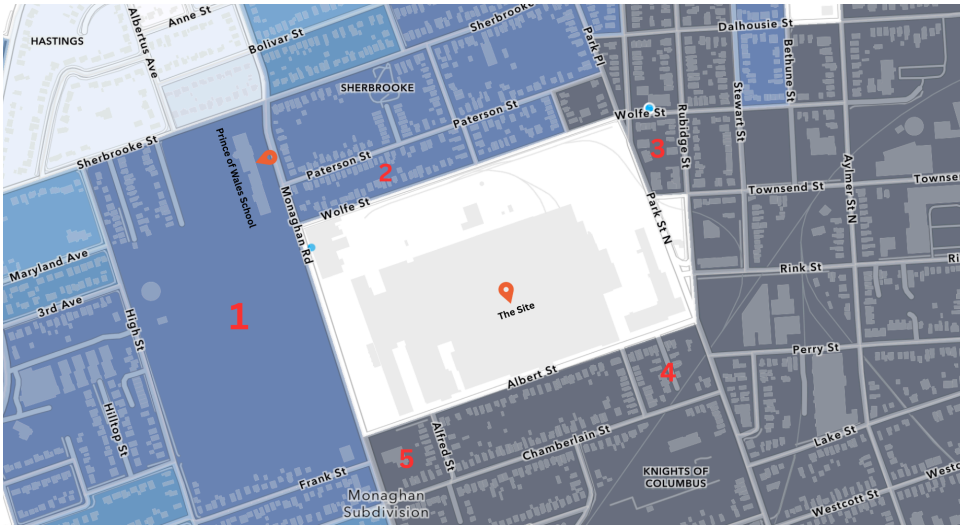
[8] GE Vernova, *Peterborough Site Updates* (2025) online: https://gevernova-peterborough.com/.

[9] Robert DeMatteo and Dale DeMatteo, *The Report of the Advisory Committee on Retrospective Exposure Profiling of the Production Processes at the General Electric Production Facility in Peterborough, Ontario 1945-2000* (Peterborough, ON: UNIFOR National Office, 15 May 2017), online: https://www.ohcow.on.ca/edit/files/resources/pebra_ventra/ge_advisory_cmtt_report_may_15_final_for_web.pdf at p 3 ["*Report of the Advisory Committee*"]. **Attached as Appendix 1.**

[10] A map showing the **25.11** metre distance between a residence on Albert Street and Building 22, which is designated for demolition. **Attached as Appendix 2.**

[11] A map showing the approximate **174.13** metre distance between Prince of Wales Public School and Building 22, which is designated for demolition. **Attached as Appendix 3.**

Cumulative Index Map (courtesy of https://www.mapping4change.org/)[12]



According to the map above, the cumulative burden index scores for neighbourhoods adjacent to the Site are:

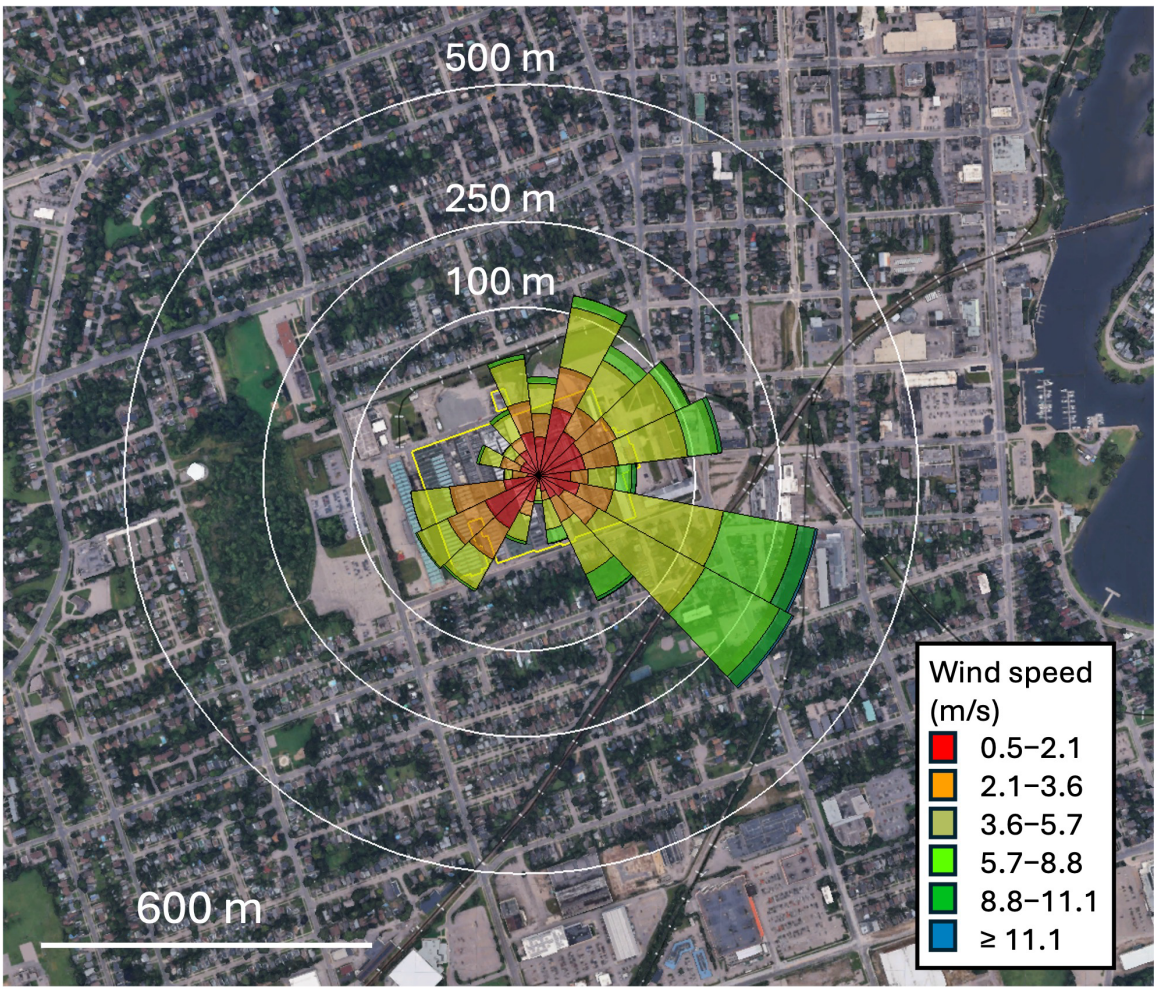
Neighbourhood	Overall Burden Percentile	Social Vulnerability Percentile	Health Vulnerability Percentile	Environmental Vulnerability Percentile
1	84th	80%	89%	60%
2	89th	75%	47%	91%
3	100th	99%	93%	97%
4	98th	85%	63%	98%
5	95th	85%	63%	94%

Any burden percentile above 80% is considered *very high*, underscoring healthy equity concerns and the heightened vulnerability of local residents to additional social, health, and environmental stressors.

Demolition Analysis

Dr. Julian Aherne, Associate Professor in the School of the Environment at Trent University, created a map to demonstrate the potential impact of airborne contaminants from the demolition on the local community. This assessment shows how dust and airborne contaminants from the demolition could spread, how close they could come to people and sensitive locations, and the possible extent of off-site impacts.

[12] The full Peterborough map, courtesy of *Mapping For Change* can be seen online, here.



In this analysis, Dr. Aherne plotted the demolition area on Google Earth and added three concentric circles with radius's of approximately 100 metres, 250 metres, and 500 metres from the Site. These distances were selected because, according to the Institute of Air Quality Management (IAQM), an assessment is recommended if there is a receptor - such as a residence, school, or park - within 250 metres of a demolition site.[13] Moreover, because fine particulate matter may remain suspended in the atmosphere for several hours depending on weather conditions,[14] Dr. Aherne also included the 500 metre radius to illustrate the broader area of potential impact.

[13] Institute of Air Quality Management, *Guidance on the Assessment of Dust from Demolition and Construction* (January 2024, Version 2.2) (online: https://iaqm.co.uk/wp-content/uploads/2013/02/Construction-Dust-Guidance-Jan-2024.pdf) at p 15.

[14] U.S. Environmental Protection Agency, *Particulate Matter (PM) Basics* (online: https://www.epa.gov/pm-pollution/particulate-matter-pm-basics); Health Canada, *Infographic: What is fine particulate matter ($PM_{2.5}$)?* (2019), online: https://www.canada.ca/en/health-canada/services/publications/healthy-living/infographic-fine-particulate-matter.html.

Dr. Aherne incorporated a *wind rose* analysis based on meteorological data (hourly wind speed and direction) collected between November 2024 and October 2025.[15] The analysis indicates that, over the past year, prevailing winds have most frequently blown toward the southeast, suggesting that this area may experience the greatest potential dust burden during demolition - though actual impacts depend on specific timing and weather conditions.

Finally, the spatial analysis shows that approximately 145 homes are within 100-metres of the Site and an additional approximately 290 homes are within the 250-metres of the Site. The 250 metre zone also includes the Prince of Wales Public School, two parks, a church, and several multi unit residential buildings, underscoring the potential for widespread exposure within the local community. The total number of homes within 250 metres of the Site is approximately 435 homes.

In short, Dr. Aherne's analysis demonstrates that the proposed demolition presents an imminent and significant potential health hazard, given the high density of nearby sensitive receptors.

Documented Exposure Risks of Contaminants on Site

The *Report of the Advisory Committee on Retrospective Exposure Profiling of the Production Processes at the GE Production Facility in Peterborough, 1945–2000*, [hereinafter "*Report of the Advisory Committee*"] was published by the UNIFOR National Office in 2017.[16] The *Report of the Advisory Committee* documents that over 3,000 industrial chemicals were used at the Site, including many classified by the International Agency for Research on Cancer ("IARC") as human carcinogens or acute toxins.[17]

To the public's knowledge, this is the most extensive profile of contamination at the site. A new and updated inventory and testing of the site is needed to determine what contamination remains on site and how to plan for a safe demolition.

Asbestos

Internationally, asbestos is classified by the IARC as a Group 1 carcinogen.[18] A substance is classified as a Group 1 carcinogen by the IARC when there is sufficient evidence that it causes cancer in humans.[19] In Canada, asbestos is listed on Health Canada's List of Toxic Substances and appears in Schedule 1 of the *Canadian Environmental Protection Act*, 1999 ("*CEPA"*).[20] If a

[15] A *wind rose* is a circular diagram that graphically reflects how frequently and at what speed the wind blows from different directions at a specific location.
[16] *Report of the Advisory Committee.*
[17] *Report of the Advisory Committee* at p 3.
[18] International Agency for Research on Cancer (IARC), *List of Classifications – IARC Monographs on the Identification of Carcinogenic Hazards to Humans*, online: https://monographs.iarc.who.int/news-events/iarc-monographs-list-of-classifications/.
[19] International Agency for Research on Cancer (IARC), "Agents Classified by the IARC Monographs, Volumes 1-139" (27 June 2025) *IARC Monographs on the Identification of Carcinogenic Hazards to Humans*, online: https://monographs.iarc.who.int/agents-classified-by-the-iarc/.
[20] *Canadian Environmental Protection Act*, 1999, SC 1999, C 33 at Schedule 1 ["*CEPA*"].

substance appears on Schedule 1 of *CEPA*, it means that the Government of Canada has determined that it poses a serious risk to the environment and/or human health.[21]

Regarding the dangers of asbestos, Health Canada notes that a person "can breathe in small asbestos fibres (or dust) released into the air from building materials during renovation and **demolition** activities."[22] Breathing in these fibres can cause "lung cancer, asbestosis (a scarring of the lungs, which makes it difficult to breathe), mesothelioma (a rare cancer of the lining of the chest or abdominal cavity) and other diseases."[23] Children are especially vulnerable to asbestos due to their developing bodies and more rapid breathing rates, which increases their risk of asbestos related diseases later in life, once exposed.[24]

Evidence of Asbestos on the Site:

- Dating back as far as the 1920's and 1930's, asbestos was used throughout nearly every building on Site for electrical insulation, thermal barriers, wiring, brake pads, and welding curtains.[25]
- The *Report of the Advisory Committee* states that at one point in time, GE reportedly used up to 500 pounds of asbestos per day, much of it handled in friable form (cutting, drilling, sawing).[26]
- The *Report of the Advisory Committee* confirms that in many of the buildings, overhead piping, insulation, ovens, and ceiling structures are known to contain asbestos coverings.[27]
- The *Report of the Advisory Committee* highlights that workers reported airborne "snow storms" of asbestos dust due to deteriorating materials and shared ventilation.[28]

Polychlorinated Biphenyls (PCBs)

Internationally, PCBs are classified by the IARC as a Group 1 carcinogen.[29] In Canada, PCBs are listed on Health Canada's List of Toxic Substances and appear in Schedule 1 of *CEPA*.[30]

Regarding the dangers of PCBs in general, as per the former Peterborough Public Health website, PCBs do not easily break down and are very persistent, they last for many years and

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[21] Environment and Climate Change Canada, "Toxic Substances List" (16 August 2022) *Canadian Environmental Protection Act Registry*, online: https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/substances-list/toxic.html.
[22] Health Canada, "Asbestos and your health" (10 February 2023) *Indoor Air Contaminants*, online: https://www.canada.ca/en/health-canada/services/air-quality/indoor-air-contaminants/health-risks-asbestos.html.
[23] Health Canada, "Asbestos and your health" (10 February 2023) *Indoor Air Contaminants*, online: https://www.canada.ca/en/health-canada/services/air-quality/indoor-air-contaminants/health-risks-asbestos.html.
[24] University of California, Davis—MIND Institute, *Asbestos* (11 July 2014) at "Asbestos and the Developing Child", online: https://health.ucdavis.edu/media-resources/mind-institute/documents/pdfs/Asbestos_7_14.pdf.
[25] *Report of the Advisory Committee* at p 14.
[26] GS Rajhans, *Ontario Department of Health, File # 1F-19: 1971 January 18* (1971) [unpublished, UNIFOR RAWC Database] as cited in *Report of the Advisory Committee* at Introduction.
[27] *Report of the Advisory Committee* at p 12.
[28] *Report of the Advisory Committee* at p 14, 34, 98, 126.
[29] International Agency for Research on Cancer (IARC), *List of Classifications – IARC Monographs on the Identification of Carcinogenic Hazards to Humans*, online: https://monographs.iarc.who.int/news-events/iarc-monographs-list-of-classifications/.
[30] *CEPA* at Schedule 1.

they are hard to destroy.[31] Further research indicates that during building demolition or renovation, PCB-containing materials (such as caulking, sealants, and electrical components) can release PCBs into the air or dust.[32] Inhalation or ingestion of these materials poses serious health risks, including cancer and other systemic effects, making proper identification, containment, and removal essential.[33] Like asbestos, children are especially vulnerable to PCBs as exposure can affect infant behavior or the immune system in children born to mothers who were exposed to high levels of PCBs.[34]

Evidence of PCBs on the Site:

- Dating back to documentation from 1945, PCBs were used extensively in capacitors, transformers, switchgear, and insulating fluids on the Site.[35]
- Further,
    - Several times, PCB-containing oils (Pyranol, Askarel, Inerteen) were spilled inside on-Site buildings and surrounding grounds;[36]
    - PCB waste oil was also reportedly used historically as a "dust suppressant" on driveways and parking areas, leading to soil contamination;[37] and
    - Roof drainage systems, tar and caulking materials, and floor drains have been shown to contain residual PCBs.[38]
- An MECP Order (#1-228916698) issued to GE in 2024 highlighted the PCB contamination at the site: "**Considering the long-term and wide-spread nature of the PCB contamination at the Site**, **and the ongoing instances of PCB contaminant concentrations in storm water discharges from the Site**, it is expected that the PCB monitoring program will continue to be required of GEPR for many years to monitor the effectiveness of its actions to control, prevent and mitigate PCB discharges from the Site to the natural environment."[39]
- The Order also said the following:
    - "Historical and/or current operations conducted at the Site include capacitor manufacturing, large motor manufacturing, small AC motor manufacturing, and AC traction motor manufacturing. PCBs were historically used in the manufacturing of capacitors. Wastes oils, some containing PCBs, were also used

[31] Peterborough Public Health, "Polychlorinated Biphenals (PCBs)" *Environmental Hazards*, online: https://www.peterboroughpublichealth.ca/your-health/environmental-hazards/polychlorinated-biphenals-pcbs/.
[32] WorkSafeBC, "Polychlorinated biphenyl (PCB) exposure during building maintenance and demolition" (15 January 2015) online: https://www.worksafebc.com/en/resources/health-safety/risk-advisory/polychlorinated-biphenyl-pcb-exposure-during-building-maintenance-or-demolition?lang=en; Health Canada, "PCB (polychlorinated biphenyls)" (4 May 2017) *Environment,* online: https://www.canada.ca/en/health-canada/services/healthy-living/your-health/environment/pcbs.html.
[33] Health Canada, "PCB (polychlorinated biphenyls)" (4 May 2017) *Environment,* online: https://www.canada.ca/en/health-canada/services/healthy-living/your-health/environment/pcbs.html.
[34] Peterborough Public Health, "Polychlorinated Biphenals (PCBs)" *Environmental Hazards*, online: https://www.peterboroughpublichealth.ca/your-health/environmental-hazards/polychlorinated-biphenals-pcbs/.
[35] *Report of the Advisory Committee* at p 15.
[36] *Report of the Advisory Committee* at p 15.
[37] *Report of the Advisory Committee* at p 15.
[38] K Stephenson, *[MOE Memo]* (21 April 2016) [unpublished, UNIFOR RAWC Database] as cited in *Report of the Advisory Committee* at p 15.
[39] Ministry of Environment, Conservation and Parks, Director's Order Issued to GEPR Energy Canada Inc., Number 1-228916698, March 6, 2024, p 11. ["Director's Order"] online: 2024 Director's Order Number 1-228916698.pdf. **Attached as Appendix 4**.

as a dust suppressant at the Site and Monaghan Road Parking Lot […] **these historical activities at Site 1 and Site 2 resulted in PCB contamination of soils and other surfaces."**[40]

- Finally, regarding potential off-site contamination from PCBs at the Site, the Order also indicated:
    - "**The main concern regarding potential off-site environmental impacts associated with the PCB contamination at the Site is for PCB molecules to be transported off-site via water discharges into the municipal storm water sewer system which flows eastward along Rink Street and discharges into Little Lake and the Otonabee River**. **Little Lake and the Otonabee River also subject to recreational water activities, and exposure to PCB contaminated waters and sediment may represent a human health risk**. PCBs also transfer up the ecological food chain to other aquatic, terrestrial and avian species within which the contaminants may bioaccumulate and result in ecological impacts. As such, further inputs of PCBs to Little Lake and the Otonabee River system should be mitigated. **Various studies have shown that deposits of PCB contaminated sediments are present in Little Lake and further downstream along the Otonabee River and in Rice Lake**, **which the Otonabee flows into, located approximately 20 kilometres south of the City of Peterborough. Studies have shown that PCBs are present within the tissues of sport fish collected from the Otonabee River and Rice Lake at concentrations that have caused fish consumption advisories to be issued and which should be followed for the protection of human health**…"[41]

Heavy Metals and Toxic Substances

Heavy metals and other toxic substances - including lead, mercury, cadmium, chromium, nickel, arsenic, and beryllium - are recognized as hazardous to human health.[42] In Canada, many of these metals or toxic substances are regulated under various federal and provincial statutes, including *CEPA*, and additional occupational health and safety regulations pursuant to the *Occupational Health and Safety Act* and the *Safe Drinking Water Act*.[43] Improper treatment of these substances can lead to many exposure issues, including discharge into localized soil and/or groundwater.[44]

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[40] Director's Order, p 9

[41] Director's Order, p 8.

[42] International Agency for Research on Cancer, *Beryllium, Cadmium, Mercury, and Exposures in the Glass Manufacturing Industry* (IARC Monographs Vol. 71, 1993) online: https://www.ncbi.nlm.nih.gov/books/NBK499760/#:~:text=Group%202,carcinogenicity%20and%20other%20relevant%20data at Preamble; Mahdi Balali-Mood et al, "Recent Advances in the Clinical Management of Intoxication by Five Heavy Metals" (14 February 2025) *Heliyon* 11(4), online: https://www.sciencedirect.com/science/article/pii/S2405844025010771/; Hyun S Kim, "An Overview of Carcinogenic Heavy Metal: Molecular Toxicity Mechanism and Prevention" (2015) *Environmental Health and Toxicology* 30:1, online: https://www.jcpjournal.org/journal/view.html?doi=10.15430/JCP.2015.20.4.232 at Abstract.

[43] *CEPA* at Schedule 1; Ontario, *O Reg 490/09* (under the *Occupational Health and Safety Act*, 2024); Ontario, *O Reg 170/03* (under the *Safe Drinking Water Act*, 2002).

[44] Shams F Ahmed et al, "Heavy metal toxicity, sources, and remediation techniques for contaminated water and soil" (2022) 25 *Environmental Technology & Innovation* 102114, online: https://www.sciencedirect.com/science/article/pii/S235218642100746X.

The *Report of the Advisory Committee* outlines that metals and other substances were used on the Site in various ways, including in paints, solder, PVC pelletizing, welding, plating, and metal finishings.[45] Further, consequent research indicates that during demolition, disturbing materials containing these substances can release dust or vapours, posing serious health risks such as neurological damage, kidney or liver toxicity, developmental and reproductive harm, and cancer.[46] Many of these substances are persistent and bioaccumulative, remaining hazardous long after initial use.[47] Proper identification, monitoring, containment, and removal of these substances in the context of demolition are thus essential to protect the community.

Evidence of Heavy Metals and Toxic Substances on the Site:

- The *Report of the Advisory Committee* confirms that the following heavy metals and toxic substances were used/present on Site as follows:
    - Lead (Schedule 1 Toxic Substance in *CEPA*[48]):
        - Used in paints, solder, and PVC pelletizing (at 40,000 lbs/week over one period).[49]
    - Mercury:
        - Present in switches, gauges, and electrical components; documented vapor exposures.[50]
    - Cadmium, Chromium (VI), Nickel, Arsenic, and Beryllium:
        - Used in welding, plating, and metal finishing processes.[51]

Solvents, Degreasers, and Volatile Organic Compounds (VOCs)

- The *Report of the Advisory Committee* confirms that large volumes of industrial solvents were used for cleaning and degreasing, including trichloroethylene (TCE), toluene, benzene, perchloroethylene, carbon tetrachloride, xylene, and acetone.[52]
    - TCE and Benzene are known carcinogens.[53]
- Regarding TCE specifically, MECP Order (#1-228916698) in 2024[54] outlined concerns related to TCE when discussing a monitoring program for the Site: "Through various industrial and related activities that occurred over time at the Site, contamination of soil

[45] *Report of the Advisory Committee* at p 3, 6, 16, 48, 118.
[46] Shams F Ahmed et al, "Heavy metal toxicity, sources, and remediation techniques for contaminated water and soil" (2022) 25 *Environmental Technology & Innovation* 102114, online: https://www.sciencedirect.com/science/article/pii/S235218642100746X.; Jessica Briffa et al, "Heavy metal pollution in the environment and their pharmacokinetic mechanisms" (2020) *Heliyon* 6:e05131, online: https://www.sciencedirect.com/science/article/pii/S2405844020315346; Mahdi Balali-Mood et al, "Recent Advances in the Clinical Management of Intoxication by Five Heavy Metals" (14 February 2025) *Heliyon* 11(4), online: https://www.sciencedirect.com/science/article/pii/S2405844025010771/.
[47] Mahdi Balali-Mood et al, "Recent Advances in the Clinical Management of Intoxication by Five Heavy Metals" (14 February 2025) *Heliyon* 11(4), online: https://www.sciencedirect.com/science/article/pii/S2405844025010771/.
[48] *CEPA* at Schedule 1.
[49] *Report of the Advisory Committee* at p 3, 6, 32, 33, 62, 63.
[50] *Report of the Advisory Committee* at p 3, 114, 127, 144, 145, 146.
[51] *Report of the Advisory Committee* at p 13, 14, 113, 114, 138, 139
[52] *Report of the Advisory Committee* at p 13.
[53] American Cancer Society, "Known and Probable Human Carcinogens" (1 August 2024), online: https://www.cancer.org/cancer/risk-prevention/understanding-cancer-risk/known-and-probable-human-carcinogens.html.
[54] Director's Order.

and groundwater resulted, including PCBs and TCE. PCBs and TCE (along with associated degradation compounds, such as dichloroethylene and vinyl chloride) are the primary Contaminants of Concern at the Site."[55]

Paints, Resins, and Floor Treatments

- The *Report of the Advisory Committee* indicates that GE used extensive epoxy and polyester resins, phenolic coatings, and glyptol paints, on the site - many of which contained formaldehyde, bisphenol-A (BPA), and isocyanates.[56]
- During its operations, the entire Site featured creosote-soaked wooden block flooring, known to off-gas volatile carcinogenic compounds.[57]

Acids and Plating Chemicals

- As per the *Report of the Advisory Committee*, the electroplating department and metal treatment shops on Site used sulfuric, nitric, and hydrochloric acids along with cyanides and chromium compounds.[58]
- Additionally, historical documentation notes the existence of corroded exhausts and recurring acid fume complaints from workers.[59]

Additional Hazards Identified from the Report

- The *Report of the Advisory Committee* indicates that coal tar and asphaltic coatings, silica dust from sandblasting, diesel and propane exhaust, and endocrine-disrupting plasticizers (phthalates) were also used across the Site.[60]
- The combination of negative air pressure within the plant and its interconnected buildings allowed these airborne contaminants to spread widely.[61]

Additional Relevant Materials:

Intake Clinic Hazard Map – This map, which was used in the *Report of the Advisory Committee* (page 181)[62], originated from an intake clinic hosted by UNIFOR local 524. An Occupational Health Clinics for Ontario Workers Inc. team prepared this map based on information provided by participants, listing the chemicals identified during the session.[63] In referencing this map, we've outlined the buildings that are slated for definition in red.

[55] Director's Order, p 7.
[56] *Report of the Advisory Committee* at p 6, 13.
[57] *Report of the Advisory Committee* at p 31, 51, 136, 137, 138.
[58] *Report of the Advisory Committee* at p 6, 22, 65, 79, 114.
[59] *Report of the Advisory Committee* at p 116, 138, 145.
[60] *Report of the Advisory Committee* at p 126, 134, 144, 145.
[61] *Report of the Advisory Committee* at p 12.
[62] Intake Clinic Hazard Map (courtesy of OHCOW), in *Report of the Advisory Committee* at p 181. **Attached as Appendix 5.**
[63] *Report of the Advisory Committee* at p 19.

Building Removals Plan – A GE map indicating which buildings will be demolished.[64]

- The public raises a particular concern about demolition of the smokestack on Building 13, which to its knowledge is highly contaminated.

2024 MECP Order – In 2024, the MECP issued an order titled: *Order to prevent discharge of contaminants*. This order requires that GE "continue to undertake ongoing environmental monitoring and mitigation programs in relation to historical contamination issues".[65] This order highlights the MECP's concern about ongoing contamination at the Site.

(3) Why an Inspection by the Medical Officer of Health is Important for the Safety of the Community

Although originally built over 125 years ago in what was once Peterborough's industrial periphery, this Site now sits in an urban area of Peterborough and is surrounded by residential neighborhoods, the Prince of Wales Public School, and small businesses. Without an immediate inspection to assess and mitigate existing risks, demolition may expose the community of Peterborough to hazardous contaminants and further pollute local soil and groundwater.

The impending demolition of this Site presents serious public health risks to a community that is already facing an elevated combination of environmental, social, and health-related stressors. The demolition of premises that to the public's knowledge remain heavily contaminated could release dangerous and toxic compounds - including asbestos fibers, PCB dust, TCE, and heavy metals - into the surrounding community. Without prompt inspection and intervention, these contaminants could pose long-term health hazards to nearby residents and the broader environment.

For these reasons, we respectfully make an urgent complaint to the Medical Officer of Health, pursuant to section 11 of the *HPPA,* and request that Lakelands Public Health work with the MECP prior to demolition of the Site to seek:

- **An inventory and testing of all hazardous materials and substances that are currently present on the Site;**

- **A detailed demolition plan, which must include at a minimum:**

    - **Measures proposed to safely contain or remove contamination from the Site;**
    - **Measures proposed to prevent offsite contamination and exposure to nearby residents, children and workers during and after demolition; and**

- **Public review and comment on GE's demolition plans prior to demolition.**

---

[64] City of Peterborough, *Agenda – City Council Meeting* (14 October 2025), Item 11(k), Proposed Partial Demolition at 107 Park Street North, GEPR Energy Canada Inc., Report IPGPL25-048, Appendix B, online: https://pub-peterborough.escribemeetings.com/filestream.ashx?DocumentId=40710. **Attached as Appendix 6.**

[65] Ministry of the Environment, Conservation and Parks, *GEPR Energy Canada Inc. – Order to prevent discharge of contaminants* (Decision, ERO 019-8032, 17 September 2024) online: https://ero.ontario.ca/notice/019-8032).

To the public's knowledge, GE has not provided detailed information to assuage serious public concerns. Public input, further scrutiny and diligence are required to safeguard the community's health and ensure that any demolition proceeds only under strict conditions that will eliminate the risk of environmental exposures. Thank you for your attention to this matter.

Sincerely,

Signatures (as of November 18, 2025)

448 signatories from the community in Peterborough

Includes the following breakdown (please note that some signatories may fall into more than one category):

- Former worker at GE facilities, 23 or 5.3%
- Worker near the GE facilities, 9 or 2.1%
- Family member of worker at GE facilities, 40 or 9.3%
- Parent or grandparent of child at Prince of Wales Public School, 79 or 18.3%
- Teacher/employee at Prince of Wales Public School, 8 or 1.9%
- Local resident, 215 or 49.8%
- Peterborough resident, 223 or 51.6%

There are also 17 people from the Local 524 retirees chapter.

Appendix 3: Robert DeMatteo & Dale DeMatteo, “The Report of the Advisory Committee on Retrospective Exposure Profiling of the Production Processes at the General Electric Production Facility in Peterborough Ontario 1945-2000”

The Report of the Advisory Committee on Retrospective Exposure Profiling of the Production Processes at the GENERAL ELECTRIC PRODUCTION FACILITY in Peterborough, Ontario 1945-2000



Prepared by

Robert DeMatteo, B.A., M.A., D.O.H.S and Dale DeMatteo, B.A., MSc.

with

GE Retiree Members of the Advisory Committee:
John Ball, Linda Brown, Jim Dufresne, Roger Fowler, Marilyn Harding, Sue James, Carl Jenson, Don McConnell, Gordon Terry, Bill Woodbeck, Jim Gill

February 5, 2017

Ms. Sari Sairanen

National Health and Safety Director

UNIFOR

205 Placer Court

Toronto, Ontario

M2H 3H9

Dear Ms. Sairanen:

RE: SUBMISSION OF THE REPORT OF THE ADVISORY COMMITTEE ON RETROSPECTIVE EXPOSURE PROFILING OF THE PRODUCTION PROCESSES AT THE CANADIAN GENERAL ELECTRIC PRODUCTION FACILITY IN PETERBOROUGH, ONTARIO

The Advisory Committee on Retrospective Exposure Profiles is pleased to submit the results of their intensive investigation of exposures to toxic agents at the General Electric plant in Peterborough, Ontario.

It is the consensus of the Committee who worked on this investigation for the last eight months that this report reflects the exposure conditions at GE over the period 1945 to 2000. The insights of the workers who participated in this study were corroborated by government inspection reports, management reports and the minutes of the joint health and safety committee at GE.

We, the undersigned members of the Advisory Committee, understand that UNIFOR, the union, will utilize the contents of this report in support of the many occupational disease claims arising out of diseases caused by toxic exposures while working at GE.

Respectfully Submitted,

Researcher, Robert DeMatteo, DOHS, MA, BA Robert DeMatteo Feb 3, 2017

Researcher, Dale DeMatteo, BA, MSc. Dale DeMatteo Feb 3, 2017

Project Coordinator, Sue James, GE retiree Sue James FEB 1, 2017

Member, John Ball, GE retiree John H. Ball Feb 2, 2017

Member, Don McConnell, GE retiree "D.D." Robert DeMatteo

Member, Lynda Brown, GE retiree Lynda Brown Feb. 2/17

Member, Marilyn Harding, GE retiree Marilyn Harding Feb. 2/17

Member, Roger Fowler, GE retiree Feb 2, 17

Member, Jim Dufresne, GE retiree

Member, Carl Jensen, GE retiree

Member, Gord Terry, Unifor Local 624 retiree executive

Member, William Woodback, Unifor Local 624 retiree executive

Member, Jim Gill, Unifor retiree

The Report of the Advisory Committee on Retrospective Exposure Profiling of the Production Processes at the GENERAL ELECTRIC PRODUCTION FACILITY in Peterborough, Ontario 1945-2000

Prepared by

Robert DeMatteo, B.A., M.A., D.O.H.S and Dale DeMatteo, B.A., MSc.

with

GE Retiree Members of the Advisory Committee:
John Ball, Linda Brown, Jim Dufresne, Roger Fowler, Marilyn Harding, Sue James, Carl Jenson, Don McConnell, Gordon Terry, Bill Woodbeck, Jim Gill

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ABBREVIATIONS:

WSIB- Workplace Safety and Insurance Board

IARC- International Agency for Research on Cancer

MOL-Ministry of Labour (Ontario)

ACGIH-American Conference of Government Industrial Hygienist

TLV-Threshold Limit Values

OEL-Occupational Exposure Limits

NTP-National Toxicological Program

MAC-Maximum Allowable Concentration

EC-European Commission

IARC Carcinogenicity Classifications:

Group 1-Human Carcinogens

2A-Probable Human Carcinogens

2B-Possible Human Carcinogen

Group 3-Not Classified

Group 4-Probably Not Carcinogenic to Humans

February 5, 2017

THE REPORT OF THE ADVISORY COMMITTEE ON RETROSPECTIVE EXPOSURE PROFILING OF THE PRODUCTION PROCESSES AT THE GENERAL ELECTRIC PRODUCTION FACILITY IN PETERBOROUGH, ONTARIO 1945-2000

Prepared by

Robert DeMatteo, B.A., M.A., D.O.H.S and Dale DeMatteo, B.A., MSc.

with

GE Retiree Members of the Advisory Committee:
John Ball, Linda Brown, Jim Dufresne, Roger Fowler, Marilyn Harding, Sue James, Carl Jenson, Don McConnell, Gordon Terry, Bill Woodbeck, and Jim Gill (retired Unifor National Health and Safety Director)

INTRODUCTION

The purpose of this research project was to develop retrospective exposure profiles of the work processes at the GE electrical production facility in Peterborough, Ontario between 1945 and 2000. As such, it involved a systematic effort to collect and analyze empirical information about how production was carried out in this very complex heavy industrial operation. Historically, this workplace is an example of the intersection of 20th century industrial and chemical "revolutions". This work was undertaken to document the extent and nature of chemical and physical exposures that are possibly linked with the various cancers and other diseases that many GE employees and their families suffered over the years.

The major source of this information came from the workers themselves through a series of intensive focus group and key informant interviews that went on for over 8 months. This information was corroborated by government inspection reports from 1945 to 2000 in addition to joint health and safety committee minutes, internal memoranda, and industrial hygiene literature.

Before proceeding to the substance and findings of the retrospective exposure study, it is important to situate this study in the broader social and scientific context that frames the results and how they may be viewed and used in Ontario's occupational health system.

The study was meant to address employees' concerns that the extent and nature of their exposures and working conditions were being subject to misrepresentation. Indeed, with the exception of a very comprehensive exposure profile study of two departments at GE by industrial hygienist, Sonya Lal of the Occupational Health Clinics for Ontario Worker (OHCOW), there was little systematic empirical study of exposure conditions.

There was an uneasy sense that what was perceived as an extraordinarily high incidence of cancer among GE employees was not being addressed to ascertain whether there was a workplace connection. Given the large number of carcinogenic chemicals used at the plant, their suspicions that there was a connection cannot be viewed as unfounded. It was also their view that the company's efforts to study the problem misrepresented the exposure conditions at the plant, and that such misrepresentation under-mind their disease claims before the Workplace Safety and Insurance Board (WSIB).

Occupational disease remains a largely under-addressed public health problem. Only a small fraction of work-related accepted claims are for occupationally caused diseases. And, an even smaller fraction are for occupationally caused cancers (Yassi 1981; Ison 1989). Yassi estimated in her background study for the Weiler inquiry into occupational disease in Ontario, that a total of 6,000 occupationally related deaths occur annually in Ontario from 3 major sources alone that are related to toxic exposures, but go unreported to the government and the workers compensation system. Some of this is explained by the rather long latency period for cancer to develop…sometimes not appearing until after retirement and therefore missed as work-related.

Over the years several investigators have identified a number of the major obstacles to workplace disease recognition (Yassi 1981; Ison 1989). Some of these include:

- Burden of proof requiring scientific certainty
- "Legalized" Threshold requirements rather than guidelines
- Dismissing patient's doctors' assessment of work-relatedness
- Over-emphasis on claimant's medical history rather than work process interactions
- Lack of exposure data
- Paucity of occupational health research generally
- Lack of occupational health training for physicians

By far, the most influential obstacle to disease recognition and its consequences has been the onerous burden of proof placed on the worker coupled with an outdated view of how diseased is produced by work, one that is out of sync with advances in occupational health and cancer research (Clapp et al. 2008; Hanahan and Weinberg 2011); Hanahan and Weinberg 2000; Welshons et al. 2003; Kortenkamp et al. 2011; Trosko and Upham 2005; Diamanti-Kandarakis et al. 2009; Kortenkamp 2008; Ewertz et al. 2001; Hardell et al. 1997; Senn 1991; Yassi 1981; Ziem and Davidoff 1992) and what the law requires for work-related disease (Supreme Court of Canada [2016] Court file No. 36300; Ison 1989; Law Reform Commission of Canada 1986). This obstacle to disease recognition is imposed by social policy and has its source in the predominant paradigm of "scientific certainty" that requires definitive proof that "X" causes "Y" in a world that by nature is complex and multi-causal. This paradigm is imbedded in current scientific research and standard setting processes and is expressed in our obsession with protecting against "false positives" without thinking about the consequences of "false negatives" (Scott 2005). Unfortunately, this mindset has permeated into administrative tribunals and standard setting bodies, which has produced its own set of detrimental consequences including unjust denial of compensation for diseases caused by work and delayed regulatory action for disease prevention.

With respect to the issue of burden of proof, it is important to note the Supreme Court of Canada's recent ruling rendered on June 24, 2016 regarding a lower court ruling on a breast cancer cluster case among a group of health technologists working at a British Columbia health facility. In this decision, the Supreme Court found that the standard of proof set by laws governing workers' compensations systems do not require a standard of scientific certainty, nor that imposed upon plaintiffs in a civil tort claim (i.e., the balance of probabilities). According to the Supreme Court, these are too stringent a standard of proof, and "… wholly inapplicable to determining causation in the workers' claims…" (Supreme Court of Canada, Docket: 36300, 2016). In essence, in worker compensation law, insufficient evidence is not "no" evidence, and inconclusive evidence may suffice in determining causation in the case of occupational disease claims. In contrast, the current approach extends the presumption of innocence to chemicals and physical agents in the light of scientific uncertainty. The real

question is "What do we do in the face of scientific uncertainty?" This is not simply a scientific question, but rather has to do with social values and ethics, and to what extent we value human life.

The current approach to occupational disease recognition results in a distorted view of the extent of occupational disease and its causes. This has led to questionable policy outcomes with respect to long delays in needed regulatory action and the protection of workers from hazardous chemical and physical agents (Watterson 1999; Scott 2005).

BACKGROUND TO THE GE PETERBOROUGH PRODUCTION FACILITY

In contrast to studying industries associated with a single manufacturing process with few chemicals and relatively few job tasks and exposure patterns, the GE plant in Peterborough undertook production on a massive scale with a complex mix of industrial processes utilizing huge quantities of some 3000 chemicals (Lal 2005/6). Some of these industries included: the manufacture of small to massive electric motors and generators; appliance manufacturing; small and large electrical components for urban electrical utilities; and a nuclear facility that produced nuclear fuel bundles for CANDU nuclear reactors. These involved a complex mix of industrial products that included: massive welding operations throughout the plant; plastics and rubber production for wire insulation; production/preparation of copper wire of various sizes and specifications; and machining and pouring molten metals for large motors and turbines to drive locomotives, ships, and large electrical utilities. The size of production is illustrated by the fact that GE Peterborough's PVC production facility used 40,000 pound of lead per week just in the PVC pelletizing operation (Tidey 1968), not to mention massive amounts of epoxy and polyester resins used to coat and insulate nearly every product it produced. GE was "product" driven with new chemicals and work processes introduced regularly. GE Peterborough retirees describe the plant as a changing "industrial mall" with many units independently run and managed.

In these production processes, large amounts of solvents were used as cleaners and degreasers including: toluene, benzene, trichloroethylene (TCE), 1,1,1-Trichloroethane (TCNU), methyl ethyl keytone (MEK), MEK Peroxide, perchloroethylene, acetone, xylene, naphtha gas, carbon tetrachloride, among others. For example, TCE was used in large heated vats that could measure 8'x10'x6' as well as applied by hand by hundreds of workers to wipe down large surfaces with rags soaked in TCE and toluene. Adding to this chemical mix was the generation of large volumes of welding fumes from welding operations going on throughout the Peterborough complex. Many of these products were massive structures that would take weeks to fabricate with 5 to 10 welders working three shifts daily. In addition, machining operations produced large amounts of metal working fluid (MWF) mists and aerosols from heated fluids used to cool and lubricate materials and cutters. The machining involved large 25' and 40' boring machines. Huge volumes of dust, comprised of asbestos, fibreglass, epoxy/polyester resin, and heavy metals, were continually generated from cutting, grinding, sanding and buffing tasks. Peterborough GE admitted to using as much as 500 lbs. of asbestos daily (Rajhans 1971).

Adding to the complex mix of chemicals was a constant off-gassing of volatile organic compounds from the wood block floors (consisting of creosote-impregnated 3" x 4" wooden blocks set on end grain) throughout the building complex. This flooring continually oozed creosotes, especially during periods when ground water would rise through the subfloor. These floors were re-treated periodically and sometimes coated with glyptol paint. Creosotes are highly volatile and classified by the International Agency for Research on Cancer (IARC) as a 2A carcinogen that is 'probably carcinogenic to humans'. As well, because of the floor's structure, various other chemicals spilled, including lead and mercury, became trapped in the crevices between the blocks. Given the widespread use of this flooring in the plant, such spills contributed to the toxic burden experienced by workers.

A significant factor that conditioned production and the safety culture at GE Peterborough was a work organizational approach that included the piece rate system, in operation until 1988, encouraging employees to work to their physical optimum and, often circumvent safe work practices to maintain production rates.

Another variable contributing to GE Peterborough's uniqueness is the physical structure itself. GE motor production was carried out primarily in the century old "Edison" building that is approximately 1,030' by 1,629' with a building area of 38.5 acres occupying more than 50 acres in downtown Peterborough. This is an "open concept" building typical of the time with saw-tooth windows at roof level to maximize sunlight and allow natural ventilation of the intense heat created by the various work processes. As these work processes shifted from the manufacture of lighting products in the Edison era to that of motors and generators during the GE era, this natural source of ventilation was totally inadequate for this enormous production mix. Despite work areas referred to as "buildings" or "departments" they were, in fact, designated areas separated by indoor-vehicle roadways and walking aisles. There were few truly isolated structures, since additions were connected to the main building by huge doorways, to accommodate trucks and cranes. Ceiling heights reached some 60' to 70' high to allow overhead cranes to pass from section to section. In effect, most departments shared the same, mainly natural, ventilation system and thus the same contaminated atmosphere. There was insufficient make-up air, which created an atmosphere of negative pressure throughout the main building. Consequently, what was generated in dusts, fumes, or vapors flowed readily to neighboring departments. In effect, there was major cross contamination between, and within, departments.

Workforce Considerations:

While the GE Peterborough workforce has remained predominantly male, during World War II women replaced men in the GE workforce and production shifted to the war effort. It was during this time that the plant became unionized. As the war ended, men returned and the workforce settled into a relatively stable ratio of 70-75% men and 25-30% women – which has continued to the present. (Older retirees reported that in their early years at the plant there was also a category of work designated "boys work" done by youths, prior to the introduction of child labour legislation).

Until the mid-1990s, women performed what were generally viewed as "women's work" or occupations – with most working in manufacturing production and approximately 1/3 working in office or clerical jobs. Women's work was described as "light" work involving detailed, fine repetitive tasks that required close up, manual work. Some of the major categories of women's jobs included: "winders" who manually wound copper wire for coils, or cores for capacitors; "tapers" who wound insulating tape composed of adhesives and fiber glass/ asbestos around coils and other electrical components; spray painters in powder paint operations; hand work that included soldering, brazing, and etching circuit cards and semi-conductors; the assembly and production of electric cords (which involved stripping insulated wire containing asbestos and silver soldering) and work forming plastic/ceramic plugs and sockets. Winding operations in the capacitor department involved exposures to toxic adhesives as well as exposure to PCBs.

Women's jobs were generally performed at work benches with 5 to 10 women involved in manually stripping and degreasing wire in preparation for soldering and brazing (which incurred heavy exposure to asbestos/ fiberglass dusts, and lead and solvent fumes). These work areas were poorly or not ventilated. In addition, women could be subject to significant by-stander exposures since many of these tasks were performed on mezzanine levels in departments directly above both intense welding operations and epoxy dipping, baking, and grinding operations where dense fumes, gases, and dusts from these operations would rise to work areas above. This was especially serious in armature (bldg. 7), bus ducts (bldg. 30), and machine shop (bldg. 8). Office and clerical personnel did not fare much better. Toxic dusts generated from many of the manufacturing operations made its way into the offices of clerical workers as evidenced by large accumulations of dusts on

workers' desks and other work stations. Focus group participants reported that office workers would find their desks covered in a blanket of dust when they arrived in the morning -- and find another buildup of dust when they came back from lunch.

Problems Estimating Exposures Using GE Records:

In the course of this research, retirees identified serious problems with the information GE Peterborough sent to the WSIB regarding their work histories and work exposures. This included: wrong or incomplete information, missing health reports, and no consideration of overtime in determining work exposures. Focus group discussions identified broader systemic problems related to the fact that employee records were linked to the company's accounting system -- in particular, time and product costing -- rather than specifically to document work histories. Work was recorded by employee (job code) and location (unit/clock#) classifications. There were categories of employees whose work demanded constant movement throughout the plant including: dispatchers, 'chasers', mobile welders, labour gangs, and maintenance workers. With large motor production, workers were required to move to the location of the product thus their unit designation could be in a different building or department from where they actually worked. Employees working in some areas, such as fractional motors, or on final production assembly, could accumulate as many as 40 tickets (i.e. 40 different jobs) performed in a day. The product-driven nature of production required a flexible work force and employees could be: loaned out to different departments to meet production schedules or deadlines; shifted to other departments and jobs during down time; and offered alternative 'clean up' work during plant shutdowns or holidays -- much, or all, of which was not documented in employee work histories. Relying on company documents as the sole source for determining exposures may significantly underestimate the degree and nature of worker exposures.

What GE Knew About Chemical Hazards:

Companies often attempt to excuse themselves from culpability for occupational diseases by claiming that "we just didn't know about the toxic effects" of the substances their workers were exposed to at the time. This oft-repeated defense by GE for not having taken adequate precautions for the protection of its employees is no longer credible given recent historical revelations of just what GE knew about the hazards of the chemicals its employees used without adequate protection.

In the course of our research we came across a book by respected occupational health researcher, Dr. Barry Castleman (2005), identifying the fact that US General Electric knew about the harmful effects of asbestos, lead, and other chemicals used in its production facilities as far back as the 1920s and 1930s. In his book, Castleman documents the work of Dr. Alice Hamilton, renowned occupational health scholar, who conducted numerous health surveys of the working conditions at GE's plants in the U.S from 1922 to 1934 -- including literature reviews on the harmful health effects of industrial chemicals in use. Based on this research she warned Gerard Swope, the president of US GE at the time, of the hazards and health effects of asbestos and other industrial chemicals affecting GE's workforce. Dr. Hamilton continued to personally advise Swope (over a period of 12 years) about chemical risks to workers as well as recommendations for improving health conditions at GE facilities. In one of Hamilton's letters to GE Vice President, CE Eveleth, dated May 9, 1929, she reports meeting a Mr. Dalton of the GE Schenectady Works, who suggested she visit two GE foundry plants in Canada, "all of which, he said, are pretty bad." She then asks Eveleth: "Do you wish me to do this?" (We have found no evidence that Hamilton was given the opportunity to visit GE plants in Canada).

Published letters and reports kept at the GE Museum in Schenectady, New York (Castleman 2005), document that in addition to asbestos, Dr. Hamilton identified the health impact of a number of chemicals used by GE including: oil smoke, gasoline as a solvent, acids, paint spraying, benzene, cyanide, nitrobenzene,

aniline, formaldehyde, phenol, numerous silica hazards including sandblasting, mercury, lead compounds, radium, carbon tetrachloride, sulfur dioxide, acetone, kerosene, toluene, hydrogen fluoride, asphalt, x-rays, chromium and nickel plating, welding, soldering, as well as issues related to eye and skin irritants, ventilation, ergonomics, lighting, sanitation and medical service. Hamilton emphasized the importance of substituting harmful chemicals as the first level of controlling harmful exposures.

Importantly, Dr. Hamilton described 'by-stander' hazards to those working near welders and sandblasters without wearing protective equipment. When her book, "Industrial Poisons in the United States," was published in 1925, copies were to be sent to 10 doctors at GE plants around the country. As early as 1929, based on Hamilton's recommendations for controlling lead exposures, one GE plant provided separate lockers for work and street clothes, boots and underwear. Boots were removed before the men left the work area through a washroom for lunch or before leaving at the end of the shift. In describing conditions for workers at the plant, Hamilton said: "It is like a first class men's club house" (Pittsfield, May 1929 in: Castleman 2005). There is tragic irony to this story given the battle Peterborough GE conducted during the 1980s over an inspector's order to institute separate locker and wash facilities for employees working with lead under the designated lead regulation. GE Peterborough appealed, and the order was rescinded.

GE was made aware of the hazards of asbestos by 1930 when Dr. Hamilton described hazardous conditions at GE plants where there was significant airborne contamination and accumulated asbestos fibers on work surfaces (Castleman 2005). US General Electric made attempts to control asbestos exposure through exhaust ventilation and by distributing literature to employees on the safe handling of asbestos in the 1930s and 1940s. Hamilton also noted that GE received advice in the 1970s from asbestos fibre and product suppliers on the hazards of using asbestos in the manufacture of phenolic resins (Castleman 2005). Other investigators have also identified and documented how major corporations have suppressed information about the hazards. (Rosner and Markowitz 2002; Michaels 2008).

Given that GE officials in the U.S. were advised of the known hazards of asbestos in their U.S. operations in the 1920s and 1930s, and that they were aware of the poor conditions in Canadian plants, it is highly likely that GE officials at the Peterborough plant would have been aware of the hazards of asbestos. Yet, testimony from focus group participants and government inspection reports indicate that workers were handling asbestos in a friable state without any respiratory protection, nor were workers warned about the hazards. This was evidenced in various tasks that workers performed including: "plucking the goose" that involved the manual removal of waste asbestos without protection from holding bins in the wire and cable department; the band sawing of asbestos sheets without protection in the armature department; and the dismantling of the asbestos covered compounding tank without protection in coil impregnation, to mention a few. Given these exposure conditions it is highly likely that these contributed significantly to the extent of work-related disease at the GE plant. They also reflect a generalized lax safety culture that would have broad ramification for workers' health.

Exposure to Carcinogens:

A partial-list of chemicals routinely used in GE Peterborough production classified as carcinogens, or strongly suspected of being carcinogenic, include (IARC 2017):

IARC Group 1-Carcinogenic to humans: wood working, welding fumes, asbestos, silica, arsenic, benzene, beryllium, cadmium, chromium VI, 4,4-methylene-bis(2chloroanilene)(a.k.a. MOCA), nickel, trichloroethylene, vinyl chloride, formaldehyde, bis-chloromethylether (a.k.a. BCME), polychlorinated biphenols (PCB), diesel engine exhaust, rubber production, painters, mineral oils, n-ntrosodiethanolamine, inorganic acid mists, uranium, wood dusts, shift work.

IARC Group 2A-Probably Carcinogenic to humans: lead, epichlorohydrin, styrene oxide, tungsten carbide, creosotes, 1,3 butadiene.

IARC Group 2B-Possibley Carcinogenic to humans: Styrene, carbon tetrachloride, tungsten cobalt, diethanolamine, magnetic fields, asphalt fumes, methyl ethyl ketone.

Others, not yet classified as carcinogenic but whose properties disrupt the endocrine system and can mimic the hormone estrogen, include bisphenol-A and phthalates used in the production of plastics and epoxy resins. In the latter case, these are suspected of being breast carcinogens and tumour promoters. (DeMatteo et al. 2012; Keith et al. 2015; vom Saal and Hughs 2005; Diamanti-Kandarakis et a.l 2009; Ibarluzea et al. 2004; Ewertz et al. 2001; Hardell et al. 1997; Crisp et al. 1998; Kortenkamp 2008; Kortenkamp et al. 2011; Welshons et al. 2003)

Many of the chemicals used in GE production processes are subjected to high heat stress resulting in thermal decomposition by-products that are highly toxic and carcinogenic as well.

In summary, the fact that there was a complex mix of various contaminants, and that departments shared the same atmospheric contaminants that involved significant by-stander exposures, presents major challenges for the classification of individual exposures through traditional methods employed in industrial hygiene and epidemiological research. In fact, such approaches to complex exposure situations are largely responsible for the misclassification and/or misrepresentation of exposures that tend to underestimate the extent of exposure (Teschke et al. 2002; dos Santos Silva 1999; Flegal et al. 1986; Greeenland 1982).

METHODS

Qualitative and Participatory Research Methods:

The research team used a qualitative approach to gathering and assessing information necessary to develop rich, detailed, exposure profiles of the industrial processes undertaken at the facility (MacEachen et al. 2016; Institute for Work and Health 2011; Kidd and Parshall 2000; Needleman and Needleman 1996; Lincoln and Guba 1985). Qualitative and "mixed" research methods in industrial hygiene and epidemiology have been successfully used in similar industrial circumstances where there are: diverse groups of workers holding multiple jobs, numerous, complex industrial processes, and exposures that have changed over the years (McDonald et al. 2004; Marano et al. 2000; Morgan et al. 1998; Alexander et al. 1996). Rather than rating individual exposures, this research focuses on profiling the production processes and their exposure points, along with workplace factors that put workers at greater/less risk of being exposed. This approach is best able to address the challenges presented by the nature of GE's production system and limitations in the availability and reliability of "hard' exposure data from industrial hygiene monitoring. As well, detailed descriptions of worker exposures in many of these industries are limited at best. Published research seldom contains data reflecting the typical, day-to-day conditions experienced by the workers, themselves.

To address these issues a participatory research approach was employed using qualitative research methods including: focus group sessions and key informant interviews, and reviews of industrial hygiene data, government inspection reports, joint committee minutes, and occupational health literature.

The core research team consisted of 10 retirees from the GE facility, the union's former National Health and Safety Director and two retired researchers with occupational and public health research experience. This group formed **a permanent focus group known as the Advisory Committee on Exposure Profiling at GE**. The activity of this Advisory Committee was coordinated by one of the retirees and facilitated by the two health

researchers. Each retiree worked at the GE plant for at least 35 years primarily in the manufacturing sectors. All had worked at the facility between 1945 to 2000 with most starting their work with GE in the early 1960s.

The Advisory Committee played a dual role in this participatory research endeavor. It acted as a permanent focus group consisting of informants with detailed knowledge of the production processes at GE over a period of 35 to 40 years. It also served as an active research team who gathered detailed information and brought in key informants with more specialized information to fill in information gaps or expand the group's knowledge base. In this latter role all members took an active part in leading the interview process with key informants.

The Advisory Committee met twice a week for 4 to 5 hours per session where the Committee documented detailed information about the various productions processes and working conditions department by department. This intense activity went on for over 8 months and the group continues to meet regularly. In the course of their work, the group would seek out and review various documents, locate processes on the hazard maps of the entire complex, and obtain industrial hygiene reports where available. The committee interviewed and documented information from more than 75 former GE employees whose names are recorded in the appendix.

The two researchers along with the coordinator were responsible for documenting the information gathered at meetings providing 3 sets of data notes that were compiled and checked for accuracy and then reworked into the resource template that forms the body of this report. Discussions were guided by a set of both open ended and structured questions (for a list of these questions see the expanded methodology section in ADDENDUM 1 at the end of this report).

The focus group process can be described as a relaxed, egalitarian atmosphere with a sense of shared ownership at meetings reflective of the retirees shared work history at GE. Importantly, the overlap of common work experiences among retirees facilitated a questioning, challenging, confirming, consensus dialogue that was both productive and confirming of the reliability of the information provided. For example, participants would often tell similar stories independent of one another, serving to reinforce confidence in the accuracy of individual recollections. Moreover, the dialogue among the participants and informants involved a consensus building process regarding the accuracy of the information being discussed. This approach was both productive and personally satisfying due to a strongly shared commitment that we do this task well (Kidd and Parshall 2000). Discussions would continue until agreement was reached about the accuracy and completeness of the information. Where agreement was lacking, efforts were made by the committee to track down alternative sources of information including other retirees and industrial hygiene literature reviews.

Risk-Based Approach:

This approach is in line with that of Sonia Lal, industrial hygienist with the Occupational Health Clinics for Ontario Workers, who undertook a very thorough retrospective exposure assessment of the production processes in the Armature and Wire & Cable departments at the GE production facility in Peterborough from 2005 to 2006 (Lal 2005/6). Similar to Lal's (2005/6) work, this current retrospective assessment relies upon a number of qualitative risk factors in assessing exposures, comparative to that used by Marano in the aircraft industry (Marano 2000). In this regard, we assessed the production processes and working conditions with regard to their potential to have significantly exposed workers. The risk factors framework included:

- The physical states of the chemicals (liquid, mist, gas, vapors, solid, dust),
- Route of entry (inhalation, absorption, ingestion),
- The quantity of the chemical used, e.g., volume of chemicals, solvents, resins, etc.,
- Size of the materials and surface areas being worked upon or fabricated,

- Proximity to the source of exposure,
- Direct/indirect handling of the chemicals,
- Duration of exposure, e.g., use of overtime,
- State of ventilation systems, e.g., effectiveness of general, natural, local exhaust ventilation,
- Provision of make-up (fresh air circulation) air,
- Provision of personal protective equipment (PPE), e.g., respiratory protection, protective clothing (gloves, coveralls), eye protection,
- Safe work practices/procedures,
- State of housekeeping practices,
- Eating and drinking at workstations,
- Work organization factors, e.g., piece-rate system, physical effort, impact on safe work practices,
- Workers knowledge of and training re: chemicals used including access to, and understanding of, MSDS precautions.

In addition to relying on qualitative findings based on the above, effort was made to include quantitative measures available including those found in the Ontario Ministry of Labour's GE hygiene reports/investigations, GE Peterborough joint health and safety committee minutes, and worker/union documentation with the employer. Additionally, the Industrial Hygiene literature was reviewed for exposure assessments involving similar industries/processes.

Information Sources and Research Process:

This project relied upon three basic sources of information on industrial processes, working conditions, and the nature and extent of exposures for this retrospective exposure assessment:

Focus Group (Advisory Committee) Information Source:

Focus Group meetings were organized with reference to the industrial processes and working conditions for each department with attention to details on: chemicals, equipment and materials being fabricated, the volume of production, the work tasks and how materials were handled, descriptions of work conditions, exposure controls, access to information, work practices, housekeeping, sensory experiences, and adverse health symptoms. Additional information was generated by members of the focus group through phone calls, informal discussions, and sharing primary/historical documents among the group.

The dynamic associated with focus group methods is one that lends itself to both enriching and challenging the veracity of information collected and providing in-depth understanding of the complex work environment at the GE facility. Throughout the research team applied the "constant comparative" method associated with qualitative research, where information collected is constantly contrasted and compared for consistency and reliability.

Supportive Documentation:

Additional documentation of exposure conditions at GE Peterborough was obtained from 1) the Ontario Ministry of Labour (MOL) Inspectorate reports/investigations 1945-2000; 2) Joint Health and Safety Committee (JHSC) minutes/reports, 3) union or employee/employer correspondence, all of which provided a cross check on the reliability and validity of focus-group generated information about the industrial processes and exposure conditions at CGE; 4) Other information sources, including: The previous hazard mapping of GE carried out by Gary Lane and OCHOW, historical documents, GE product materials, worker medical reports

and documents, local newspaper articles, GE Peterborough newsletters, motor production process videos, and broad ranging literature and internet searches.

Industrial Hygiene, Occupational Health, and other Literature Reviews:

Additional documentation was sought through reviews of the scientific literature documenting industrial processes and observed exposures from published studies of similar work environments as well as general information identifying and describing various industrial processes.

In this way, we were able to corroborate the description of work processes and exposure conditions through the process of "triangulation" (Lincoln and Guba 1985; Needleman and Needleman 1996; Patton 1990), a major validation technique used in qualitative analysis. A sense of informational reliability was achieved through this use of different approaches to information gathering including 1) The richness and dynamic of focus group-based discussion and consensus; 2) A review of official government (MOL) reports, JHSC minutes, and employer documents; and 3) A review of industrial hygiene, occupational health, and other literatures.

LIMITATIONS OF THE SCIENCE

In considering the retrospective exposure profiles, some perspective is in order with regard to current interpretations attached to numerical exposure levels to various chemicals as well as results of epidemiological studies. Firstly, there is the assumption that no harm should have come to workers if exposure levels were below the regulated occupational exposure limits or Threshold Limit Values set by the American Conference of Government Industrial Hygienist (ACGIH). Secondly, there is the interpretation of negative epidemiological studies as indicating that there is no association between the disease and the chemical exposures studied.

In response to these assumptions it is important to recognize that the validity of these approaches is being challenged by a large and growing number of researchers in the field of occupational and environmental medicine. In the case of exposure standards, these research efforts have provided evidence that exposure standards are not health-based limits. Researchers have shown that the standard setting process and science upon which these are based are significantly compromised by industry influence. Further, they show that the "science" upon which these limits are based is, itself, seriously flawed. At best, these limits are what industry has determined to be economically and technically feasible rather than protective of workers' health.

Importantly, the misuses of the science of epidemiology and the misrepresentation of epidemiological study results have come under increasing critical scrutiny that can no longer be ignored. Here again a growing body of critical investigation has uncovered the questionable manipulation of data and analysis as well as serious flaws in research design shown to be the result of industry influence on the researchers. Many epidemiological studies suffer from inherent limitations such as poor design, misclassification of exposures, and insufficient statistical power to detect an elevated risk to health. The classic example involves concluding that there is no association between disease and exposures when the study did not have the statistical power, due to small sample size, to detect a risk that may be present. These unacknowledged limitations of science have serious consequence for the protection of occupational and public health.

For a fuller treatment of these limitations and detailed citations, please see ADDENDUM 2 - LIMITATIONS OF THE SCIENCE.

BRIEF OUTLINE OF RESEARCH FINDINGS

Information was gathered on the production processes and extent and nature of exposures for 22 departments/buildings. Numerous departments or processes went through changes in location over the years and some were discontinued as a result of outsourcing products, being moved to other areas, or being closed down due to toxic contamination. In total, 22 GE Peterborough departments are reviewed in the detailed exposure profiles that represent the body of this report including:

- Building #4: Capacitors
- Building #5: Coil Impregnation
- Building #7: Armature
- Building #8: Machine Shop
- Building #9: Fractional Horse Power Motors
- Building #10: Generator Assembly/Babbitt
- Building #12: Punch Press
- Building # 14A: Tank Shop
- Building # 14: Structural Steel
- Building # 16: Switch Gear
- Building # 16A: Transportation Equipment
- Building # 17: Non-Metallic Machine Shop (aka Carpentry)
- Building # 18: Induction Motors
- Building # 20: Drive Systems
- Building # 21: Nuclear
- Building # 22: Wire & Cable (until 1980)
- Building # 24: Wire & Cable (Formex until 1980)
- Building # 26: Wire & Cable (until 1980)
- Building # 22: Traction Motors (1994-2004)
- Building # 23: Plating Department
- Building # 30: Bus Ducts
- Building # 34: Steel Cutting

It is impossible to summarize all that is contained in the detailed exposure profiles. However, it is useful to identify some of the general conditions, and the nature and extent of exposures shared by most employees. The following are major working-condition features, commonly experienced throughout the plant, that raise the level of risk for significant chemical exposures.

These common conditions were also confirmed by the independent multiple source of documentation the researchers reviewed e.g. MOL, JHSC reports, etc. In addition to supporting the reliability of the focus group-based data, the multiple sources of documentation exposed a pattern of recalcitrance on the part of GE towards making necessary improvements and repairs to protect worker health and, often, outright refusal to adhere to the law with regard to providing workers and their union with information they requested and to which they were entitled. There was also evidence of an unclear relationship between the Ontario Ministry of Labour inspectorate and a very powerful multinational corporation, one with widespread influence both locally and internationally. What else could explain the inspectorate's seeming reluctance to issue orders preferring instead to give "advice to management" or issue unenforceable "recommendations" -- rather than write "orders" where compliance is mandatory.

Common Physical and Work Conditions:

1. The GE facility had little in the way of effective local exhaust ventilation. Most ventilation was by natural means and there was not enough make-up (fresh) air provided. There were locations in which contaminated exhausted air would re-enter the building atmosphere because of the location of exhaust and intake ports.
2. The lack of adequate replacement air resulted in negative air pressure throughout the building leading to the migration of air contaminants within and among departments (Kyselka 1979).
3. Asbestos for insulations on electrical wires and motor parts was used universally throughout the plant. The large size of products required large amounts of asbestos in various forms. Much work with asbestos was done by hand and in confined spaces. Asbestos was drilled, cut with a band saw, and milled by hand, resulting in the dispersal of asbestos fibres/dust. Overhead piping throughout the plant was covered with friable asbestos insulation, contributing to asbostos air contamination. It is documented that GE employed over 500 lbs. of asbestos per day (Rajhan 1971).
4. In addition to chemical exposures associated with industrial work processes, workers were exposed to diesel, propane, and gas fumes as well as dust from transportation vehicles within and outside the plant. Often vehicles were left idling for hours during loading and unloading. Numerous complaints about these fumes are contained in MOL and JHSC reports. Creasote impregnated wood block floors throughout the building were also a common source of chemical exposure for workers.
5. The absence, and poor quality, of hygiene and housekeeping practices within the GE plant are documented including: lack of showers and lockers, the use of recycled rather than potable water, non-functioning water fountains, inadequate lunch room facilities, poor containment and handling of dust, dirt, spills, fumes, vapors, and workers required to provide their own work clothes. Retirees reported that it was once discovered that soft drink and coffee machines had been hooked up to a recycled water source rather than potable drinking water.
6. Nearly every department or area had a curing oven and/or heated resin or solvent tank resulting in employees working under high heat stress and exposed to heavy solvent and resin vapors. Retirees made reference to the “GE smell” which referred to a distinct odor carried on workers’ bodies and clothing that family, friends and health professionals detected.
7. The large size and surface areas of materials being fabricated required the use of large volumes of solvents, paints, and resins as well as extensive welding which took place in open areas. This translated into higher levels of vapors and fumes associated with these processes.
8. The large size of products fabricated resulted in employees working with chemicals for prolonged periods of time in close proximity and confined spaces, for example while degreasing and welding. Some parts were over 40 feet in diameter. At peak, these operations demanded higher use of overtime. Some pieces took weeks, sometimes months, to complete.

The following constellation of risk factors was identified as contributing to significant exposure of workers to a wide spectrum of toxic and carcinogenic chemicals:

- Working closely to the source of exposure,
- Prolonged exposure to the toxic chemicals used or generated during production,
- Absence or inadequacy of exposure controls at the source, e.g. local exhaust system,
- Absence or inadequacy of personal protective equipment,
- Inadequate provision of make-up air and consequent negative air pressure in the complex,
- Application of large volumes of solvents, resins, PAHs, and paints due to large size of products,

- Long duration of exposure because of size and production schedule pressure,
- Inadequate knowledge about the health hazards and exposure controls for worker protection,
- Poor enforcement of safe-work procedures,
- Poor housekeeping practices,
- Eating and drinking and smoking at workstations,
- Inadequate hygiene facilities, and generally poor housekeeping.

Common Chemical Exposures:

Solvents: No matter what department one worked in, there was enormous use of solvents for cleaning and degreasing materials. Degreasers were used in large volumes and often applied by bare hands on large surface areas. Almost every department provided degreasers in the form of trichloroethylene (TCE) in very large tanks that measured upwards of 24 sq. ft. in surface area. Some were vapor degreasers that at times did not function properly. Residues of degreasers were drained on the floor producing large amounts of solvent vapor. Routinely, solvent vapors would migrate to areas where arc welding was performed thus producing HCL gas. Workers routinely washed down large metal surfaces with rags saturated with (TCE) or toluene in preparation for fabrication leading to inhalation and absorption of solvents. Workers frequently registered complaints about vapors and/or adverse effects such as eye, nose and throat irritation as well as narcotic effects. Other commonly used solvents included: toluene, perchloroethylene, MEK, acetone, trichloroethane, xylene, and naphtha gas. Many solvents, when heated, produced thermal decomposition by-products that were equally toxic. Some, including toluene, were highly contaminated with benzene, a group 1 carcinogen.

It is interesting to note that in one instance, an MOL inspector issued orders to protect workers from exposure to toluene despite concentrations below the TLV and protests from management, because the worker's adverse health symptoms were an indicator that the worker was over exposed to the solvent (regardless of the TLV reading). Solvents were used in every department under review (Advisory Committee Meeting notes).

Welding Fumes: Every department had some form of welding and/or soldering operation going on. These were usually large-scale operations involving from 1 to 8 welders working at fabricating electrical housings and parts for motors and generators. Mobile welding operations were also carried out in almost every area of the plant. Welding "booths," contained only by (frayed and friable) asbestos curtains, had little in the way of effective local exhaust ventilation. Welding work areas were commonly described as "thick with welding smoke-plumes," with many complaints related to irritating gases such as phosgene and ozone. MOL reports list many complaints about TCE vapors migrating from degreasing operations to aluminum welding areas (due to negative air pressure) producing phosgene gas. These were reported in focus groups then confirmed in MOL reports and JHSC minutes, as well as internal memorandum from GE Peterborough management. Management also indicated that workers suffered symptoms of COPD as a result of welding exposures. Workers themselves described being "surrounded by clouds of blue smoke so thick you couldn't see the person working next to you" (Advisory Committee meeting notes).

Welding operations included all forms of welding including oxy-acetylene torch cutting and welding, electric arc welding such as MIG, TIG, CO2, and plasma welding. Depending on the type of welding and materials used, both welders and by-standers were exposed to: 1) Welding fumes containing aluminum, beryllium, cadmium oxides, chromium, copper, fluorides, iron oxide, lead, manganese, molybdenum, nickel, vanadium, or zinc oxides; 2) Welding gases including carbon monoxide, hydrogen fluoride, nitrogen oxide, oxygen deficiency, and ozone; 3) Organic vapors such as aldehydes (e.g. formaldehyde), isocyanate, phosgene, phosphine and from metals coated with isocyanate paints, epoxy resins, polyester resins, solvents, or rust inhibitors.

As a result of the large volume of welding going on in every area of the plant and poor exposure controls and housekeeping, exposure to welding fumes was significant throughout the plant for both welders and by-standers. Significant exposure to ozone as well as phosgene gas was reported in some areas of the plant. Focus groups identified eating at workstations, poor housekeeping, and little effective exhaust ventilation. Smoke eaters were reported to "not be very effective," thus with limited utility for controlling exposures. Welding, in some form, was performed in every department under review.

Epoxy, Polyester and Asphalt Resins: Epoxy and polyester resins were used in more than 70% of plant operations. The resin dipping and curing operations involved dipping, often very large, motor components (including huge coils, armatures and stators) in open vats of resin or in Vacuum Pressure Impregnation (VPI) tanks. In the case of VPI tanks, significant exposure to epoxy and polyester resin vapors occurred when: tanks were open for dipping, lift cables were attached by hitchers, and crane operators sitting above the tanks manipulated large items to and from curing ovens. Workers who squeegeed excess resin were also exposed. Finally, excess cured/hardened resins were ground off motor parts and the oven surfaces during grinding and cleaning operations. Retirees described "thick blue smoke" in the atmosphere during such operations, and "plumes of smoke" surrounding the crane operator's cage. Workers described the grinding operations as particularly "dirty" operations where workers were covered in dust -- and thick layers of grinding dust covered all surfaces. Under heat, epoxies and resins break down into constituents such as bisphenol-A (BP-A/ endocrine disrupter) and epichlorohydrin (IARC 2A –probably carcinogenic to humans) and various aldehydes. Focus group discussions identified: workers using compressed air to blow off dust; eating and drinking at workstations; and poor housekeeping. Also identified was the absence of effective local exhaust ventilation and lack of respiratory protection for exposures to epoxy/resins, which was corroborated by inspectors' reports and JHSC minutes. Retirees described an "overheated VPI tank exploding and catching fire after city firefighters sprayed water on it resulting in highly toxic, fumes -- the result of thermal decomposition -- quickly spreading through the plant and overcoming workers (Advisory Committee meetings notes).

Asbestos Exposures: For years, asbestos was the primary material used to (electrically) insulate nearly every component in the multitude of electrical products produced at GE. Along with PVC, lead, and rubber coverings, asbestos -- in various forms -- was made into electrical insulation in stators, armatures, rotors, and various wires and coils. Asbestos was carded, braided, cut, sawed, shaved, and embedded in plastic resin and rubber wire coatings. The Wire and Cable department was a major user of asbestos fibre. Its presence was apparent as airborne dust ("snow storms" as workers described them), on floors and machines, and in storage bins. Some departments shaved and or sanded asbestos-impregnated insulation from wires in preparation for brazing and soldering. Asbestos was used as protective curtains around welding operations and ovens, and as heat insulation blankets to protect welders and/or parts during welding. Workers used asbestos gloves for moving hot materials and parts. All of these were reported to be in tattered, friable condition and a significant source of additional exposure to asbestos. The Armature Department and Carpenter Shop performed major cutting of asbestos boards with band saws. These were pre-drilled and shaped with grinders and sanders, producing large amounts of asbestos dust. Asbestos was ubiquitous and frequently blown (off surfaces and clothing) with compressed air. Workers classified as labourers were assigned to clean out asbestos waste bins on the roof of the Wire and Cable department without respiratory or other protection. The company was cavalier about this hazard since it advertised the sale of waste asbestos for 13 cents a pound as "home insulation" (Advisory Committee Meeting notes and Local newspaper clipping). Exposures were significant for those directly handling asbestos as well as by-standers. As mentioned previously, negative pressure in the plant contributed to the migration of asbestos to other parts of the plant. Given the large volume used in production and the manner in which it was used, workers would be significantly exposed through inhalation.

Polychlorinated Biphenols (PCBs): The use of PCBs at the GE plant has left a long lasting legacy as witnessed by widespread contamination throughout the plant and the surrounding community of Peterborough well after its discontinued use in 1977. This highly toxic, carcinogenic chemical was used as a dielectric fluid in the production of capacitors in building #4 and in transformers and circuit breakers in building #16 and #10. In the process of filling and draining PCB oil from these very large tanks, there was a great deal of spillage and splashes on floors and on workers. This toxic fluid was used in very large volumes not only in the production of new electrical devices but also in the process of dismantling old, or damaged, tanks and in draining them and wiping down the tanks by hand with solvents such as toluene or TCE. PCB was used under the trade names of Pyranol, Askarel, and Inerteen. Workers from several areas (Bldgs #4, #16 and #10) reported heavy exposures to PCBs during the production of transformers, breakers and capacitors. The Ontario Department of Health reported levels ranging from 70 mg/10m^3 to 130 mg/10m^3 (Johnston July 20, 1945). These exposures included others working in the vicinity. Workers in these shops indicated exposure to decomposition by-products, including substances known to be even more toxic than PCB itself. These have been identified as chlorinated dibenzodioxins (CDD) and chlorinated dibenzofurans (CDF). Research indicates that PCB is not only carcinogenic but also acts as a tumor promoter, in combination with other carcinogens (IDSP, December 1987).

Documentation of contamination levels and exposures was the subject of ongoing discussion at JHSC meetings over the high levels found, at or above the TLV, at the time (JHSC Minutes October,1981). Also documented was an incident of contractors "failing to follow prescribed safety procedures" while handling PCB waste oils (JHSC minutes September 26, 1985). An internal company memorandum identified several areas as "highly contaminated." Levels as high as 90,600 ug/100cm^2 were reported in lab test reports (Baker January, 18, 1989; Baker December 1, 1986).

At present, the widespread contamination of PCB waste oils is under the surveillance of the Ontario Ministry of the Environment, since PCB residues persist and have been identified in many areas of the plant -- as well as adjoining land where PCB waste oils were spread over parking lots and road ways as a "dust suppressant." The Ministry of Environment (MOE) has recently identified that plant roof debris is contaminated, and since roof drains run through the interior of the building, chronically leaking into work areas, workers continue to be exposed to waste PCBs (Stephenson MOE memo, April 21, 2016).

Metal Working Fluid (MWF) and Machining: Another major part of the GE Peterborough operation was large scale machining that went on in Traction Motors (Bldg. 22), Induction Motors (Bldg. 18), Switch Gear (Bldg. 16), Transportation Equipment (Bldg. 16A), Tank Shop (Bldg. 14A), Structural Steel (Bldg. 14), Generator Assembly (Bldg. 10), Babbitt Shop (Bldg. 10B), Punch Press (Bldg. 12), Machine Shop (Bldg. 8), Fractional Motors (Bldg. 9), Bus Duct (Bldg. 30) and Steel Cutting (Bldg. 34). All of these machining operations used very large boring, milling, drilling, and lathing machines. Some were as large as 40 feet in diameter. These machining operations used large quantities of MWFs consisting of cooling fluids and lubricating oils sprayed on the machine's cutters. There are several types of MWFs including straight oils, semi synthetic oils, and water-soluble fluids. Many water-soluble fluids are treated with biocides that contain arsenic. MWFs are heated by friction generated in cutting, thus producing mists and vapors containing thermal decomposition by-products as well as unused components of the fluids. Advisory Committee members describe machining operations as "overwhelmed with bluish smoke and mists, in addition to foul smelling vapors." Operator clothing would be saturated with fluids. In addition to MWFs' chemical components and thermal by-products, they would contain components of various metals being machined. Compressed air was used to clean surface areas -- further spreading MWF residue. Workers ate at workstations, thus were exposed to MWFs through inhalation, ingestion, and absorption.

Beryllium and Uranium Exposures: The nuclear department located in Building 21 was the source of exposure to beryllium and uranium oxide. The major source of beryllium exposure was the beryllium room where beryllium powder would be vacuum vapor-fused to zirconium sheets then cut into spacers and pads for the bundle tubes. In the early days of its use, levels as high as 41ug/m³, are documented when workers "hand sawed" beryllium blocks into powder for processing (even though a letter from the Department of Health warned CGE to purchase its beryllium in powdered form). Despite efforts to keep levels as low as reasonably achievable, beryllium disease is on the rise, even as standard-setting bodies, such as the ACGIH, propose lower TLVs (e.g., 0.05 ug/m³). Recent evidence indicates that this new standard is "unachievable," forcing producers to seek a safer alternative (Harmsen et al. 2010).

The identification of uranium risks has focused on measuring worker exposures (with personal dosimeters) to alpha particle emissions, yet indirect evidence in the form of suppressed monocyte production is reported to be an indication of worker exposure. A scientific study that included GE Peterborough workers identified that fuel bundle workers receive significant exposures to alpha radiation from uranium oxide (Chase 1992). The same study found that 44% of GE nuclear workers had reduced monocyte counts that were "abnormally" low -- 15-20 times lower than expected in a sample of healthy men and women. According to Dr. Chase "… therefore, there are valid and persuasive reasons to suspect that workers are being affected by their exposure to uranium."

What this description of "common exposures" indicates is that GE Peterborough workers were routinely exposed to a complex mix of toxic chemicals occurring throughout the plant with "business as usual."

HOW THE MAIN BODY OF THIS REPORT IS ORGANIZED, AND HOW TO USE IT

The body of this report contains twenty-two individual building/department profiles identifying in detail the work processes carried out and chemicals associated with these different processes. The information is presented in column form with "Production Process" listed on the left column and "Chemical Risk Exposure" listed on the right.

From the "Production Process" descriptions we formulate an exposure probability through identification of a constellation of risk factors for each process. In describing how work was carried out we are able to infer risk factors such as: was the worker directly involved, did the worker directly handle the materials, what was the physical state of the material(s), what volume was used, what was the production rate, how much time was spent on the tasks, were exposure controls available and adequate, and what is the toxicity rating of the material? From Advisory Committee notes, backed by MOL and JHSC reports, we were able to document adverse symptoms and complaints.

The "Chemical Exposure Risks" set out in the right hand column arise out of how production was carried out for each of the work processes described in the left hand column. The right hand column reflects a qualitative assessment of what the exposures were like, given the way production was carried out by workers and the existence of the risk factors identified above. These are accompanied by an explanation for the assessment in terms of the nature of the production process. Where reliable hard data is available this is presented, but always in conjunction with the experiences arising from the production process itself.

To inform the reader, each building profile is preceded by a "face sheet" identifying (in outline form) the different processes that went on in each building, and listing of (identifiable) chemicals associated with the various work processes. Readers will note the repetition of many individual chemicals/chemical groups as one reads through these profiles.

DISCUSSION

GE Peterborough employees were exposed to a multiplicity of carcinogens and other toxic chemicals. The chemicals used at the plant have well-known adverse health effects and are associated with occupational illnesses. Moreover, workers were exposed to multiple carcinogens simultaneously which further increases the risk of developing cancer.

However, from what is identified, with respect to significant worker exposures to toxic chemicals including a large number of carcinogens, it is hard not to conclude that such exposures have harmed the health of GE employees working at various processes throughout the plant. What has been demonstrated in these exposure profiles is that not only were carcinogenic chemicals present, but they were used in large quantities, in close proximity to the workers, and frequently and for long durations—conditions dictated by the large size and intricacies of the products and parts being fabricated.

What Sonia Lal, of OHCOW, found in her retrospective exposure profiles of the Armature Department and the Wire and Cable Department applies equally to all other departments and buildings throughout the GE facility. Her observations are worth repeating with respect to current findings in this retrospective profile that included an additional 21 buildings.

Ms. Lal (in executive summary, OHCOW file # G884) observed, “The constant dipping, baking, curing of these products and the exposure forms, i.e. solids, liquids, gases and their decomposition products have been demonstrated here to be of paramount importance when trying to assess and establish exposures. One process cannot be looked at as stand alone, as the processes all occurred in a building, namely Building 7-5-8-10, for armature employees. Most buildings at GE were similar in that they all relied on natural ventilation. Hence the above statement applies to all buildings, as all the processes within the buildings were close to one another, contaminants were heavy and accumulated, (as there was no forced make-up air) and thus bystander exposure to different contaminants from several processes were incurred by employees" (Lal 2005/6 p. i-a).

The current findings of this much extended exposure profile corroborate what Sonia Lal found in her comprehensive, detailed retrospective profile of the Armature and Wire & Cable departments and are detailed in the body of this report.

While this project does not assign precise quantitative measures to the extent of exposures it is possible to infer the extent of exposures from the nature of the production process, the size and intricacy of the production process, the tasks performed by the workers, the quantities and types of chemicals used or produced, the proximity to the materials, the extent of exposure controls, the characteristics of the ventilations systems, safe work practices and work organization characteristics. Here are a few examples: extensive welding and grinding operations fabricating huge breaker tanks in confined spaces generating large clouds of welding fumes consisting of a complex mixture of gases and heavy metal fumes in the Tank Shop; lapping (sanding) large lead Babbitt bearings bare handed immersed in toluene up to the forearms in Bldg. 8 and Babbitt Shop; crane operators hovering over plumes of vapors from degreaser tanks and epoxy resin VPI tanks in several departments; draining and pouring PCBs in the building of capacitors as well as welding caps on in the Capacitor department; women doing hand work continuously exposed to solvents, lead and cadmium during soldering operations; workers inhaling and being soaked with MWFs during machining of large metal plates, 25’ to 40’ in diameter; hand wiping of large coils and metal surfaces with rags soaked in toluene; stripping of asbestos coated wires; hand squeegeeing epoxy resin from coils after resin impregnation; band sawing asbestos boards generating large amounts of asbestos laden dust, to mention but a few. What is described here was carried out without effective local exhaust ventilation or adequate protective equipment under intense production schedules.

These findings are corroborated through review of Ministry of Labour reports, JHSC minutes, employer-records available, and industrial hygiene studies on similar production processes. The research team has no hesitation in concluding that most GE workers were significantly exposed to carcinogenic and other toxic chemicals, and that it is highly likely that these exposures have harmed, and continue to harm, their health. GE employees laboured under very poor working conditions marked by inadequate to non-existent exposure controls and lax enforcement. Additionally, these workers were chronically exposed to substances that are potent carcinogens, or strongly suspected carcinogens -- as well as being capable of disrupting the endocrine system. This condition is aggravated by the fact that workers were exposed to complex mixtures of hazardous chemicals that have additive and/or synergistic effects. What we don't know, and is not well documented in the scientific literature, is the synergistic effects of such a multiplicity of exposures.

In conclusion, it must be reiterated that manufacturing in the 20th century was characterized by an historic intersection of the industrial and chemical "revolutions." The GE plant in Peterborough is a classic example, in design and function, of that dynamic social experiment. As such, workers at GE were both participants in, and witnesses to, the horrific working conditions associated with this historical pairing – and its significant toll on workers and their families.

LIST OF GE WORKER/FAMILY PARTICIPANTS

Retiree Advisory Group: John Ball, Lynda Brown, Jim Dufresne, Roger Fowler, Marilyn Harding, Sue James, Carl Jensen, Don McConnell, Gord Terry, Bill Woodbeck, Jim Gill

Invited Retiree Contributors: Sharon Armstrong, Bill Drain, Steve Casey, Mel Crowe, Gary Dalton, Steve Deal, Paul Evans, Bob Gaspari, Paul Graham (Ptbo. Firefighter) Jim Heron, Joe Keating, Ron Lang, Gord Watson

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Widow/family member contributors: Diane Carl, Sandra Condon, Steve and Cindy Crossley, Debbie Chute, Higgins Family, Aileen Hughes, Pat Huzinga, Sandy Lebeau, Joan McKinlay, Marcelle O'Connell, Arlene Petrany, Sara Sharpe, Lenore Shiels

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While it is hard to single out any one individual when so much depends on the collective action of workers, one cannot overlook the debt of gratitude to a very tough, dedicated, Worker Health & Safety Representative at GE Peterborough who passionately fought for more than 40 years to better working conditions at the plant. He meticulously saved every piece of communication that passed through his hands during his years at GE. He was courageous to a fault and both loved and hated. If there is a hero, among so many who participated in this project, it is John Ball. We acknowledge also the important work of Sue James, as coordinator of the project who kept us on track, and whose insights, broad knowledge of the plant, and constant "digging" for information was critical. Essential and invaluable was both the individual and group contributions of the Advisory Committee "mainstays" including: John Ball, Linda Brown, Jim Dufresne, Roger Fowler, Sue James, Marilyn Harding, Carl Jensen, Don McConnell, Gordon Terry, Bill Woodbeck, and Jim Gill. As retirees, our

advisory committee members were both willing and able to commit to the very significant time and hard work required to complete this project.

UNIFOR, as the union representing workers at GE Peterborough (specifically Joel Carr, Nancy Clark, and National Health and Safety Director, Sari Sairanen, and staff at the national office) provided meeting space and support as well as undertaking the creation of a data base for the storage and retrieval of government inspection reports, minutes of JHSC, internal company communications and MSDS. UNIFOR has worked to coordinate occupational disease claims with the Office of the Worker Advisor and is assembling supportive documentation, generated by this retrospective study, to go before the WSIB. Special thanks to Local 599-O and its executives for providing meeting space for the committee's work. We thank Laura Hargrove for her work in the final preparation of the report.

The detailed chemical hazard mapping of the GE plant done by both Gary Lane and OHCOW was critical to this project providing a reference point, and supportive documentation for focus group discussions. The work of Sonia Lal and OHCOW identifying risk exposures at GE provided a starting point for this project, serving as a guide and inspiration. Her excellent retrospective profiles on Armature and Wire and Cable departments were substantially relied upon, and incorporated into this report.

We thank Dr. Noel Kerin of OHCOW for his commitment to GE families, especially his support for many claimants through the clinics of 2004.

And finally, we acknowledge the long fight for justice led by the Occupational and Environmental Health Coalition of Peterborough (OEHCP) for promoting their vision of “A healthy viable community in Peterborough and for generations to come,” through their ongoing commitment to, and practical support for, GE families coping with occupationally related illness and death.

This broad community effort “to set the record straight” reflects a concerted collective effort on the part of many citizens and activists to get to the bottom of this occupational disease catastrophe.

February 5, 2017

BUILDING: #4 **DEPARTMENT: CAPACITOR**

General Description
Building Capacitors
Building Cans for Capacitors
Capacitor Reclaim Area
Laboratory 2nd Floor
Welding Operation

Known Chemicals used or produced:

Metals: Cadmium, Silver, Stainless Steel
Glyptol
Hexavant Chromium
Mercury
Polychloronated Biphenols (PCBs, Pyranol)
TCE, (Roylene)
Toluene
Tricholorobenzene
Dioctylpthalate

February 5, 2017

Building: #4 **Department: Capacitor**

Production Process **Chemical Exposure Risk**

General Description: This department had two large tanks containing Polychloronated Biphenols (PCBs), and a large degreasing tank filled with TCE. It employed 40 people working 2 shifts. The department was generally devoted to the building and filling of capacitors of various sizes with PCB dielectric fluids. These ranged in sizes from a few inches to 2-3 feet across. This work involved construction of canisters, formation of the coils and filling and sealing the canister with lead solder. The processes also entailed deconstruction of faulty or old capacitors and dumping old fluid. Note that PCB use was discontinued in 1977. It was replaced with a mixture of trichlorobenzene and dioctylphthalate.

Building Capacitors

1. The process begins with the construction of the components. This involves winding aluminum foil and "treated" paper together to form the body of the capacitor. The aluminum foil formed an anode and cathode with electrolyte paper layered between the two;
2. This wound body then placed in a tray on a conveyor;
3. Next, the windings are placed in a "canister;"
4. Leads for the anode and cathode foils are attached with spot welding, and/or crimped;
5. The canisters are then taken to a "treatment" area where they are dipped in tanks containing Polychloronated Biphenols (PCB up until 1977) and are filled by vacuum impregnation; (small capacitors are hand dipped);
6. Prior to dipping, the PCB fluid is poured into tanks of about 50 gallons with semi lid openings and exhaust ventilation. This fluid is circulated for about 5 hours then pumped into a storage tank, then used to fill impregnation tanks where capacitors are filled under vacuum pressure for 5 hours;
7. Capacitor caps are soldered closed after air pockets have been filled with PCBs. This welding occurred while capacitor was still

General Exposures: Workers in this department were highly exposed to degreaser TCE, PCBs, toluene, and various welding fumes that likely contained hexavalent chromium and cadmium from extensive stainless steel welding and silver brazing. These exposures took the form of dusts, fumes and vapours as well as liquid form. (After 1977, PCB was replaced by a mix of trichlorobenzene/dioctyl-phthalate [TCB] as the dielectric fluid in capacitor production. Hence exposure to TCB commenced around 1977). This was high production work involving direct contact with contaminants and very intensive job tasks. There was little or no effective local exhaust ventilation. Housekeeping was poor and no respiratory or skin protection was provided.

Inhalation and skin absorption were highly likely given these risk factors. And given that workers ate and smoked at their workstations, and there were no washing facilities, ingestion of these toxins was highly likely.

PCB Exposures: Workers were in direct contact with PCBs and worked in close proximity to this material. Workers were not provided with appropriate skin protection. Documentation of relatively high exposures to PCB is provided through a series of MOL reports of significant contamination in the capacitor department in bldg. #4. MOL reports available beginning in 1945 and up until 1984 document levels of PCB air contamination well above the current TLV of 0.05 mg/m^3. The readings were as follows:

1. 7/20/45:130 mg/10m^3 (open); 70mg/10m3(closed)"Well above the allowable concentration" of 10mg/10m^3;
2. 2/20/48:140-360 mg/10m^3;
3. 5/14/8: 7-220mg/10m^3 (5 samples);
4. 6/03/54: New more volatile form of PCB introduced-"Recent changes in pyranol…has resulted in increased vapours …over those

Production Process

under the PCB liquid. During the process a great deal of combustion by-products from heating the metal were generated, as well as the PCBs;

8. Capacitors are then taken to a test area;
9. PCB tanks were located in Bldg. #4 North. There was signed prohibiting entry and entry limited to specialized personnel in recognition of high hazard;
10. After the sealing operation, capacitors were removed to the trichloroethylene degreasing tanks;
11. Then painted with Glyptol epoxy based paint.

Welding and Soldering: Welding was carried out by one person for these operations. Apertures on capacitors were soldered closed with lead and/or silver solder. This process was fairly intensive.

Large capacitors were rolled into an oven and a vacuum manifold was connected to a Schrader valve and left for hours. After removal from the oven cool oil was placed in and the valve closed with lead solder.

Building of "cans" for capacitors

1. 6x12 sheets of low grade stainless were used to form "cans;"
2. These were dipped in trichloroethylene degreaser in an open 6x6x10' tank;
3. Capacitor cans were then hung to drain before being welded;
4. Cans fusion-welded with stick welding (There was no local exhaust ventilation and atmosphere was thick with fumes).

Capacitor Reclaim Area

1. Damaged units, or those not meeting specifications returned to this area and the fluid is emptied into a tank 6'x2'x8' high at floor level. (During the operation splashes of fluid are scattered and vapours are dispersed. Local exhaust ventilation ineffective as per MOL inspector's use of smoke detector tube);
2. A pneumatic press is used to break the capacitor canisters apart. (Local exhaust was

Chemical Exposure Risk

previously used."

5. 6/24/56: Discussion of increased volume of PCB used and the need for better ventilation and personal hygiene;
6. 4/06/59: inspector recommends improving ventilation because vacuum tanks are rich in pyranol;
7. 5/08/59: "These results are higher than those obtained in 1948. We feel these figures are representative…and that a vapour problem exists";
8. 8/22/60: "Installed ventilation…Improvement shown but concentrations still above the MAC." Hygiene facilities unsatisfactory.
9. 01/11/61: Follow up air concentrations measured show PCB levels 5 to 11 times the TLV. Inspector recommends medical monitoring to see if further improvements should be made;
10. 08/27/79: Operators sampling TCB fluid for dielectric properties without PPE-no gloves, organic vapour respirator. Containers filled with TCB left uncovered and may contribute to TCB vapours. Splashes and spills in the TCB reclaim area dispersing into air. Local exhaust ventilation not effective to capture vapour and particulate. Local exhaust for pneumatic break up press "completely ineffective and should be modified." TCE concentration levels at the degreaser were 100ppm to 150ppm. TCB spillage seen and paper towels soaked with solvent left in an open barrel. "This could contribute to organic vapours being discharged constantly into the work room." Orders issue for ventilation, isolation and PPE.
11. 4/11/84: Test for seepage of PCB through concrete floors in bldg.#4N. No air concentrations above the old TLV. But recommend encapsulating the floors;
12. 8/24/84: Swipe samples show very high surface contaminations, stored transformers must be removed and workers advised of hazards and hygiene practices.

Production Process

ineffective as per MOL inspector);

3. Chemicals exposed to in reclaim process included: Trichloroethylene, Polychloronated Biphenols (Pyronal), Toluene, and trichlorobenzene/ dioctylphthalate.

Laboratory 2nd floor:

Mercury (from instrument spills and/or breakage) routinely swept up by staff without protection or ventilation. Staff would collect spilled mercury and dip into trichloroethylene tanks to clean for reuse. This was all done manually.

Chemical Exposure Risk

TCE/Cadmium Exposures (MOL reports):

1. 8/14/79: high levels of TCE vapour in filling and reclaim area. Ventilation found ineffective. Housekeeping and hygiene practices poor, e.g. open buckets of TCE, spills cleaned up by hand with paper towels and left on floor. Inspector recommended PPE, adequate ventilation, and improved housekeeping and hygiene;
2. 01/27/1982: Cadmium in urine levels high and exposure to cadmium confirmed by the MOL. Recommends no food or drink should be consumed in the silver soldering area.

Mercury Exposure: Inhalation and skin absorption of mercury in liquid and vapour state without protective equipment as well as inhalation and absorption of TEC during the mercury cleaning process. Ingestion also another likely route of entry given eating and smoking at the workstation.

JHSC report: 10/11/79
Re: unexpected test finding: "Ministry of Health conducted tests in area using personal dosimeters. Chemicals checked were trichlorethylene, trichlorethylane, and trichlorolenzene. Strangely enough, D1(2-ethyhexyl) phthalate is major component of this mixture and this was not mentioned during checks."

BUILDING: #5 **DEPARTMENT: COIL IMPREGNATION**

General Description
Asphalt Impregnation Process
MICA Coil Processing
MICA/asphalt Tape Production
Maintenance and Cleaning of Impregnation Area
Compounding Tank Removal (1977)

Known chemicals used or produced:

Asphalt
Asbestos
Benzene
Coal tar
Coal tar pitch
Mica dust
Toluene

February 5, 2017

Building: #5 **Department: Coil Impregnation**

Production Process **Chemical Exposure Risk**

General description: the coil-impregnating department was attached to Building 7, in the Armature department, and was part of that production system, employing 10-20 people. This department housed 2 compounding "tanks" that were partially above and below the floor. Coils were vacuum pressure impregnated with asphalt and then baked to harden in an oven. Building 5 also carried on a Mica coil processing operation and a mica/asphalt tape production operation during the 1960s.

Asphalt impregnation process:

Both compound tanks were pressure-impregnating tanks. When the doors were opened heavy asphalt fumes would flow out. A tray of coils would be place in the tanks and it would pressurize from 4 to 24 hours. With two tanks, one would always be running while the other was being unloaded or loaded. Workers did not wear respirator protection and there was no local exhaust ventilation to protect from fumes. No gloves were worn. The current TLV for asphalt fumes is 0.5mg/m³ as benzene-soluble aerosol. Informants noted that fumes from asphalt were very heavy when the doors were opened. In the asphalt impregnation process there was constant cleaning of parts and hands with 1500 toluene.

MICA Coil Processing:

Coils coming out of the compounding tank process were taped and baked. Subsequently, 2 operators would strip off sacrificial tape and tar with knives and then go back to the coil taping process. Informants described the tasks as dusty and dirty since the tape was brittle. Some workers wore gloves and face shields.

Employees frequently complained that it was very hard to breath because of the heavy air borne dust.

Mica/Asphalt Tape Production Process:

Mica/Asphalt Tape consisted of a layer of Mica flakes sandwiched between two strips of tape coated with black sticky varnish (asphalt).

General Exposure risks: high risk of significant exposures of asphalt, toluene, benzene, mica dust through inhalation given the volume of usage and absence of exposure controls.

Risks of inhalation, absorption, and ingestion were present. Given workers' adverse health symptoms and detection of strong odours from the chemicals and heating of them, it is highly likely that reports of exposure are confirmed and that exposure controls were inadequate to protect workers.

Workers in this operation were heavily exposed to asphalt fumes and thermal decomposition by-products. Coal tar pitch fumes from the open pressure tanks and oven-baking processes were highly likely inhaled. Also workers handled these impregnated coils bare handed which put them at risk of absorbing these chemicals through the skin. This was even more likely given that workers used toluene to wash the tar off their bodies. Toluene would defat the protective oils from the skin thus aiding absorption.

Workers were also likely absorbing a certain amount of benzene, a known contaminant in toluene.

The mica/asphalt coil processing also exposed workers to asphalt fumes, mica dust and solvent vapours.

These were very likely inhaled/absorbed in significant amounts given the high level of production as well as the likelihood of absorption through defatted skin. The other factor contributing to the entry of this chemical into the body was that workers were eating and drinking at their workstations.

The mica tape production process and tasks also put workers at risk of exposure to inhaling both asphalt fumes and mica dusts in addition to inhaling and absorbing the solvent toluene used to clean equipment and exposed body parts, especially hands.

Production Process	Chemical Exposure Risk
1. Workers would feed Mica into a hopper 2' square that travelled on a conveyor into a shaker that "shook" the mica onto the sticky tape; 2. As the machine ran, mica black varnish was applied onto the tape; 3. At the end of the conveyor, a heating element caused the flakes to stick to the tape and formed a spool of tape; 4. This was then cut in various sizes by a slitter. This was a sticky and dusty operation and there was mica all over the work area. Compressed air was used to clean mica dust off equipment and clothing. A large 8'x4' steel tank in the area, which contained 1500 toluene, was used to clean equipment on the slitting machine. This tank was open most times. Employees routinely used the toluene to also clean their hands. Workers were very concerned about their health because they found it difficult to breathe and suffered from frequent coughing. There was a danger of fire should the conveyor stop and the paper begin to burn because of the heating element operating at between 300 and 400°C.	This operation put workers at high risk of exposure to dusts and fumes from asphalt and resins without any protective equipment or other exposure controls.
Maintenance and Cleaning of impregnation: Maintenance workers were periodically sent in to clean up hardened resins and asphalt caked onto to rail tracks, ovens, and other equipment and surfaces. This usually involved the use of grinders and jackhammers to remove the hardened asphalt and resins. This was a very dusty operations and workers complained about the residue dust and fumes. Workers did not wear respiratory protection and there was no local exhaust. This was a long-term procedure to clean the area of hardened residue. **Compounding Tank Removal 1977:** **Compounding Tank 1977 incident:** The compounding tank was used for asphalt coating of parts/coils by immersing parts in asphalt mixture. This tank stood 20' high and was encased in loose asbestos 2' thick in a friable state. Asbestos insulation was held in place	This event exposed these workers to enormous concentrations of asbestos and led to development of asbestos related pulmonary disease. In this case one of the workers was diagnosed with pleura fibrosis and the board subsequently accepted his WSIB claim. Workers would have been exposed to asbestos levels that were likely 1000 times higher than the current TLV of 0.1f/cc.

Production Process

Chemical Exposure Risk

by a 2x4 frame that surrounded the tank and was covered with a canvas tarp to hold the loose asbestos in place. When the tank was no longer needed an order for its removal was made leading to a major asbestos exposure.

Removal Process: Workers were directed to remove and dismantle the tank. Workers cut the canvas open to get at the asbestos and began to remove the asbestos manually with shovels and buckets. The asbestos was taken to a local dump. Some was given to employees to insulate their homes.

When an upper manager discovered this dangerous removal of asbestos the work was shut down and the MOL was called in to investigate. The work was halted and did not resume until protect procedures were put in place but by then a major exposure event had occurred.

BUILDING: #7 **DEPARTMENT: ARMATURE**

Processes Armature Upstairs:
Sheer Station
Winding Lathes
Coil Forming Operation
Punch Press
752 Forming Machine
Above Ground Dip Tank
Cut Off Machine and Stripper
Flux pots
Sunken Dip Tank
Baking Oven
Taping Machines
Stator Coil Set Up and Wrapper
Bake Oven
Pole Face Bar Press

Processes Armature Downstairs: (1960s)
Substation
Copper Storage
Copper Lathe
Coil Winding Lathe
Tin Pot Operations
Spreader
Coil Taping Area
Asphalt VPI Tanks
Test Area
Assembly Winders
Overhead Crane Operation
Assembly Winders
Bending Process
Welding Area
Assembly Winders MD-CD
Assembly Winders (turbine rotors)

Assembly winders (induction bar rotors)
Ovens
Portable Ovens
Armature Dip Tank
Storage Tanks
Mica Tape Production
Hydro Poles Operation

Processes lower level 1960-1980:
Copper Storage Area
Assembly Winders
Banding Lathe
VPI Tanks
VPI Epoxy resin 6860 Dipping
Small VPI Tanks
Isonol 51 Tank
Xylene Tank
Sin-Bin
Cold Forming
Coil Manufacturing
Fridge Epoxy Storage Facility

Processes Armature lower level 1980-2005:
Coil Fabrication
Bake Ovens
Crane Cycle
Excitor Process
Isonel Tank
Winding Lathe
Shear Station

Known Chemicals used or produced:
Asbestos, fiberglass, epon glass, resi-glass cord, "castor" brand asbestos gloves
Asphalt 1592, asphalt varnish, "black varnish"
BCME, CPA
Benzene
Bisphenol-A
Chromatap,
Chromic acid
Copper, copper dust, brazed copper, gy wire
Dicumyl peroxide
Epichlorohydrin
Methyl Ethyl Keytone (MEK), MEK peroxide,
Fillers
Formaldehyde
Glyptol paint, 5105 paint, 5142 epoxy, epoxy 74023
Hydrogen cyanide
Isonel 51, 9700 Isonel
Lead, tin, beeswax
Liquid asphalt bonding agents specifications 1027 and 1028
MEK
Methanol
Mineral spirits
Muriatic acid
MWFs
Nomex
Ozone
Phenols
Rosin
Royalene, TCE
Shellac, varnish
Silica, silica dust, liquid silica
Silver solder, sylphs solder
Styrene/styrene oxides, tributyl styrene thinner
Tapes: FG/epoxy, FG/mica, Terylene, Kapton, mylar, hydro, permfil, shrink, fiberglass
TCE, TCE-1300glue, TCE 1500 thinner
Toluene, xylene
Toluene, xylene, methyl, Vinyl toluene
Trichloroethylene
Vinyl toluene
VPI Resin mixes: A311, M6860, 485 (50-50 thinner-resin), 9522, 9637, 5918, Isonel 51
Welding fumes
Mica, mica mat

February 5, 2017

Building: #7

Department: Armature

Sources: Sonya Lal, 2006 (OHCOW retrospective) and Advisory Committee

Production Process

Background: This was a large department employing 200 workers over 3 shifts. This department produced coils for motors and generators, stators, DC motors, and large size armatures for motors. Production process took place in building #7 measuring 350'x100'x70' ht. There was a mezzanine covering half the building that ran N/S, open to the lower floor. Large-scale armatures were transported via dedicated railway to buildings #8 and #10 where same processes and chemicals were used. Hence exposures in buildings #8 and #10 were similar to those in building #7. In addition, VPI processes of coating electrical coils with polyester resins and epoxy were carried out in buildings #8 and #10. Winding assembly was also done in these buildings. Parts were transported from department to department via dedicated transfer cars on rail tracks. Depending on volume of parts, two or more cars were used. Building #10 built large water-wheel generators and building #8 processed 30-40 tonnes of equipment. Processes took place both in Armature Upstairs (mezzanine) and Downstairs:

Armature (Upstairs)

(Production carried out mainly by women making 5 coils per shift)

1. Shear Station: (replaced by winding lathes in 1980s). This was a large machine to cut insulation for coils. An operator cut fibreglass and asbestos sheets to size generating large amounts of dust resulting in free floating asbestos and fibreglass fibres suspended in the workplace atmosphere. Suspended fibres were dispersed further due to large-standing fans used to cool the area. Also used to cut asbestos wedges and fillers in winding process;
2. Winding Lathes (replaced shear station). This operation consisted of 20' lathes where copper wire was run through the machine and 'taped' with cloth insulation after the wire was first 'lubricated' with silica powder

Chemical Exposure Risk

Summary of toxic chemical exposures: A large variety of chemicals were used in the armature department as well as in buildings #8 and #10. These were used in large quantities with little or no local exhaust ventilation, PPE, inconsistent housekeeping, and lack of appropriate hygiene facilities (no showers, no near-by potable water or wash facilities). Chemical contaminants affected all employees whether directly handling these or from by-stander exposures. Because they were mists, vapours, fumes or liquids, main routes of entry were inhalation and skin absorption. However, because worker ate lunch and smoked at their workstations, chemical were likely ingested as well.

Chemicals workers exposed to included: copper, Isonel 51 (solvent borne polyester resin), formaldehyde, BCME, mineral spirits, shellac, methanol, trichloroethylene, hydrogen cyanide, chromic acid, styrene/styrene oxides, dicumyl peroxide, asbestos, mica, vinyl toluene, rosin core solder, royalene, solvent mixtures, liquid asphalt bonding agents specifications 1027 and 1028, benzene, toluene, xylene, methyl ethyl keytone (MEK), MEK peroxide, chromatap, Bisphenol-A, epoxy resins*, fillers, phenols, epichlorohydrin, welding fumes, ozone, fibreglass.

VPI Resin mixtures workers were exposed to included: A311, M6860, 485 (50-50 thinner-resin), 9522, 9637, 5918, and Isonel 51 baked at 160c.

Inhalation of asbestos fibre and fibreglass. Levels prior to the enactment of the occupational health and safety act in 1979 were measured for asbestos at 10 fibres /cc. Prior to the Act, little was done to abate asbestos exposure or provide personal protective equipment. But even as asbestos levels declined in the plant after 1979, they still would be at levels far exceeding current exposure limits of 0.1f/cc.

Cloth insulation was likely asbestos and there is a possibility of silica exposure as well.

Production Process	Chemical Exposure Risk
in large tubs. Silica was released into the workplace if these tubs were damaged or cracked;	
3. Coil forming operation: This involved the shaping of diesel coil by a large hydraulic press using long strips of copper. Fibreglass insulated wire strips were formed using various size wooden forms or molds. The insulation used was 'Nomex', a fibreglass, or Mica Mat. The coil product was then dipped in methanol to secure a firm moist wrap. Isopropyl alcohol was sometimes used depending on specifications. The coil was next dipped in a green bonding solution and sent to 'dry press' to be compressed and baked in an oven. During the baking cycle the coil was wrapped in a 'Nomex' wrap. 1300 Glue (yellow glue) was brushed onto coil slots and coil was insulated again;	Risk of inhalation to fibreglass and Mica dust from frayed insulation sheets and during the forming operation. Also inhalation and absorption of alcohol vapours, bonding solution as well as thermal decomposition by-products during the baking and curing process. Additional inhalation of dust as 1300 glue fumes.
4. Punch Press: One employee assigned to the punch press used to flatten copper leads and pieces were punched out. Operation did not require heating of metal, but were treated with cutting oils. Press was very loud and no ear protection provided;	Punch press operation produced both copper dust (possibly coated with metal treatments such as degreasers) and insulation dusts (fibreglass, mica, asbestos). Risk of inhalation of copper and insulation dust likely.
5. 752 Forming machine: Flat copper wire was shaped into a loop and punch- pressed into a form. Insulation was added to wire consisting of either silica, mica, fibreglass, scotch tape, or 2-gauze fibreglass tape with mica sandwiched between layers. Wire was then dipped in isopropyl alcohol and fed into a taping machine where fibreglass wrap was applied with glyptol glue. Liquid silica was used as a bonding material. Minimal dust produced. Other issues: No local exhaust ventilation to capture fibres released during taping. Machines were used continuously on 8-hour shifts. Tape was cut in rolls with rough edges and loose fibres, which were not contained due to lack of exposure controls;	Risk of inhalation and absorption of alcohol and ingredients in glyptol glue. Inhalation of insulation fibres from edges of tape that would break off. Fibres were not contained without local exhaust ventilation.
6. Above ground Dip Tank for glass measured 3'x4'. Tank was filled with Isonel 51, (an orange dye) with toluene added. No local	

Production Process	Chemical Exposure Risk
ventilation. The tank was used to dye the tape in GE colours plus added texture. There was a strong odour of alcohol. The lid for the tank was rarely used to contain vapours. A wire basket lowered parts into the tank, and then employees removed the dipped wet tape with bare hands. No gloves were worn. Workers hands and arms were frequently in the dip tank. Some workers reported discoloration of hair and fingernails;	Inhalation of fumes and vapours from dip tanks containing Isonel 51. Exposure to formaldehyde and the formation of BCME, BPA. Also exposure to Yellow dye and both inhalation and skin absorption of dye and alcohol due to extensive direct skin contact with these chemicals.
7. Cut off machine and stripper: This 10" machine was used to straighten, strip, and cut fibreglass-covered wire. Copper dust was generated during the cutting process. The ends of wire were sent through brushes that stripped off fibreglass insulation and the wire then cut to length. Much of the wire was insulated with asbestos, also released in the process. There was no local exhaust ventilation. Machine used by one employee for 8-hour shift. The brushes stripped off a great deal of insulation, generating a large amount of asbestos/fibreglass fibre including Kapton Glass;	Risk of inhalation to copper dusts generated during cutting process as well as risk of inhalation of insulation dusts containing fibreglass during stripping process. Risk of inhalation of insulation dust very high, given the stripping process and lack of local ventilation.
8. Lead, flux, and tin pots: Lead pot (size of a crock pot) was heated to melt bars of lead at 621F. The leads of copper wire, as well as Gy wire, were dipped in the lead pot. The wire was placed on a rack to cool. While there was some ventilation above the pot, there was splashing, bubbling and vapours present in the air. No protective equipment was provided. Flux Pot containing a brown, sticky substance in gallon pails used to clean copper leads for soldering. The flux contained muriatic acid. When fluxed wire hit the molten lead, the lead would splash up producing fumes with a strong odour. A standing fan was used to disperse fumes, but was not always available since it was shared with others;	Risk of Inhalation of lead molten lead fumes highly likely. Supported by what we know about the industrial process as well as MOL and medical monitoring reports exceeding acceptable lead/urine/blood levels. As well, ventilation was inadequate and process produced splashes and bubbling, increasing the potential for exposure. Also risk of inhalation and skin absorption of acid-based flux. **MOL:03/26/68:** re: lead/tin pots poor housekeeping, pots not cleaned, not provided with clear composition of tinning process. Local "exhaust inadequate and require complete overhaul." **MOL:03/26/68:** following previous report on lead pots. Ventilation inadequate in armature. Orders issued: medical surveillance, lead signage, no eating, drinking smoking, housekeeping, hygiene practices, PPE **MOL:08/04/71:** Follow up of resin explosion to prevent further contamination; Clean up of phenolic
9. Dip tank (4'x4') sunken in floor containing epoxy varnish thinned with toluene and xylene. MEK peroxide was added as an	

Production Process	Chemical Exposure Risk
accelerator. Parts were dipped and drip-dried over the tank, then baked in an oven. This area was full of heavy fumes from the tank and dripping parts as well as oven baking and drying parts. Tank was used to apply varnish to armatures or rotor-type coils in many sizes up to 7 to 8 feet. Due to dripping, varnish accumulated on floors. There was a heavy chemical odour from tank and drying coils. Employees in adjacent areas also exposed to strong fumes. Fans used, dispersing the fumes to other areas of the department as well as other departments. Employee workstations were near the dipping tanks. There was no local exhaust ventilation for the dipping operation;	resin vapourized and condense on structures. Institute adequate measures to avoid skin and inhalation. **MOL:06/7/73:** dermatitis as a result of epoxy impregnated tapes that are soaked in toluene and used in the winding operation. Gloves difficult to perform tasks with. Improved hygiene and latex gloves provided. **MOL:06/26/73:** Test results not reported but epoxy tape is soaked in toluene. Three types of tapes used: FG/epoxy, FG/mica/epoxy, terylene. Company failed to take proper protective measure because it was told by the manufacturer that epoxy was “mild”.
10. Baking Oven used for dipping was not properly ventilated. It was 8’-10’ in size. Employees could see and smell smoke. Oven heated by electric heaters that forced air down the coils. Fumes were very heavy, consisting of: varnishes, lead, flux, and thermal decomposition by-products from the baking process. Employees experienced heavy solvent odours often reporting symptoms of eyes, nose, and throat irritations;	**MOL:06/19/74:** High exposure to resin while coating stator with resin using a hose. Worker was soaked in epoxy resin. High solvent and epoxy exposure. “”…company has recognized the hazard involved in this method… and taken steps to discontinue the operation. No orders issued. **MOL: 11/24/76:** Investigate asbestos exposures in armature dept.—workers using band saws to cut asbestos without local exhaust; ventilation should not allow fibres to re-enter work area. Air sampling suggested. Order issued for adequate ventilation.
11. Taping Machines (see MOL report) 5 machines used with 5 or 6 employees assigned. Reports describe heavy fibres in air like a “snow storm.” Process involved the use of Mica-Mat, Fibreglass, and Kapton tape. All production items were taped here. Process generated heavy fibres. Employees could not wear gloves due to fine nature of the work, hence had direct skin contact with treated tapes. Alcohol in 5-gallon pails used to moisten tapes. The alcohols consisted of isopropyl, MEK, Xylene, toluene, causing skin to go white, as well as cause burns and skin rashes. Machines were cleaned with solvents once per week with alcohol. Employees would get covered in glue and use MEK to clean it off with vigorous scrubbing. When	Risk of inhalation and skin absorption of epoxy resin, MEK peroxide was very likely given the amounts and surface areas of covered material and temperatures of oven. Thermal decomposition by-products. Reports of heavy fumes and odours from the dip tank and oven baking operation. There was no local exhaust ventilation. Risk of inhalation and absorption of resin fumes, lead, fluxes and thermal decomposition by-products is highly likely given the risk factors and observations of heavy fumes documented in this area. Risk of inhalation of insulation fibres highly likely during this operation given observation about visible fibre dust containing mica, fibreglass, and Kapton tape dusts. This is confirmed by MOL reports.

Production Process	Chemical Exposure Risk
working on diesel components, workers dipped their hands in alcohol continuously to position insulation, which led to many cases of dermatitis. Workers reported skin peeling off in sheets when showering at home due to solvent exposure;	Inhalation and absorption of treatments for tapes as well as several solvents handled bare handed. These included Isopropyl alcohol, MEK, xylene, toluene. Use of MEK to clean glue off hands. Exposures confirmed by the incidence of dermatitis and other symptoms.
12. Stator coil set up and wrapper: TCE-1300 glue used in this process had a very heavy odour. It was applied by brush and MEK was used to remove and clean up;	Risk of inhalation and skin absorption of ingredients in both TCE 1300 glue and MEK.
13. Oven (5'x6') used to heat coils prior to moving to die press. The 761, Gys and 581 epoxies were baked in oven to make slots solid. Workers often heat their food in the ovens and ate at workstations because of distance to cafeteria and limited seating;	Risk of exposure to epoxies through inhalation and absorption highly likely. Ingestion also possible given eating at workstations.
14. Pole face bar press. Solid piece of copper insulated with layers of tape, e.g. hydro tape, shrink Mylar, terrylene, tedlar tape, permfil tape, all done by hand. Varnish also used for adhesive (an epoxy resin) brushed on as a very sticky paste. A heated press heated both the copper wire and epoxy resins to cure tape on to the wire. There was no local exhaust. MEK was used to clean presses and remove epoxy brown varnishes. Rags dipped in MEK used to wipe down presses while still hot, thus emitting heavy fumes. "Free Coat" spray was applied to the press to act as a non-stick, which contained MEK. Employees ate and smoked at their workstations. Fibres were significant at the mezzanine level. The air borne fibres and fumes were dispersed to other areas of the building as well.	Risk of inhalation of tape fibres as well as their chemical treatments. Also reports of heavy dust accumulation at mezzanine level would support this assessment. Also risk of inhalation of epoxy resins and thermal decomposition products. Inhalation and skin absorption of MEK highly likely given use for cleaning hands and arms. **JHSC: 1/15/80** re: smoke Grievance filed on matter of enclosure of upper gallery and method of payment when fumes force workers to evacuate area. Although several corrections made, problem still there. Situation under investigation for long time (first brought to attention 10/79).
Armature Downstairs (1960s) 1. A substation consisting of 2-3 transformers were located in this area, used by maintenance and fenced off from the rest of armature department. It included a degreasing tank measuring 16'x4'x6' deep. The tank was half in, and half above, ground. It contained #10000 Royalene (TCE). This was a vapour degreaser operation heated to 200F.	Risk of inhalation and skin absorption of trichloroethylene exposures was high given: proximity to the chemical, its form in high vapour state from being heated, direct handling, lack of local exhaust ventilation, and worker observation and experience of health symptoms of exposure.

Production Process	Chemical Exposure Risk
Parts were lowered in a basket containing copper and steel components by an overhead hoist. The degreasing process was monitored for 10-15 minutes. Vapour was very strong with workers stating that it "cleared their sinuses". There was no effective local exhaust ventilation. A water tank of the same size was heated with an exhaust over the top. Brazed copper parts from other operations were dipped into this tank for rinsing;	
2. There was a copper storage area where workers wearing cotton gloves picked up copper wire on reels to be made into coils. Some wire was insulated with asbestos from the carding operations;	Potential exposure to asbestos dependent on condition of asbestos laden insulation and whether this was stripped.
3. Copper lathe machine formed copper wire into a flat plate 2"x1/2" thick;	
4. Coil winding lathes operated on a 2-3-shift basis. This was a dry operation. Copper wire was fed into a lathe, which tensioned the wire and created coils. Mica or fibreglass and asbestos tape were applied automatically creating air borne fibre visible in the atmosphere. If the wire came from wire and cable, it was likely asbestos. There was no local exhaust or PPE provided. Motorized sweepers cleaned the main aisle. Workers swept other areas. Dust accumulation on all surfaces and airborne fibres were visible in sunlight. No change rooms were provided and work clothes were brought home. Workers complained about itching and dermatitis. Employer provided SBS 30 and PLY-gel to relieve itching as well as time for these to be applied;	Risk of inhalation of copper dust as well as dusts consisting of mica, asbestos and fibreglass. In the latter case, the winding machine applying the insulation tapes did generate fibres by abrading the insulation as it was being applied. Workers reports of high fibre in the workplace atmosphere that was clearly visible. Risk of asbestos more likely if wire came from wire and cable department. Note that there was no local exhaust ventilation, nor PPE. Dust accumulation, clear sign that the atmosphere was laden with fibres -- as well as workers' symptoms of dermatitis and itching. Latter is confirmed by the employer's attempt to address the adverse health effect.
5. Tin Pot operations/stripper flux. Tin/lead mixture (bees wax added as release agent) heated to 449F. Wire was mechanically stripped of insulation. Flux made of rosin and alcohol applied to clean copper in preparation of tinning. Significant amounts of vapour and fumes detected by those working on	High risk of inhalation and skin absorption of tin and lead fumes from heated molten pots as well as the alcohol based resin, given that the pots were open and workers handled materials directly without effective local exhaust ventilation and respiratory protection. "Sap-like" odours are also a sign that workers were exposed to these fumes.

Production Process	Chemical Exposure Risk
lathes adjacent to the pot operation (which produced sap-like fumes). Odours were heavy from tin/flux. Ventilation system inadequate, despite roof exhaust system. Molten tin was made of 60/40 solder lead/tin. Workers manually fed pots with bars of lead and tin. Asbestos gloves were worn (brand name "Castor");	Risk of inhalation of asbestos fibre highly likely given the generation of asbestos dust during the spreader operation.
6. Spreader: (used with high voltage coils) Machine spread the coils into the shape required for insertion in stator/rotor. The spreading operation generated and dispersed asbestos fibres;	Inhalation of mica dust and inhalation and absorption of fumes from 'black varnish' as well as direct handling of this material. Also inhalation and absorption of TCE while direct handling and clean skin with this chemical. This is confirmed by adverse health effects on skin. The reported accumulation of black varnish, mica dust and talc indicates that workers highly exposed given reports of heavy fumes, volume of production and number of workers employed in the operation.
7. Coil taping area: (30 workers per shift on 3 shifts) Coils were placed in clamps and lead taped with mica tape, then voltage applied to determine amount of tape required. Each round of taping required the application of black varnish (45 gallon drums). Required the application of 9 layers of tape and varnish. Fibreglass cord use to tighten coils back into position. Coils were then air-dried. Gloves not worn because detailed movements required. Consequently workers dipped their hands in 1500 (TCE) thinner to facilitate tightening of cord. Hands often broke out in blisters and dry skin. The work area was characterized by the accumulation of black varnish, mica dust, and talc and considered to be 'one of the dirtiest jobs' in the plant. Workers ate lunch at workstations with windows opened or fans provided in summer. Area filled with heavy fumes and vapours due to large number of workers and large production runs;	Risk of inhalation of asphalt fumes (likely containing TCE) was highly likely. Skin absorption risk, given direct handling of the coated parts. Also risks of inhalation of both glyptol paint fumes and dust from insulation tapes containing graphite and asbestos (which was in a friable state). Confirmation of exposure from workers' adverse health symptoms. ***NOTE: See also Building #5 report regarding compounding "tanks".**
8. Two asphalt VPI compound tanks measuring 25'deep x 10' diameter and 12' deep x 8' diameter. This was a vacuum pressure impregnation process to coat coils, et al. One operator/shift and two to fill and empty. Tank first filled with asphalt, then coils to be coated placed on trays and heated in tank for three 24-hour periods to allow asphalt to harden the mica and fit to size. One tank running	

Production Process	Chemical Exposure Risk
continuously. Baked coils and cardboard separators removed by hand. Paper dust masks were worn. Asbestos tape use to tape the leads came in a 1" wide reel with loose fibres secured with graphite tape. The remaining wire was painted with red glyptol paint. Exposure to resins became worse over time with workers experiencing burning sore throats. Fumes heaviest when lids were opened;	
9. Test area: Process involved high potential testing of 30 to 40 thousand volts. For large coils, test took 60 tests. Ozone was emitted in process, burning workers' noses and sinuses. Ozone odours were detected at the upper level as well;	Risk of inhalation of ozone gas generated by application of high voltages was very likely given workers' experience of odours (even in the upper level) and adverse health symptoms. Ozone is considered a lung carcinogen.
10. Assembly winders: (also conducted in buildings 8 and 10) Process involved 20 to 30 workers handling asphalt coated wire to be set up in the stators. Coils first placed into slots in stator then held in place with asbestos wedges. Varnish placed in each slot (1592 asphalt varnish), which held the asbestos intact. Additional wedges of leathered cardboard and wood used to secure coils in place. Varnished fibreglass cord further secured everything in place. Coils were connected individually, and then soldered in place with rosin core solder by acetylene/ oxygen torch. There was no local exhaust ventilation. Coil leads were insulated with a fibreglass tape also coated with 1592 asphalt varnish. This process was repeated 10-15 times per pair of coil leads. Workers were covered in black asphalt varnish; some wore safety glasses;	High risk of inhalation of asphalt fumes as well as TCE used to thin asphalt. High risk of skin absorption of asphalt given the amount of direct handling of coated materials. High risk of inhalation of asbestos and fibreglass dust. High risk of inhalation of solder fumes and thermal decomposition by-products. These exposures would be intense given the volume of production and the repetitiveness of the process and the fact that there was no local exhaust ventilation and little ppe.
Note: General environment can be characterized as similar to a road tarring operation with a heavy smell of tar and blue haze. There was no local exhaust ventilation and little, if any, PPE. Work practices included using compressed air to clean dust off surfaces and solvents to clean their bodies. Smoking and eating at workstations were permitted throughout the department. The other important	Environmental conditions are supportive indications that high exposures were very likely with weak exposure controls to protect workers from these toxic chemicals. These conditions were aggravated by the piecework system that was in place until 1988.

Production Process	Chemical Exposure Risk
aspect of work at GE was the institution of the piece rate system, which tended to exacerbate toxic exposure;	
11. Overhead crane operation: Armatures and other parts, were transported from one end of the building to another by mobile and overhead cranes driven by operators in wire mesh cabs measuring 5'x5'. Hitchers worked with crane operators, guiding them from the ground and attaching and detaching parts to be moved, dipped, etc. Overhead cranes were not enclosed and the operator was subject to large amounts of fumes and vapours from the degreasing tanks containing heated TCE as well as the resins fumes from the VPI tanks and baking ovens. This included asphalt, epoxy resins and degreasers. Observers indicate that the crane cab was engulfed in clouds of smoke and fumes. The operator would take parts in and out of the dipping and baking cycle 3 to 4 times or more daily, ranging in duration from 5 minutes to hours depending on the process. The operator hitchers were also at significant exposure risk in directing the crane operator and leaning over tanks and ovens to hook and unhook parts and monitor the process. Both operators had no protective equipment and there was no local exhaust ventilation. According to observations of other employees, the crane cab and operator would be engulfed in blue smoke. Also observed were large amount of resin dust on crane cab surfaces;	Crane operators were subject to rather high risks of inhaling resin fumes, degreasers and various dusts containing asbestos, fibreglass, and mica. Fumes would also include thermal decomposition by-products resulting from heating and baking resins and curing agents. Hitchers too were subject to high risks of inhaling fumes, often bending over tanks to hook and unhook products being transported.
12. Assembly Winders (Multi Circuit Field Armatures MCF) tasks included securing copper wire to the armature 1' to 5' in length. This involved inserting 3" to 4" sheets of varnished asbestos (wedges) in the slots of the stator as well as sheets of Mica and varnish. Epon glass wedges were also used;	Risk of inhalation of mica and asbestos dust from abraided wedges being inserted into slots. This would also include absorption of resins from directly handling these coated products.
13. Banding Process required the use of a banding machine located near the magnetic frame department. Here the machine would apply	Risk of exposure to fibreglass breakoff and tape resins. Inhalation of fibres and resin fumes and/or by products.

Production Process	Chemical Exposure Risk
a varnished fibreglass tape called Resi-Glass cord;	Risk of inhalation of welding fumes including thermal decomposition by-products from welding resins.
14. Welding area: TIG welding and brazing was mainly used to attach leads to the insulated bars of the commutators riser. This usually involved copper-to-copper welding with no filler. It also involved welding resins on the wires. This operation generated copper and thermal decomposition by-products from burning resins. These operations took 3-4 days with 2-4 welders. There was no local exhaust ventilation and no proper respiratory equipment. Silphos was also used to solder leads. Fumes were dense and rose to the mezzanine level. This was a lengthy process and produced a heavy accumulation of fumes and dusts throughout the building;	Risk of inhalation of fumes from soldering silphos, a silver-based solder. These fumes were heavy and permeated other parts of the building such as the upper level.
15. Assembly winders MD-CD: Same as MCF. Leads cut by lathe, dipped in tin pot heated at 500-600c. Hoisted by crane to the tin pot for 10 to 15 minutes. Wiped down with TCE coated rags manually and then taken for cutting, smoothing and sanding. Part was then placed in a walk-in oven, dipped in 9700 Isonel, dipped, baked and cooled 2 to 3 times. Fumes were heavy and would irritate eyes, nose and throat. Uncured resin would react in the 2nd dip and produce a chemical reaction that was stronger. The trapped uncured resins would be released when cooled and or grinded;	High risk of inhalation and absorption of tin and lead fumes. Fumes were quite dense and workers directly handled the coated part with bare hands. Also, inhalation of metal and resin dusts from sanding and grinding excess resins in addition to inhalation of uncured resins trapped in materials released when cooled.
16. Assembly Winders (turbine rotors): Insulation-blocks of mica and fibreglass and/or asbestos inserted into the slots and repeated several time between high potential testing. The large steel ring was heated to shrink into the rotor with wooden blocks continually sanded to create a proper fit. Finally a piece of insulation was added with a steel wedge;	Risk of inhalation of mica, fibreglass and asbestos when inserting these blocks into slots.
17. Assembly winders (Induction Bar Rotors): This process involved bare copper wire and mica-mat tape lined with Mylar or Nomex. Liner is then dipped in Isonel varnish. Additional	Risk of inhalation of dusts and resin fumes from Mylar, Nomex and isonel varnish high. Risk of inhalation of asbestos dust from paper. Risk of inhalation of TIG welding and Sylphs solder. Inhalation of resin fumes and thermal decomposition by-products from baking resins several times per cycle.

Production Process	Chemical Exposure Risk
insulation provided by asbestos paper varnished (with #1592) between bars 36' wide. Connections TIG welded with Sylphs. All coils tied with resi-glass cord. Product tested, banded, and cure-baked. The process of dipping, baking etc. repeated 2-3 times.	**JHSC: 2/12/80 Re: #3 oven ventilation system:** Padlock to ensure vent remains open not properly installed. Switch can be knocked off with padlock in place. Become obvious that careful monitoring of requested repairs necessary to ensure proper compliance.
Note: the above process involved close and intricate work with direct contact with materials and chemical processes including asbestos and chemical reactions associated with resin coating, curing, and welding etc.;	
18. Ovens: typical oven was 15' deep 10' high and 10' door, heated to 160c. Workers walked in and out with parts and would be exposed to high temperatures and intense fumes. Doors would be opened quite often because of the piece rate operation. Odours were like burnt diesel fumes or varnish. Ventilation was inadequate;	Risk of inhalation of resin fumes and thermal decomposition by-products in and outside of the ovens. These would be quite intense in the ovens where workers were in the oven itself. Ventilation was not adequate to control exposures. **MOL: 10/04/82:** Investigation of heavy fumes and orders from curing oven. Report suggests odors may be due to cresol formaldehyde, hexaldehyde, acetaldehyde, propeanaldehyde, and phenol.
19. Portable ovens; (in buildings 8 and 10 also) Ovens were 20'x20'x15' equipped with Calrod heaters. Products were covered in an asbestos cloth that was greasy to the touch. Workers handled this cloth intensely, manipulating it repeatedly, e.g., by removing it and dropping it from heights. Workers came out covered in fibres, which were visible in the air;	**MOL: 10/25/82:** follow up on curing oven. Workers complaining of irritation, odors, and nausea. Leak detected. Employer concludes no hazard after testing. However, inspector notes—fumes contain a large variety of thermal decomposition products that at low concentrations can be irritants; exhaust system is likely compromised by roof exhaust and overloading of oven. No orders issued, just advice: don't overload oven and enclose upper end.
20. Armature dip in Isonel 9700: Armatures dipped in tank 7'x7' containing 9700 Signal and toluene thinner. The Armature was manually hosed with varnish. Armature rotated as it was covered by varnish a section at a time. Worker repeatedly added toluene thinner to the Isonel 5 gallon pail. There was approximately 150-180 gallon of Isonel and about 20 gallons of toluene in the mix. This process produced heavy fumes that smelled like diesel. Workers experienced burning eyes and upper respiratory irritation. Varnish applied manually, then brush used to remove excess. This took 8 hours to complete. Armature moved to baking oven where it drip-dried while rotating as it baked to cure.	High risk of inhalation of resin fumes as well as asbestos dust from handling the oven blanket, which was fraying and handled continuously. High risk of inhalation of Isonel fumes and toluene, handled directly and in close proximity to the dipping operation. Large volume of chemicals contributed to a heavy exposure over a long period of time. Resin and toluene were used in large quantities and handled manually. Risk of inhalation of asbestos fibre from cutting asbestos blankets to size and manipulating over coated and heated parts. Process took a great deal of time and was repeated several times per cycle resulting in a long duration of exposure. No local exhaust and high fume concentration confirmed by 1982 MOL investigation.

Production Process	Chemical Exposure Risk
After this, an asbestos blanket covered the armature. This was cut to size and put in place by an overhead crane and manipulated by the crane operator and worker. This was a high fibre operation and the worker directly handled and manipulated the asbestos blanket. Process also monitored by operator who was required to go into the oven to read/ record temperatures. Exposures to high heat (160c) as well as asbestos fibres. Process repeated 2-3 times. See 1982 MOL report regarding trapped fumes. No local exhaust ventilation;	Risk exposures during filling and cleaning. Exposure to both resin and solvents when tank door opened. After tank is drained for cleaning often had to grind out dried spots of varnish thus exposed to grinding dust as well as any fumes created by friction heat)
21. Storage Tanks: Tin, varnish, Isonel. Three-storey storage tank for asphalt;	
22. Mica tape production took place in a room 30'x60'x30' where flaked mica particles were applied to a tape coated in warmed varnish. Mica was thrown into a hopper and traveled up and over into a shaker that deposited mica particles onto the varnished sticky tape that captured the flakes. As machine ran, mica black varnish was applied onto the tape (asphalt tar varnish). This was heated to keep it soft and sticky. Large amounts of varnish on floor and dust from mica. Tape rolls cut with a slitter machine. An 8x4' toluene tank used to clean the slitter blades and worker's hands. Compressed air used to blow dust from machines and clothes;	Risk of inhalation of mica dust and fumes from black varnish and toluene was high given the open processing of flakes and varnish coated tapes. Risk of skin absorption of varnish as well as toluene high given extent that varnish got on workers' skin and use of toluene to clean it off. The volume of waste varnish accumulation would confirm the high risk of exposure from several routes of entry.
23. Hydro Poles operation: To secure copper wire to poles, insulated wires were attached to steel frames then varnished and baked. Workers cleaned poles with rags dipped in toluene and no gloves for about 30 minutes for a small item. Toluene vapour was overwhelming. Pole then painted with black varnish/ shellac alcohol based. Mica was applied, heated and painted with shellac and baked 3 times for 8 hours. Workers ground off excess cured resin generating lots of dust. No local exhaust ventilation during this because ovens shut off;	Risk of inhalation and absorption of varnish fumes and toluene as a result of direct handling; worker reports of heavy concentration of fumes. Risk of inhalation of mica dusts as well as cured resin dust from grinding excess resin from coated parts. Lack of local exhaust ventilation elevated risk of significant exposures. High risk of inhalation of TCE fumes, copper dust, and solder residues given the volume of materials, direct handling, and lack of exposure controls for long periods of time. Exposures confirmed by reported acute adverse health effects by workers.
	JHSC: 5/20/80 re: armature stacks Recently installed exhaust stacks creating heavy smoke and acrid fumes in whole east of plant area

Production Process	Chemical Exposure Risk
Armature Department: 1960-1980s:	
24. Copper Storage Area: Tasks carried out included a TCE degreasing area and grinding excessive copper. No local exhaust ventilation. Generated a great deal of copper dust and residues of solder for 3-8 hours/shift. The TCE operation involved bathing parts in TCE for an hour, and then bathing in water. This produced a violent chemical reaction of smoke, producing rashes and irritations of eyes, nose and throat;	including inside bldgs. now that warm weather is here. **JHSC: 3/23/82 re: fumes -** Polyurethane tent used to cover area where toluene thinners used to clean coils. Work refusal because of fumes. Tent to be used temporarily but the special job is done and tent still in use. Tent is not vented, also a fire hazard with toluene fumes.
25. Assembly winders: Workers in this area prepared and attached large copper leads for large DC and AC stators. The brazing produced thick blue smoke, affecting crane operator as well. Workers reported burning resins of the leads. In late 1980s smoke hogs were installed, but not viewed as effective;	High risk of inhalation of brazing fumes as well as resin fumes, intense enough to affect the crane operator. These were large leads and brazing and resulting fumes were substantial.
26. Banding Lathe: Resi-glass applied to armatures producing fumes from heating insulated parts, resins and other thinners. Armatures then dipped in Isonel for 10-15 minutes and lifted and drained over tank for ½ hour, producing heavy fumes and vapours;	High risk of inhalation of resin fumes and Isonel fumes from the banding and dipping process.
27. VPI Tanks: Two tanks installed in 1967-68 plus others added latter. Large VPI added in 1990 (10' partly underground). Small tanks 100''x116"x 152" deep. Materials heated include: catalyzed epoxy 74023, Tributyl styrene thinner, and resin M6860. Reports of rashes from thinners and resins. Tanks removed in 1994-95;	High risk of both inhalation and dermal exposures associated with VPI tanks. Workers throughout the plant complained of fumes from these tanks.
28. VPI Epoxy resin 6860 8-hr. dipping cycles went on 24/7. When lid raised heavy fumes emitted with adverse effects felt within 10-15 minute of lifting or placing armature in or out of tank. Tank operators used squeegees to remove excess resin when in oven and dripping over tank. Other activities included grinding excess cured epoxy resin. Leads were also ground and brazed. These activities generated heavy fumes from resins, and copper and resin dusts;	VPI dipping and curing operation involved extensive inhalation of resin fumes and thermal decomposition by-products from dipping and oven curing which would go on extensively in repeated cycles. Inhalation of resin and copper dusts from grinding excess resins after baking. Risk of both inhalation and dermal exposure to resin fumes and decomposition by-products. **MOL:06/24/83:** Lab test by MOL re: Workers concern about hazards from thermal decomposition by products from burning urea formaldehyde foams. Test indicated the following by-products: p-dioxane,

Production Process	Chemical Exposure Risk
29. Small VPI tanks involved dipping small parts in VPI tank resin for 1½ hours, generating resin fumes which would be drawn back into the room when doors opened. Oven baked at 160°C for 8 hours;	vinyl chloride, 2-chlorethanol, cyclopentanone, and isocyanates found.
30. Isonel 51 tank used to coat coil with insulating varnish. Parts were dipped into tank until bubbles stopped. Varnish thinned with xylene and toluene. Then lifted and left to drain for ½ hour which would release vapours. Parts then placed in an oven at 160°C for 4-8 hours. After cooling, the dipping process was repeated. Since the parts were still warm from the first dip, the second dip would produce more vapour and heat. Leads were ground to remove excess resin creating lots of dust in addition to fumes. See JHSC Minutes re: an inspection in this regard;	**MOL:06/02/87:** Investigation of excessive emissions from curing oven. GE epoxy resin GE74023 covered baffle. Excessive amount of epoxy on baffle suspected as source of fumes affecting workers and residents. MSDS no established TLV, but indicates that toxic gases may be generated. Stop work order issued until adequate precautions developed and instituted. High risk of inhalation of resin fumes and thermal decomposition by-products during the dipping and baking operation in the Isonel coating process. Inhalation of resin and copper dusts from grinding operations on leads.
31. Xylene tank: During the 70s tank (32'x12'x8') used to clean resin off bare hands. Sometimes soaked hands for 5-10 minutes. Produced heavy vapours. No exhaust ventilation;	Direct dermal exposure to Xylene in "washing" of hands as well as inhalation of xylene vapours without local exhaust ventilation. Risk of inhalation of various sanding dusts highly likely.
32. Sin-Bin: A sanding area that produced and accumulated great deal of dust. No exhaust ventilation;	Risk of inhalation of epoxy fumes from coatings and paint.
33. Coil forming: Coil cut, made hollow and then epoxied, painted and heated. Production of vapours from epoxy and paint;	Risk of inhalation of epoxy fumes.
34. Coil manufacturing (Bruce Generating) Hydro coil bar forming. Coil was formed, then epoxied and heated. Very sticky;	
35. Fridge: (Epoxy storage facility) 30x40x20'. Epoxy odour detected, staff could stay in there for a long period;	Risk of inhalation of Nomex insulation, solder fumes.
Armature 1980s to 2005:	
1. Coil fabrication: Produced coil for armature. Involved winding enamel wire, tying (armature) legs with string. Then stripped and tinned upstairs. Nomex placed in slots, leads soldered, then brazed with rosin cored solder. Emitted fumes during the soldering operation.	

Production Process	Chemical Exposure Risk
Product tied with resi-glass, banded, and shipped to oven;	
2. Ovens were at 160°C measuring 6'x8'. Parts carted in and out, pot tested and then process repeated 2-3 times;	
3. Crane cycle involved 3 cycles at 6 hours per cycle;	
Brazing Operations: Extensive brazing was carried out in this department. Armature downstairs torch brazed copper segments with silver solder then power sanded. White paste flux fumes from solder and flux. Silphos brazing rods used containing cadmium Oxyacetylene and natural gas. VPI, degreaser TCE, and curing oven.	
4. Excitor Process for inserting coils in stators: 1. Banding lathe (see #26 above); 2. Punch press to flatten copper, blank out corners, press flat, and push together, then braze corners, clean with water; this could take two weeks with copper dust all over; copper strips used silphos solder, air grinding generating copper and silphos dust. Washed with MEK, acetone wiped by hand with rags (workers report being overcome by solvent fumes); insulation could involve asbestos, quinogo, quintax, Nomex; cut to size with shears, slitter, use rectifier to bond everything at 135°C in press, cool to 40°C and clean coil. Insulation of pole with Mica M5680 epoxy on winding lathe. Rotor Pole 5105 red epoxy to pole with insulation using Mica epon glass, paint with 5105 paint then red epoxy between each layer; bake at 160°C for 8 hours; (warming up 5105 paint produces fumes); apply 5142 epoxy twice. Clean up with Toluene 1500. Workers ate at workstation;	Risk of inhalation and absorption of copper dusts, silphos solder, MEK, acetone and toluene. Risk of inhalation of asbestos and other insulating materials including mica. **JHSC: 5/20/80 Re: toluene incident** Employee working for 2 hrs. on armature bars using 1500 thinners in large amounts resulted in loss of consciousness and taken to Peterborough Health Centre (toluene recently substituted for acetone and workers had not been educated on use of chemical and heath risks). Risk of inhalation of epoxy fumes, toluene, Isonel, thermal decomposition by-products.
5. Isonel Tank: Parts were dipped for 10 minutes in Isonel then excess brushed manually. Low voltage coils prepped and dipped into VPI tank twice. Resin and flux then soldered and taped with fibreglass tape. Parts dipped again and placed in oven. After baking and cooling, excess cured resin air-chiselled off, leads burned by brazing, generating fumes and dust;	Risk of inhalation of epoxy fumes and thermal decomposition by-products generated by heating and curing. **JHSC: 10/27/81: Pole winding** A number of new employees have since moved from this work area because of epoxy rash. In 1/12/82 report it states "rashes increasing."

Production Process	Chemical Exposure Risk
6. Winding lathe: Rotor Pole #5105 red epoxy pieced poles insulated with coil; wet winding process; reel wire up and insulate with Mica. Epon glass paint with 5105 to bond first layer, paint all other layers with red epoxy, then bake in oven at 160°C for 8 hours; 5105 warmed to 60°C then back to varnish. Heavy fumes generated by Isonel at 160°C;	**JHSC: 12/8/81: rotor pole area** "Area very smoky and dusty. Request check for ventilation."
7. Shear station: no exhaust ventilation. Materials sheared to size to fill slots. There were two machines running producing lots of airborne fibres. There was no local exhaust ventilation. Air from open window would disperse fibres further.	See above
Note: The hydro poles referred to in this text is a part of the armature and not to be confused with wooden hydro poles found on the roadside.	Risk of inhalation of airborne fibres generated from cutting operation.

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BUILDING: #8 **DEPARTMENT: MACHINE SHOP**

General Description
South West Area
South East Area
North West Area
North East Area
Gallery North and South
Work Processes/Machines
Balancing Machine/Welding and Brazing
Phosgene Gas
Tread Cutting in 8A
Degreasers
MWF (Metal Working Fluids)
Babbitt Fitting (Midway in South End of Building)
Machining Process (Concentrated in South End of the Building)
Green Layout Paint
Grinding and De-burring Operations
Curing and Annealing Ovens

Known chemicals used or produced:

Epoxy Resins
Formation of new chemicals through decomposition or mixing (phosgene, BPA, formaldehyde)
Metal Dusts (Brass, Bronze, Stainless Steel, Steel, Nickel, Chromium, Cadmium, Zinc)
MWFs (Steel Kut, TrimSol, Cimcool, Dasco Tap, Benzene including additives: Arsenic
Chlorine, Sulphur, Mineral Oils)
Solvents (Toluene, Xylene, Acetone, MEK)
Welding Flux (Tin, Lead)
Brazing

February 5, 2017

Building: #8 **Department: Machine Shop Production**

Process **Chemical Exposure Risk**

General Description: This department was primarily engaged in the production of parts for very large motors. This was a high volume department. There were approximately 250 employees in the machine shop. Workers carried out major machining processes including cutting, boring, milling, grinding, polishing and sanding. These various processes produced substantial amounts of fumes, dusts, vapours, mists and gases.

Parts production involved the use of a large number of metal machines (approximately 35 in the south end and approximately 20 in the north end). With this large number of machining operations going on there were extremely large amounts of MWFs which included: 'Steel Kut', 'Trimsol', 'Cimcool', Dasco Tap, and several other water soluble fluids containing arsenic as a biocide. Most operations also applied solvent degreasers to clean and prepare metals for machining, welding and finishing. There were 3 degreasing tanks containing various degreasing agents including Royalene (TCE), Toluene, xylene, acetone, and MEK. Tanks were refilled and cleaned manually during slack periods. Large surface areas were hand wiped by employees with rags heavily soaked in toluene, TCE or MEK.

South West Area of the Building:

There were 6 large vertical boring machines, 4 milling machines, several radial drills. This area also included: 2 slot L&S, planer, degreaser power wash, balance machine and welding booth.

South East Area of the Building:

There were 2 horizontal boring machines, one of which was a 25' machine in addition to the large "Red Gilbert," the Kozma machine, four grinding operations and small and large lathes beside the foreman's office. This area also included: a paint booth, clean and grind operation, NC vertical boring mill, radial drill, and three horizontal boring mills.

Workers were exposed to a variety of toxic chemical that could be inhaled, absorbed through skin, and/or ingested. These included various degreasers such as TCE, MWF such as 'Steel Kut', dusts such as asbestos, mica and metals such as copper, tin, cadmium, and chromate.

JHSC: 8/23/83: re: thinners: "Large gluing operation, operators using thinners to get glue off their hands. Recommend using green gloves to prevent contact with glue."

The lack of adequate local exhaust ventilation and PPE certainly aggravated exposure risks.

Inhalation and absorption of MWF as well as heavily used degreasers were in the high-risk category because of shear volume.

Workers are exposed to through inhalation various vapours from degreasing fluids such as TCE, MEK, acetone, xylene as well as phosgene gas when these solvents come in contact with welding operations.

Workers in most machining operations inhale and absorb through the skin, large amounts of MWF. One such cutting oil called 'Steel Kut' is particularly used in large quantities and is responsible for various adverse respiratory and dermal reactions indicating that workers are exposed significantly.

Exposures through inhalation and skin absorption were evidenced by observations from the MOL indicating that workers were soaked with this oil and that respirators would clog during machining. This product contains mineral oil, sulphur and chlorine. The latter two decompose into sulphur dioxide and phosgene. (MOL: Sept 10, 1982 – four operators identified with dermatitis in past 5 years).

MOL: June 25,1990 – report of soldering near furnace hood. Solvents in large covered beakers beside lapping machine.

Production Process

Gallery South/West:

Spindle drills, 2 layout tables, drill, 2 milling machines, 2 Monarch NC machines and horizontal boring mill.

Gallery South/East:

3 engine lathes, NC lathe and shaft grinder.

North West Area of the Building:

Just below the Main Aisle there was a small machining area, 3 horizontal boring mills, a spider and shaft assembly area and a very large open degreasing tank next to the welding operation across the main Aisle. A large degreasing tank was located in the NW corner. This area also included shaft shrinking operation with dry ice, horizontal lathe, large NC lathe, Large Wotan Lathe.

North East:

Large lathe.

Gallery North:

Assembly and shipping.

North East Area of the Building:

There were 5 lathes and 4 NC boring mills, de-burring booth and a paint booth. North of the main aisle, a shaft-balancing machine was located as well as a welding area, a small assembly area, a machining area, a tin-plating area, a paint shop, and a shipping area. The area also contained a large oven used to cure epoxied parts and armatures from the Armature Dept. across the outside driveway.

Balancing Machine/Welding and Brazing:

This process involved balancing of spinning motor parts such as shafts. This required a great deal of brazing by the welders who attached counter weights to the shaft to reduce wobble and friction. The brazing operation produce large amounts of welding fume as well as residues of degreasers and other metal pre-treatments.

Chemical Exposure Risk

Workers are exposed to through inhalation various vapours from degreasing fluids such as TCE, MEK, acetone, xylene as well as phosgene gas when these solvents come in contact with welding operations.

MOL: Dec 6,1982 - Mica dust build-up on floor of lathe machine noted in Internal Responsibility System Cyclical Review.

MOL: Dec 6, 1982 – exhaust ventilation at paint spray booth inadequate air velocity (signs of overspray noted on surrounding area).

Significant risk of inhalation of welding fumes containing residual degreasers and heavy metals.

Production Process	Chemical Exposure Risk
Phosgene Gas: Since the brazing/welding operation was very close to the large open degreasing tank containing TCE, fumes from the tank would come in contact with the welding operation producing a highly toxic gas -- phosgene. This gas is referred to as poison gas.	**JHSC: 11/4/80 re: TCE exposure:** "(Company doctor) feels (worker's) medical problems probably related to close proximity of his work station to Bldg.#8 degreaser (as area) still considered a 'trouble spot' and number of other people have complained of discomfort as well." (Worker currently on layoff).
Tread Cutting in 8A: A major bolt threading operation was conducted in Bldg. #8A referred to as the 'hole in the wall'. During this process 'Steel-Kut' cutting oil consisting of mineral oils mixed with sulphur and chlorine, was sprayed liberally during the thread cutting operation on the lathe. 'Dasco Tap' was used during this thread cutting operation. The bolts to be cut were as large as 3-4" diameter and 12" long.	
Degreasers: This department manufactured various components of motor and generator production. During the process of machining, cutting, milling, grinding, buffing and welding there was a substantial use of degreasers, e.g. 2 tanks of Royalene (TCE) and other degreasers such as acetone, MEK, toluene, and xylene.	See inhalation and absorption of MWF and thermal decomposition by-products.
MWF (Metal Working Fluids): The various machining operation employed the constant and heavy use of MWF. The department used "Steel Kut" MWF, which was the subject of a health impact study during the 1990s because of reported health complaints and adverse effects experienced by the operators and other personnel. Other machining operations would apply large amounts of MWF that would be sprayed on continuously during the machining. Air in the building would be filled with MWF mist and bluish smoke from heating of fluids during machining. Workers' clothing would be saturated with fluid. Dermatitis, skin burns and irritation, irritated eyes, nose and throat were common complaints. After machining, operators used compressed air to clear cuttings and coolant and oils. This was followed	The risk of inhalation of fine dust containing various metal alloys including bronze, brass, stainless steel, mild steel, combined with cutting oil fumes/vapours. **MOL inspector observations, Sept. 29, 1982:** The chlorine and sulphur is bonded to the aliphatic chain in the oil and will decompose at high temperature and produce sulphur dioxide and phosgene gas. **JHSC: 8/24/82 re: cutting oils:** Four workers experiencing skin problems, some more severe than others.

Production Process	Chemical Exposure Risk

by a manual washdown with rags soaked in toluene, and/or TCE.

MWFs: In building 8I, Bay 15 measuring about 30x60x60 feet two Herbert Turret lathes were operated. These were mostly used for cutting thread on brass, bronze, stainless and mild steel. This operation used Steel Kut oil for over 20 years at the plant beginning in the 1960s. This oil is a mineral oil containing sulphur and chlorine. The machines used 4 g per week and are dripped from a pipe on to the work piece. Most of the oil is dissipated by being thrown out by centrifugal force in the form of droplets or mists as well as thermal decomposition on the hot metal chips. Occasionally operators use respirator but when it is soaked with oil it is impossible to breathe through. At times the hot chips will cause the oil to flare up and produce irritating smoke. Operator's shirts and trousers are routinely soaked with oil as well as on operators' faces.

Babbitt Fitting (Midway in South End of Building):

Babbitt fitting was carried out in both buildings #8 and #10. This operation involved fitters sanding and smoothing imperfections in the babbitt bearings with bare hands in a trough of toluene. This process would take several hours depending on the size of the bearing (See building #10 profile).

Tin Plating (South of Paint Booth in North East Section of Building):

This department carried out tin-plating in the NE section of the building. The plating process involved cyanide acid and tin/lead salts. This process produced significant amounts of vapours as a result of the electroplating process. These vapour contained cyanide salts and tin/lead constituents.

Machining of Commutators (Concentrated in South End of the Building):

Some of the machining involved the application of MWF while others would be conducted 'dry.' There was no local exhaust ventilation. Machining of Commutators involved the generation of copper, asbestos and mica dusts. Retirees described the area

Babbitt fitters experienced major exposures both through skin absorption and inhalation. Ingestion was also a factor because workers ate and smoked at their workstations.

Working with bare hands in a slurry containing lead alloy and toluene would involved major absorption of both lead alloy and toluene, particularly since the toluene would defat the skin and make absorption more likely.

As well, since the toluene volatilizes, vapour consisting of benzene-contaminated toluene would be inhaled readily.

(MOL: May 23,1986 – air testing identified significant lead exposure which company attributed to use of compressed air. Practice terminated. Urine levels below alert level).

The tinning operation would generate heavy metal and cyanide acid vapours would be inhaled and absorbed through skin contact during mixing and dipping and retrieving tinned parts.

Significant risk of copper dust inhalation dust as well as absorption through the skin. Since workers ate

Production Process

as covered with waste particles/dust six inches deep. Workers' clothing and skin would be encased in metal dusts. This dust consisted of fine copper and silica particulate.

Green Layout Paint:

Green Layout Paint containing lead and solvents was used to outline cuts and borings to be made on steel plates. This paint was applied with naphtha gas, which is highly volatile.

Grinding and De-burring Operations:

All machined and welded parts needed to be de-burred of sharp edges and roughness. These grinding, de-burring, and buffing operations generated large amounts of metal dust that contained residues of MWF, degreasers and other contaminants. The use of Chromac, a cutting and grinding oil was noted.

Curing and Annealing Ovens:

Machining operations required metals to be annealed (heated) prior to machining. As well, large epoxy coated motor parts such as armatures were transported from the armature department to be baked and cured. This generated a great deal of resin decomposition by-products including BPA, formaldehyde, and other additives in the resin mixes.

Chemical Exposure Risk

at their workstations it is highly likely that workers ingested these dusts. Workers' skin and hair were reported to turn green from the oxidation process.

Vapours from applying layout paint are readily inhaled and would be highly concentrated on large surface areas. Since this process was by hand, absorption through the skin would also occur.

JHSC: 8/30/83: re: paint fumes: Test-men in high potential testing threaten work stoppage if painters continue to paint large jobs outside booth. "(Union rep) disregarded notes circulating pump for water exhaust is not working properly."

JHSC: 12/17/84: re: paint fumes: "jobs still being painted outside the booth. This problem existed before the new modern booth installed. However, all that has been accomplished is more material is in the booth and when full, work is painted outside…lots of excuses…but very little is ever resolved."

The risk of inhalation of fine dust containing grit/resin, metal dust contains various metal alloys such as nickel, chromium, cadmium, zinc.

Thermal decomposition by-products would be readily available to be inhaled in this baking and annealing process. This would include vapourized oils during annealing as well as decomposed curing resins in the form of fumes and vapours.

JHSC: 2/21/83: re: V-100 epoxy grout: "Large quantities used for base of a machine. Product has highly toxic fumes. Workers complaining about fumes. Action offered: To notify workers in area next time product is used."

JHSC: 12/16/77 re: diesel exhaust fume incident: While crane operator loading a transport truck, the driver started the diesel engine and "revved" it. Heavy smoke and fumes blanketed crane operator. Shortly afterward he complained of headaches and severe nausea. Next day felt poorly but reported for work and in evening suffered a heart attack and rushed to hospital (doctor couldn't confirm the

Production Process	Chemical Exposure Risk
	cause because he didn't know about his exposure to exhaust and required blood tests weren't done").
	JHSC: 4/27/82 re: pigeon droppings:
	Workers in #8 having problem with pigeon droppings in water fountain and on their lunch tables."
	JHSC: 12/13/82: re: drinking fountains: water tests show pipes leading to drinking fountains in #8 and #10 "rusting away."
	JHSC: 12/13/82: re: Imron Paint: (This is a special for a customer). Warning label is very strict on ventilation and air supply respirators (union rep worried about Isocyanates in paint). Question is how paint got onto the floor without safety unit knowing of hazard?
	JHSC: 5/27/83: re: solder fumes: "Solder fumes from capacitors travel along wall to female bench worker in balcony causing her to feel ill."
	JHSC: 1/22/85: re: hygiene station in rotor area: "Worker has developed a rash and needs the hygiene station. The area hygiene station is not maintained."
	JHSC: 1/22/85 re: eye wash station: "(In paint booth) an eye wash station is needed in this work station."
	JHSC: 12/10/85 re: lead assessment for rotor and bearing booth areas: "Assessment (legal document) recommendations included that workers be provided with proper showering facility. (This was) rejected by company."

BUILDING: #9 **DEPARTMENT: FRACTIONAL MOTORS**

General Description

General Working Conditions

Work Regime

Production Machinery/Processes:

1. **Punch Press Operation**
2. **Die Cast Operation**
3. **Grinding & Cleaning Operation**
4. **Machining Operation**
5. **Winding Operation**
6. **Degreasing**
7. **Asbestos Glove Repair**
8. **Brazing**

Known chemicals used or produced:

Aluminum Alloy
Asbestos fiber and dust
Copper and other metal dusts
Epoxy (Formex)
MEK
Release Agents
TCE (Royalene)
Thermal Decomposition (annealing and curing processes)
Silver solder (30% cadmium)
Silphos (cadmium)

February 5, 2017

Building: #9 **Department: Fractional Motors**

Production Process **Chemical Exposure Risk**

General Description: Fractional Motors produced electric motors that were fractions of a full horsepower motor. The production processes were housed in a low ceiling building attached to the Armature department in Building #7. In fact, workers had to walk through the Armature department to enter Fractional Motors. The ceiling was approximately 16' high and a floor space of about 500'x250'. This is the only department in the plant with a moving assembly line (i.e., small size of product parts).

Work Regime: This was a high production, labour intensive, operation employing approximately 80 to 100 staff on 2-3 shifts with a great deal of overtime on a 24/7 basis. Production was on the piece rate system involving building the various components of induction motors of different sizes. All motor parts were made from scratch— hand wound field coils; machined rotors, armatures, and stators; die casts; punch plating; grinding and cleaning; degreasing; resin coating; baking; welding, soldering and brazing. Two curing ovens (Cosmo and Kozma) were located in the low ceiling building.

Motor parts were assembled from start to finish by employees working on a moving assembly line. "The pace of work was punishing, but this is where you made good money" (Worker).

Production machinery/process included: Two punch presses, three die cast operations, open resin dipping tank, VPI tank, two ovens, open pot degreasing containing MEK and Royalene (TCE) tank, boring machines, keying machines, rotor lathe, and 2 parallel assembly lines.

General Working Conditions: Due to low ceilings and inadequate general and local exhaust ventilation, the building air quality was poor and contaminated with a mixture of very toxic chemicals fumes, vapours and mists generated from punching, machining, casting, resin dipping and baking operations, as well as grit, metal and resin dusts from clean and grind operations. Since production was intense -- in terms of pace of work and volume of materials used -- the Low ceiling in Fractional Motors contributed to the concentration of mist, vapours, and fumes, gases and smoke in the general atmosphere of this operation. This toxic atmosphere was more available at the workers' breathing zone.

Additionally, workers were exposed to the great number of contaminants from the Armature operation. Not only did workers have to walk through Armature to get to their job, but they were also exposed to toxics that migrated from the Armature department.

The work regime in Fractional was intense with everything conditioned by the piece rate system. This meant that workers worked more intensely for long periods thus conditioning the amount of toxins that would be inhaled and metabolized by the body. This was most exhibited on the speed of the production assembly lines; punching operations, and die casts. It meant workers would short cut safe work procedures to maintain pay rates.

JHSC: 2/23/j83: re: Cosmo furnace: "Excess fumes reported in the Cosmo area. Area is poorly exhausted. When Feseco is sprayed on products the area is full of mist." MOL has written directive on problem.

JHSC: 8/23/83: re: Kozmo furnace: "Problem has risen again regarding poor ventilation around 2 furnaces in Fractional. Although management had indicated to Floor Safety members that both units would not be used, this in fact was not so. Both units were in operation the week of this meeting and fumes were very heavy."

A very complex mixture of chemicals was generated from all these operations combined. Most operations were not equipped with local exhaust ventilation and little in the way of protective equipment. This mixture would include exposure to a combination of solvents, resins, MWF, thermal decomposition products, various dusts from grinding operations. These were mostly inhaled but also absorbed by bare

Production Process

atmosphere was highly contaminated. In addition, these operations were labour intensive, e.g. workers handled all aspects of production directly by hand in close proximity with each other. Local exhaust ventilation and personal protective equipment was not provided. Workers ate and smoked at their workstations. Housekeeping was poor.

Specific Processes:

Punch Press Operation: Oil-lubricated and annealed steel sheets were punched at a rapid pace at about 100/minute. This operation produced large amounts of oil mists and vapour.

These punching were then stacked on spindles and pressed together on a 'capton' machine. These "pilings" were then ground and deburred and buffed with hand grinders and buffers, producing large amounts of dusts. A similar process was carried out for the rotors as well;

Die Cast Operation: This was a semi-automatic, aluminum, die-casting operation with molten aluminum alloy (2400°F) producing end shields and end caps. There were three die cast operations, simultaneously producing approximately 1000 per hour. Three die cast operators worked on piece-rate for 3 shifts. These operations created very heavy fumes and vapours from molten aluminum alloys and mold/die release agents. Operators and those working near by developed major sinus problems;

Grinding and Cleaning: Castings were then machined, ground and deburred before going into a soap wash and then into heated open degreasing tanks;

Machining Operations: In machining processes, large amounts of MWF were used during the boring, milling, drilling, and keying operations as well as in turning shafts on lathes. These various metal machining operations generated large amounts of metal dusts and mists and vapour from the heated MWF, which also contained biocides containing arsenic. Die casts were machined after coming out of molds. Machining with MWF generated large amounts of coolant and cutting oils would produce

Chemical Exposure Risk

hand handling and ingested because of smoking and eating at the workstation.

This metal punching operation generated large amounts of oil mists and vapours. Given the volume and speed of production this generated a high concentration of oil mists and vapour that would be inhaled and absorbed through the skin.

Since these were deburred by grinding and sanding this operation would produce large amounts of metal dusts that would be inhaled by those directly carrying out the process as well as by-standers given the proximity of other workers.

Molten aluminum vapours and fumes were readily inhaled at this operation. This was a very smoky environment. Reports of sinus problems would confirm the routine exposure to these fumes and vapours.

Inhalation of metal dusts containing residues of release agents. No local exhaust was provided and no respiratory protection worn.

Exposure to MWF: The machining operations produce large amounts of various MWFs that were inhaled and absorbed through the skin. These also contained biocides containing arsenic in addition to the chemical constituents of the oils and coolants and metals. MOL investigation of work refusal in 1976 indicated that a significant amount of overspray from oil mist from grinding machining was having adverse effects on workers using Chromac 2213. Inspector noted this should be corrected because of risk of dermatitis (OHB # 6L-111-7A-74; January 8, 1976). In 1983 an investigation into a worker illness from MWF exposure to Cimcool used in the same grinding process noted in the 1976 refusal investigation. Inspector noted 'tramp oil' in the MWF and small amounts of 'thiol'. Metal chips were blown off with compressed air, which would aerosolize the cutting oils and coolant called Cimcool 5 Star 40. Contaminants included small amounts of oil mist, ethanolamine, formaldehyde that were 0.69mg/m^3 (TLV=5mg/m^3), 0.07ppm (TLV=1ppm) and <2.0 ppm (TLV=3ppm) respectively. These are not insignificant

Production Process

significant amounts of overspray. Excello machines near the shaft grinding area had no local exhaust ventilation. Approximately 800 end plates were machined per day;

Winding Operation: Coils were hand-wound by a battery of two rows of women winding formex coated copper wire into coils that were then cut and shaped and pressed into stators/rotors. After cutting they were first dipped in degreaser MEK and then dipped into the resin tanks (about 100 coils per dip), taken out and allowed to drip dry. The coils were then placed into baking ovens for curing. Fraying asbestos curtains were hung at both ends of the belt-driven oven. After curing, the coils were cleaned, ground, and pressed into the stators/rotors along with insulation containing asbestos/fibreglass. The pressing and tapping of insulation released asbestos and fibreglass fibres into the atmosphere. This release was substantial give the volume of coils and insulation being pressed;

Degreasing: There were 2 large degreasing tanks containing TCE and MEK. Motor components were degreased in vapour degreasers. Degreaser fumes were very heavy and migrated to other areas of the operation.

These above operations produced large amounts of smoke, mists, vapours, and dusts from machining, grinding, degreasing, epoxy dipping and baking in curing ovens. Workers describe the work atmosphere as 'a thick haze of bluish smoke 24/7';

Brazing Operations: Extensive brazing was carried out in this department utilizing silver solder and silphos brazing rods as well as lead solder with white paste flux degreaser TCE, and curing oven;

Spot Welding: The motor shells were spot welded, producing a great amount of weld fumes. Note that this department was pushing out 1000 motors a day.

Chemical Exposure Risk

amounts for Formaldehyde and Ethanolamine since these levels represent 70% and 60% of their respective TLVs. No local exhaust provided. Coolant changed only 3 times a year. (See **MOL/OHB# 1183HMOW; 08/23/1983.**)

In addition to handling the Formex wire coils that contain resins that would be absorbed through the skin, the degreasing process and resin coating exposed workers through inhalation of heavy concentrations of degreaser solvents as well as resin vapours and thermal decomposition by-products from oven baking.

The large degreasing tanks contributed heavily to the inhalation of solvent vapours containing TCE and MEK.

Workers were also exposed to significant amounts of asbestos dust from oven curtains as well as asbestos insulation used in the motors. These were cut and pressed into motors and such action would release fibres into the atmosphere.

JHSC: 12/14/78: asbestos exposure: "On routine check (JB) found asbestos mitts being repaired in large quantities (hundreds per night). Obvious that the woman who repairs mitts is subject to much fibre when handling and cutting."

JHSC: 1/25/79: asbestos exposures: "(Company doctor and Company H&S rep) are supposed to survey use of asbestos in plant. So far we still have a **good deal of it in use and control is, at best, very lax."**

JHSC: 2/23/78: fibrosis diagnosis: "Worker (woman) diagnosed with fibrosis of both lungs. Her doctor says it could be caused by work environment."

JHSC: 4/6/78: fibrosis diagnosis: (Company doctor) visit to investigate area where (woman diagnosed with fibrosis) worked. Safety Committee not informed even though we made the initial request for the consultation. He made a cursory inspection of end shield area then called in several (union) members for meeting. No rep from Safety Committee or shop

Production Process	Chemical Exposure Risk
	steward was present. To date no report on findings or opinion on matter. **JHSC: 5/4/78: fibrosis diagnosis:** "Test results on felt used in work under TLV in both samples, suggesting that felt is 'probably safe'. We feel further investigation is indicated." **JHSC: 2/17/81: failed clean up:** "Hydraulic oil clean-up originally dropped from minutes with understanding everything was to be repaired. Since problem still exists (from '79) checking why this was not completed? Our concern is that is may contain PCSs." **JHSC: 6/30/83: re: Cimcool:** "Work refusal due to cimcool."

BUILDING: #10 **DEPARTMENT: FOUNDRY**

General description
Babbitt production in the Babbitt Shop
Rotor Area
Lapping Process
Garlock Gaskets
Machining and Boring
MWF
Grinding and Deburring
Welding Operation
Painting
Layoff Process
Temporary Oven 1980s
Grinding and chiseling
Testing Process
MOCA in Mining Hoist

Known Chemicals used or produced:

Arsenic
Degreasers (Toluene, Benzene, MEK, TCE)
EMFs
Epoxy Resins (Glyptol, MOCA)
Flux
Lead Paint, Lead Alloy
Metals (Cadmium, Tin, Copper, Nickel, Chromium, Beryllium, Silver, Lead)
MWFs (Steel Kut, Cimcool, Dasko Tap)
Naptha Gas
Ozone
Polyurethane Foams and Adhesives
Release Agents

Building #10, 10A, 10B, 10C

Department: Generator Assembly/Babbitt

Production Process

Chemical Exposure Risk

General description: Building 10 was approximately 800' long and employed over 60 workers on each shift. It housed a major machining, boring, milling, turning, and welding operation as well as assembly and resin curing operations. The building is equipped with 25' and 40' large boring machines as well as smaller boring and milling machines. It also included large drills and lathes. The building had large baking ovens and resin dipping tanks used to resin-coat and cure-bake large armatures that were delivered from the armature department. This was a high production department involving the manufacture of very large motors (some as large as 400 metric tons when finally shipped out of the plant).

General Working Conditions: The work environment was heavily contaminated with a large variety of fumes, smoke, vapours and dusts. In most cases it was not only the operator who was exposed but there was a great deal of by-stander exposure. This was particularly true in welding, Babbitt molding, and resin curing operations. Ventilation was poor and local exhaust ventilation many times was not working, if it was provided.

Many tasks required bare-hand handling of toxics that enhanced risk of exposure. JHSC reports indicate that housekeeping was poor and work practices involved smoking and eating at workstations.

Babbitt production in the Babbitt Shop: Building 10B was used for the manufacture of 'Babbitt' bearings composed of a lead alloy called arsine—88% to 100% lead. Prior to pouring lead into the tinned bearing, one half of the steel bearing is heated in an oven to 220 c. The hot bearing is removed and lowered by crane into a molten metal bath (60% tin/40% lead) for 10 minutes. This is repeated 1 or two times. The melting pot was about 4'-5' in diameter and approximately 4' deep and raised up several feet off the ground. 2'x6" Lead alloy ingots were fed by hand into the molten lead pot. The molten alloy was gravity fed through a chute that directed the molten lead into large cast molds treated with a release agent -'CML' or 'CKL'. This process generated a great deal of smoke containing lead alloy fumes and

General Exposures: Inhalation and absorption (through the skin) of toluene and its constituents (e.g. benzene) was endemic to machining processes. Absorption was further enhanced by toluene's destruction of the skin's protective oil, thus increasing risk exposure. Both types of exposure involved long and close contact with these toxic chemicals, resulting in heavy exposure to these substances.

Inhalation and skin absorption of MWF mists and sprays are continuous throughout the machining process. Machining would involve exposures that could last for hours, daily. Also since the operator's clothing was saturated, the exposure would occur beyond the end of the process. MWF have been rated by several international agencies as carcinogenic.

Inhalation of various metal dust and particles is highly likely given the extent of machining, particularly when machining is conducted without fluids and wetting agents. Added to inhalation and absorption exposures was the risk of ingestion of toxic chemicals as a result of workers smoking and eating at their workstations.

Lead alloy fume exposure: The Babbitt foundry operation involved major inhalation of lead alloy and release agent thermal decomposition products. These were significant because of the large volume of lead alloy used in a molten form where lead fumes would be produced during the melting and pouring operation with operators directly involved. There was also significant standby exposure to workers in adjacent departments not isolated from the Babbitt forming operation.

Exposure to lead was confirmed by the fact that workers would exceed the regulated body burden for lead under the designated substances regulation of lead. E.g. See MOL report on Doug Twist. Company monitoring showed air concentration levels of lead at 0.02 TWAE during tinning and babbitting and urine samples ranging between 0.24 and 0.34 umol/l over a 2-year period. The OELs at the time was 0.15mg/m3 and 0.72umol/l. Are these readings reliable and valid? Were the conditions

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releasing agents. A huge plume of smoke would rise violently when the molten lead contacted the release agent which was so dense that smoke and fumes would migrate to building # 12, adversely affecting workers in the punch press operation. These Babbitt bearings could weigh up to 2 tons with a very large surface area.

After dipping, the surface of the poured metal is torched to prevent hardening. Then lead solder and paste were used to fill in remaining cavities. These coating and pouring operations took an estimated 3.5 to 6 hours.

The babbitts were then machined and dry sanded. The workers would sand scrape and file the bearing in preparation to be fitted onto a shaft and run to allow the bearing to wear in. Until 1986, dusts from sanding babbits were blown off surfaces and clothing with compressed air, dispersing lead dust into the general atmosphere. Joint committee minutes from the 1980s indicate that the ventilation system in the Babbitt shop was not working.

Rotor Area: This was a lead soldering operation that involved 4 workers in hand soldering 0.5" copper bar connectors on to rotors. The fitter heated the copper bars to 235°C causing the applied lead solder to melt and run onto connections. Workers spent about 10 hours a day doing this.

Lapping Process: (Babbitt Fitting Process Carried out in the 'bearing booth' in Building #8 and in #10): After the Babbitts were released from the mold they were machined to size and test run on a shaft followed by a lapping process. The lapping process took about ½ day. This was carried out by a 'fitter' who sanded the inside of the bearing with his bare hands immersed in toluene -- using 400 grit sand paper and 'scotch pad'. A slury of lead alloy and toluene would result.

Garlock Gaskets: Fitters also performed the task of cutting gaskets from 3'x4' sheets of Garlock gasket material. Garlock was an asbestos fibre impregnated rubber material. This was done either manually with a sharp or punched out on the punch press. This

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sampled representative of normal conditions? Did an accredited lab analyze the results? While the air samples do not indicate the TLV standard was exceeded, the results of the urine samples do indicate lead uptake and potential for harm.

Rotor Area Exposures: The MOL originally issued an order to place the Rotor area soldering under the designated lead regulation requiring more stringent hygiene controls. This order was successfully appealed on the grounds that air concentration and urine concentrations were below the OELs. We have no way of determining the validity and reliability of the employer's air and biological monitoring. However, it was the professional opinion of the health and safety inspector that more stringent exposure controls were necessary since there was no local exhaust ventilation and it was noted that compressed air for cleaning was condoned by employer.

Babbitt Fitting exposures: The emersion of bare skin in the bearing trough de-fatted the skin increasing the risk of absorption for both lead and benzene containing toluene. Workers reported getting 'high' while performing this task. It wasn't until the late 1980s that the Ontario lead regulation was applied to this work task, requiring medical surveillance. This process was carried out in the north end of building #10. It was also carried out in a 'bearing booth' in building #8.

The company attributed the relatively high lead air concentrations of between 0.17 and 0.16 mg/m³ in the Babbitt shop to the practice of blowing off lead dust with compressed air. This practice was finally replaced by using a Shop Vac with a HEPA filter. During this period the Ministry of Labour issued orders to place these lead operations under the lead regulation that required more stringent protections. The employer successfully appealed this order. See OHB 86E049MOAR, March 18, 1986.

Garlock Gaskets: The cutting and shaping of gaskets from rolls of Garlock material exposed workers to asbestos fibres. Asbestos was released as the material

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could be an 8-hour/day operation depending on the demand from other departments. The process of cutting and/or stamping out gaskets from the Garlock produced asbestos dust together with other composition material.

Machining and Boring: These operations involved a great deal of MWF including cutting oils, fluids and coolants. The work included milling, machining, boring, metal cutting, metal turning on lathes for shafts, and shaping. These processes involved major use of MWFs, also referred to as cutting and cooling oils. Some are synthetic while others are natural products. Many have toxic additives to prevent spoilage, such as arsenic compounds.

MWF: Metal working fluids were sprayed on continuously during machining with cooling fluids sprayed from a large tank of recycled coolant and operators applying cutting oils manually. These would generate large amounts of mists, vapour and smoke produce by heat generate during cutting. The atmosphere would be wet with mist and vapour and workers would be soaked with these fluids. One of these MWF called "Steel-Kut" was particularly reactive and workers would often develop dermatitis as well as respiratory irritation and sensitization. Steel-Kut was the object of a major study in the 1990s in building #8 and #10. The MSDS for this cutting oil indicated that it contained mineral oil, sulfur and chlorine. See list of various MWF used in these processes. Cimcool and Dasco Tap were also used in machining operations.

The machining process would also produce large amounts of metal dusts. Some areas would accumulate several inches of dust/particles. Some machining would be conducted dry and this would increase the amount of air borne metal dust. Operators would clean off oils and particles with a compressed air gun, thus dispersing these contaminants further. With the negative air pressure these complex contaminants were spread to other areas, producing cross contamination.

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was cut and manipulated. The close up work would also place workers at significant risk of inhaling these fibres. There might be further asbestos dispersion as workers cleaned their work area with compressed air.

MWF Exposures and Machining and Boring: Exposure to metal working fluids, both coolants and cutting oils was significant. These exposures involved large amounts of mists and fumes from MWFs broken down by high temperatures generated during high volume machining on large surface areas. Exposures were through inhalation and absorption through the skin. Dermal exposures were confirmed by reports of skin irritation and dermatitis as well as major investigation into these problems with MWFs.

JHSC: 9/21/78: re: drilling in 10C: Complaints of headache, nausea from operators. Sample taken of vapour produced identified Dasco Tap #2. Test tubes at face area of methyl chloroform registered excess of 650 ppm (whereas short term exposure level is 450 ppm for 15 minutes). Union rep called for operation to cease until corrections made. Face masks obtained to remove contaminant but union asked for ventilation to be installed since other persons in area are being affected as well."

JHSC: 11/16/78: drilling update: "We have asked for a completion date from engineering (re: ventilation). To date we have had no luck on this. It may be necessary to take further action."

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Grinding and Deburring: (After machining, milling, drilling, turning, cutting and welding) Materials were then ground and deburred with air driven wire brushes, and buffed. These tasks produce a large amount of grit/resin dust, and metal dust contaminated with residues of MWF and degreasers.	**Exposures During Grinding Operations:** The grinding and cleaning operations generated great quantities of inhalable metal and resin dusts. There was no effective local exhaust ventilation.
Welding Operations: This department contained a fairly large welding operation located south of the main aisle. This involved numerous types of welding and use of various types of fluxes and welding rods for mild steel, stainless steel, cast iron, and aluminum. Welders operated MIG, TIG, submerged welding, brazing, oxy/acetylene. This generated large amounts of welding fumes containing metals such as cadmium, nickel, chromium, beryllium, silver, copper, to mention a few of the routine by-products of welding in addition to residues of degreasers and MWF. Welding was also conducted with portable units carried to various locations.	**Exposure to Various Welding Fumes:** Welding was carried out extensively throughout the department creating a great deal of by-stander exposure. The main route of exposure was inhalation of welding fumes including gases such as ozone, residues from degreasers and various metal and flux fumes. A significant amount of welding involved oily surfaces, generating large amounts of smoke in the general atmosphere. Metals such as cadmium, chromium, silver, copper and beryllium were present in these fumes.
Since there was a great deal of oil on metal surfaces, welding operations would produce a great amount of smoke that was carried throughout the department. The arc air welding which involved a carbon rod coated with copper would be used to cut plates 3" thick and produce great amount of welding smoke. Also welders would perform welds on surfaces that were coated with epoxies and/or polyurethane foams and adhesives. The assembly and shipping areas would also involve a great deal of welding to fit motor parts, as well as securing these very large motors to flatbed rail cars. Securing a 400-ton motor was complex and involved a large amount of welding to the rail car, which could take over a week to complete.	Welders were also exposed to asbestos fibres from using asbestos blankets to protect parts and themselves during welding operation. Workers laid on these blankets that were in friable condition from heavy usage.
Degreasers: Motor parts were regularly dipped or hand wiped with degreasers as a pre-treatment prior to welding or painting and/or to clean off MWF from the machining processes. The degreaser of choice was usually TCE, or MEK, toluene, and acetone.	**Solvent Exposures:** Welding operations involved risk of inhalation of various degreasers including TCE, toluene, xylene and MEK. Workers reported being overcome by toluene and exhibiting neurological symptoms. Investigation confirmed that workers were hand wiping the insulation off stator coils with rags soaked in toluene. The only ventilation was by "natural means" with no local exhaust ventilation. See MOL Report: OHB 05890GMOW; 08/12/1980 re: Bldg.#10 Bays 21to 29.
Painting: Motors and parts were regularly painted with what was called Glyptol. There were frequent complaints about the vapours and odors from this	**Paint Exposures:** High risk of inhalation of glyptol paint ingredients including solvents and epoxy resins and pigments. This was particularly evident when paint was sprayed in open areas. See JHSC report

Production Process	Chemical Exposure Risk
application, particularly when it was sprayed on in the open. Glyptol was a GE product composed of a group of Alkyd polymers. Among its constituents were pigments containing magnesium silicate (asbestos), titanium dioxide, calcium carbonate as well as volatiles such as alkyd resins, butyl cellosolire, paropasal "P", and ammonia.	regarding a work refusal that occurred because of spray painting in Bay N-26.
Layoff Process: This process involved painting steel plates with lead paint mixed with naphtha gas. This was manually painted on the plates so that direct contact would be made with paint. This process was also carried out in building #34. This process produced naphthalene vapours as well as lead fumes.	**Exposure to lead and naphtha gas:** Risk of inhalation significant to very volatile naphtha gas and fumes from volatized lead.
Temporary Oven 1980s: In the 1980s a 'temporary tent' curing oven was constructed in Bay 24N of Bldg. #10 to accommodate coating very large armatures. It was constructed against the west wall of Bldg. #10. This oven was 25' high and 40'x40' square. It was lined with a very **thick asbestos curtain, which** surrounded all 4 sides of the oven to keep the heat in. A tin roof was also constructed to keep heat in which was equipped with a vertical exhaust duct. Activity in the oven involved rotating large armatures (ferris-wheel style) in a resin-filled epoxy (vinyl toluene) trough, 12'x15' in size. As the armatures were being coated with the resin the Kelro heaters would bake the coated armature to harden the epoxy resins. During this process workers would also squeegee the resin to ensure uniform coverage. Workers were noted in JHSC minutes to have made complaints about how they were required to handle the resins during this process, and demanded the hygienist come to view the work with respect to its health impact.	**Exposure to Asbestos and Resin vapours:** Significant worker and bystander risk of inhalation of asbestos dust from curtains, which were in friable condition as a result of wear and tear from work activity. This combined with risk of inhalation of polyester epoxy resins and thermal decomposition by-products during oven baking made worse by lack of appropriate ventilation and dispersal of contaminants through air movement and work activities. Workers experienced frequent headaches and eye, nose and throat irritation from inhalation and absorption of the resin fumes and gases.
Armatures were baked for approximately 72 hours.	
This resin dipping/baking process produced large amounts of thick bluish smoke throughout the department. The resins were used in great volumes given the size of the armatures being coated. Health and safety JHSC comment that ventilation in this oven did not work consistently.	

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Grinding and chiseling: After the epoxy hardened workers would grind and/or chisel off excess resin and hardened resin in the trough producing great amounts of grit and resin dusts since these (40-ton) armatures were very large.

Per shift, 40 to 50 motors were dipped and baked in this manner. There was no local exhaust ventilation. Fumes were heavy and prevalent. There were frequent work stoppages throughout the 1980s as a result of workers concerns about these exposures.

Testing Process: Large motors that would run at between 20,000 and 30,000 horsepower were regularly tested and run at extreme power. Gases generated during the process included ozone and nitrogen dioxide. This operation also produced strong magnetic fields in the ELF frequency range.

MOCA in Mining Hoist: Mining hoists were built in 10S. This involved fitting MOCA pucks in the slots of very large hoist drums. These were fitted in slots around the entire circumference of the hoist drum where the 2"-3" diameter cable would "ride" on them. The 6" MOCA pucks were hand machined, filed, sanded and then cut with a chain saw and hammered into the slots butt-joined. This involved hand-fitting large numbers pucks around the drum, producing significant MOCA dust that would cover the soles of workers' shoes.

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Exposure to Resin Dusts: Inhalation of significant quantities of cured hardened resin dusts during grinding and cleaning operations to remove (baked on) excess resins as well as cleaning the oven trough. Generated dusts would also be deposited on and absorbed through the skin.

Exposure to Electromagnetic fields during electrical testing at very high voltages. Workers were chronically exposed to EMFs at very high amperages. EMFs are classified as a human carcinogen.

MOCA Exposures: This process generated large amounts of MOCA dust inhaled by workers handling the substance by grinding, cutting, filing and hammering to make it fit, as well as those in close proximity. MOCA, 4,4'-methylenebis (2chloroaniline is classified by IARC as a Group 1 carcinogen-carcinogenic to humans, IARC Monograph Vol. 100F, 2012).

JHSC: 11/3/77: re: Tar epoxy exposures: "Crown Diamond tar epoxy is sprayed in unventilated area. This job questioned as far back as 2 years but no action taken to correct it."

JHSC: 8/14/79: re: Asbestos dust: "Large armature was being processed (epoxy bake) and large sheets of asbestos cloth and blankets of Kaowool draped over it. When cycle finished the asbestos and Kaowool was dragged off armature creating clouds of dust and fibre in large area of #10 bldg. Upon checking out situation it was badly contaminated so instructions given to use zero discharge vacuum cleaners to clean up particles."

JHSC: 12/8/81 re: spray paint: Painters painting 25 foot key bars outside paint booth. Also going inside stators to spray paint. Chemicals in paint are

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	ammonia magnesium silica (a form of asbestos). Management to get more information on paint. **JHSC: 8/24/82: re: hydrogen leak:** "Hydrogen leak led to evacuation of #8, #10, #10C, #12. Workers complained that evacuation route took them right past hydrogen tanker truck." **JHSC: 10/19/82: re: asbestos refusal:** "Workers in 10C were asked to heat an asbestos board. Laboratory worker had no work order for job and no authority to give men work without first contacting foreman." **JHSC: 12/13/82: re: drinking fountains:** "Water tests showed pipes to water fountain rusting away." **JHSC: 9/26/85: re: removing PCBs:** On Saturday, transformers were being drained of pyranol which contains PCBs. The prescribed procedures were not followed and as a result of the poor handling there was a work refusal by employees in the surrounding area." **JHSC: 12/86: re: showers for lead workers:** (As per recommendation in Lead Assessment done in #10) "…company is not prepared to supply showers for lead workers in Babbitt shop, Lead Rotor, and Bearing Fit areas." To be appealed to MOL by union.

BUILDING: #12 **DEPARTMENT: PUNCH PRESS**

Punch Press Operation
General Description
General Working Conditions
Punching/Machining
Welding
Grinding/Deburring
Annealing and Enameling Ovens
Enameling
Annealing
Copper Coil Annealing
Commutator Machining
Coil Stripping
Cutting with Carborundum Saw
Degreasing Tanks
Rebuilding Old Motors

Known Chemicals used or produced:

Asbestos
Caustic Soda: sodium nitrite/nitrate
Gasses: $C0_2$, helium, ozone, phosgene,
Decomposition by-products: formaldyhyde, benzene, PAHs
Degreasers: TCE, Toluene
Detergents
Fibers/Dust: Asbestos, Fibreglass, Insulation products, Mica
Metals: steel, copper, stainless steel
MWFs: Steel Kut, Dasco Tap
Resins/Resin fumes: Glyptol, others?

February 5, 2017

Building #12 **Department: Punch Press**

Production Process **Chemical Exposure Risk**

Punch Press Operation:

General Description: The Punch Press shop ran north south between buildings #14 and # 10. It employed 100-150 workers on 3 shifts. It was about 1000'x200'x60' high. It was a wide-open operation in the north section and partially enclosed in the south. It was a major punching and machining operation that provided punched out parts and punched sheets of steel as well as machined parts throughout the GE operation. It had very large punch press and a large shearing machine, small lathes, 2 large boring mills, a battery of small punch presses operated by women in the SE aisle and a laser operated press. Very large degreasers were located in the area. The 'Rim Plate' area contained a very large punch press that punched large plates for water generators. Finally, this department was heavily engaged in the 're-manufacturing' of diesel motors that were torn down, cleaned, rebuilt as necessary, and painted.

This was a high volume shop that in addition to what the punch press and machining operations generated, this department was subjected to contaminants from the welding and grinding operations in building 14A and lead and mold release fumes from the Babbitt shop.

These contaminants were highly likely to be inhaled. The complaints from workers concerning these fumes as well as symptoms attest to these over exposures.

JHSC: 2/23/78: re: degreasers: When degreaser scheduled for clean out, air-line put down to exhaust fumes and dry out residue. This process tends to 1. Blow strong vapours in a wide area creating real hazard to other personnel and 2. Creates a dangerous environment for worker doing the cleaning.

General Working Conditions: In addition to contaminants generated in bldg.12 operations, contaminants from the Tank Shop in bldg. 14 would migrate to building 12 punch press operators. This included large amounts of welding fumes, degreaser vapours, and grinding dusts. As well, fumes and gases would migrate from the Babbitt Shop in bldg. 10B consisting of lead alloy fumes and release agents. This infiltration was due to the negative pressure and lack of local exhaust ventilations in these two areas.

Ingestion also likely given that workers ate and drank at the workstation and did not have washing facilities.

Punching/machining operation and use of solvents and MWF: This was a major metal machining and punching operation, punching out large and small parts throughout, as well as shearing large heavy gauge sheets of steel with a large shearing machine. Metals brought in were coated with varsol prior to shearing and punching. The shearing and punching operation would generate large amounts of mist and vapour from the varsol coating being stamped and heated, from impact. The stamping process could produce 100s of parts per minute, so that the rapid punching process would produce large amounts of mist and vapour.

Inhalation, absorption and ingestions of several MWF, solvent and oil mists produced by punching and machining highly likely in large surface area and high volume production process.

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The Rim Plate operation would involve punching a steel plate that could be 8'x5'x1/4 thick. The plate was mopped with 'Steel Kut' machine oil in preparation for punching. During the impact a great deal of mist and vapour was produced.	
Welding: A substantial amount of welding was carried on fabricating parts which were then ground and deburred.	At times, welding activity would generate small fires and explosions as a result of TCE residue trapped in small cavities within the motor castings. Workers reported severe nosebleeds and sinus injury. Welders also used asbestos woven blankets during welding operations to protect certain parts from the welding splatter.
Grinding/Deburring: After punching and machining, parts had to be deburred by grinding, sanding and buffing. This was usually done with compressed air driven grinders and metal rotating brushes, as well as belt sanders using 400 grit sand paper. The deburring operation produced a great amount of air borne dust containing grit/resin, metal particulate with residues of MWF.	Grinding and deburring operations produced large amounts of dust containing solvents residues, heavy metals and epoxy resin dusts. Inhalation highly likely given the lack of adequate local exhaust ventilation and PPE.
	JHSC: 11/15/82: re: radiation: "Query radiation checks since x-ray room beside this work area has been increased. Workers upset this problem has persisted for over a year."
Annealing and Enameling Ovens: There were two ovens located on the west wall north of the main aisle. These were enclosed except for an entry and exit ports with asbestos curtains.	Annealing and enameling ovens generated a mixture of thermal decomposition byproducts that were readily inhaled. These would include oil and solvent residues that were heated to high temperatures. This would also include epoxy resin fumes and break down byproducts from the curing process.
Enameling: After being deburred, punchings were placed on a conveyor belt that travelled through the oven. These were heated to burn off oils and then sprayed with brown epoxy and baked for about 15 minutes then taken off the line and stacked. This process generated a great amount of bluish smoke that permeated the atmosphere with a complex mixture of epoxy thermal decomposition by products such as BPA, formaldehyde, benzene, etc. While there were many types of epoxies used, this was most likely Isonal.	Inhalation and skin absorption of a variety of thermal decomposition by products from polyester and epoxy resins.
Annealing Process: During the annealing process punchings were baked at high temperatures to temper the steel parts. This also generated a great deal of smoke containing thermal decomposition by-products from the burning off of various oils, degreasers and MWF. This process would also generate asbestos fibres from the curtains being brushing against the punchings as they entered and exited. These curtains were replaced often as a result of the wear and tear.	Inhalation of asbestos fibres from fraying asbestos curtains, degreaser and MWF residues and decomposition by-products.

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Copper Coil Annealing Process: Flat copper coils are hoisted by an overhead crane and dipped into a vat of TCE, then dipped into a tank of molten sodium nitrite/sodium nitrate, and then soaked in a cold water rinse. Periodically, the caustic tank has to be replenished and the old material taken out and dispensed. **There is a possibility that this solution can react with an acid and produce nitrogen dioxide gas. This might be possible if there is insufficient time for the TCE to be completely dripped off before entering the caustic bath.** Because of the piece rate system operators were not allowing sufficient time to elapse between the two dips.	Exposure to TCE vapours, nitrite/nitrate salts, and possibly NO_2. While this was not measured the likelihood of NO_2 being formed and inhaled is entirely possible.
Commutator machining: Large commutators were machined on lathes in this area as well as in Building #8. This produced large amounts of mica, asbestos and copper dusts from the machining process. During this process, asbestos boards 2”x16”x1/4 were machined for commutators.	Machining commutators generated copper, mica and asbestos dust which are highly likely inhaled and ingested Inhalation of insulation dusts containing resins, asbestos, fibreglass fibres highly likely.
Coil Stripping: This involved stripping copper and insulation of coil rings, which were then ground, sanded and chiseled and then dipped in caustic soda. These were then sent to Bldg. 16A to be re-wound and re-insulated in and asphalt dip.	As above.
Cutting with carborundum saw: Constant cutting with a carborundum saw was a night and day operation that generated large amount of metal and grinder dusts. Workers describe area as ‘coated in dust’.	Inhalation of grit and resin dusts generated by saw.
Degreasing Tanks: This department had 3 degreasing tanks. TCE, caustic soda, possibly xylene. These were used extensively during the re-manufacturing process. Routinely, parts were dipped from TCE to caustic soda without allowing the residues to drip dry sufficiently. This would cause some severe reactions and noxious fumes that workers complained about. MOL reports noted this practice and ‘recommended’ that at least 15 minutes elapse between dips. Despite this recommendation the department continued the practice. (See MOL reports)	See **MOL report dated August 26, 1964** addressing employers concerns about the handling of waste sodium nitrite/nitrate. Fire broke out when materials spilled on wooden pallet. Asbestos paper subsequently used to prevent fire when stored on wooden pallets. The likelihood of inhalation of caustic soda salt vapour and asbestos as well as degreaser vapours. Inspector notes the possibility for caustic salts to be carried in the vapour and steam.

Production Process	Chemical Exposure Risk
Re-manufacturing used Motors:	
The re-manufacturing of used diesel motors was done in south end of bldg12 and 16A. These were reconditioned locomotive engines for CN. The operation continued 24/7 for many years. Area measures about 30x20x60 high.	
Manual Disassembly Process:	
1. Entire motors were steam cleaned with high-pressure nozzles;	Exposure to heavy mist of detergent, solvents, and unknown residues from motors.
2. Bolts manually removed from frames to release rotors, stators, casting parts;	
3. The disassembled parts were steam cleaned;	
4. Newly cleaned parts first dipped in a (10'x12') vat of heated TCE;	Steps 4 and 5 generated heavy fumes from the dipping in TCE and caustic soda.
5. Parts were then dipped in a (5'x6') vat of caustic soda;	
6. Parts then steam cleaned under high pressure;	Steam cleaning generated heavy mist of detergent and solvent residues.
7. These heavy parts were maneuvered by overhead cranes, which would at times hit asbestos insulated pipes thus dislodging large amounts of friable asbestos. These would fall on welding operations and cause flash-fires when ignited;	Frequent exposures to loose asbestos fiber falling on workers and floating in the air.
8. Crane operators worked in open cabs with no building exhaust system;	Crane operators exposed to mists and fumes from degreasing operations carried out below them. Described as "clouds of dust and fumes."
9. Welding operations going on simultaneous with the manual disassembly operation adding welding fumes to the other chemical fumes and mists generated in the disassembly process. Approximately 3 welders in the area carrying out MIG and CO_2 welding in the area of a TCE degreasing tank and operation;	A "toxic soup" of chemicals and fumes generated in a process that went on for 12 hours per shift, around the clock for many years. (Producing 3-4 remanufactured units per day).
10. Located between the disassembly building (12) and remanufacturing building (16A) was a major welding operation. The gasses used were CO_2, helium, and fumes from molten metal, which would be carried into buildings 12 and 16A as all of these buildings were not physically isolated, rather divided by low partitions that did not prevent fumes from reaching other parts of the complex;	This "toxic soup" included: welding fumes and gasses, MWFs, degreaser fumes (TCE), heavy metals, toluene, insulation dusts/vapours, resin fumes, which workers would be exposed to for 12-hour shifts.
11. Armatures of heavy copper coils were made	**Welders' Health Issues:**
	Workers made frequent complaints of irritated nose, eyes and throat. Workers complained and filed workers' compensation claims for nose bleeds. These welding operations can generate significant quantities of ozone gas that is a known respiratory irritant as well as a probable human carcinogen. As well, in

Production Process

in the shop, then cleaned and annealed before using. Cleaning was done in a vapour degreaser of TCE tank 7x5x9' deep fitted with exhaust slots. Degreasing takes about 20 minutes with crane operator handling the basket. Then crane operator places the basket next to a salt bath of sodium nitrite/nitrate in a 8'x4' tank of molten salts (Draw Temp-275°F). Bath is maintained at 800°F. The parts soak for 6 hours in the salt bath then are soaked in a rinsing tank at 200°F. Considerable steam is generated during the rinse phase. The crane operator is above these tanks while vapour and steam is generated upward.

Chemical Exposure Risk

contact with TCE, phosgene gas can also be produced. This gas is highly toxic and a major respiratory irritant. Measurement via Draeger Tubes of TCE in the area where the nosebleed occurred was 25 ppm. **Report # IE-67; June 5, 1970. These tubes have an error rate +/- 25-35%.**

Welders made frequent complaints about ozone gas and welding fumes from arc MIG and stick welding. The report notes that one worker was well on his way to developing COPD and should find other work than welding -- particularly MIG and TIG welding which generate significant amounts of ozone gas which is a major irritant.

Crane operator health issues:

Department of Health report dated April 1, 1970 concerning a crane operator who filed a work related illness claim as a result of exposure to the annealing chemical while he was dipping the coils in these solutions. Nose bleeds, swelling of the ankles, rashes and a fever.

While the investigators concluded that this couldn't have been work-related, there is a possibility that nitrogen dioxide could have been formed as a result of acid being formed from the TCE degreasing operation being near the welding operations. It is possible that NO_2 was formed by reaction of the salt bath and the acid mists.

Department of Health report dated April 6, 1970 indicated that a field visit on March 23, 1970 found a number of problems with the operation:

Poor housekeeping; "visual inspection. …Indicated that the exhaust system was completely ineffective"; and there were no eye wash fountains near caustic soda tanks. Crane operator experienced adverse health effects while dipping coils in caustic soda as well as steam generated by quench tanks.

BUILDING: #14 **DEPARTMENT: POWDER PAINT/STRUCTURAL STEEL**

General Description Powder Paint

Steps in Powder Paint Process

General Description Structural Steel

Tank Shop

Specific Operations:

Welding Air Blast Tanks
Stainless Steel Tanks
102" and FGK Breakers
Evidure Torch and Aluminum Welding
Bertram Vertical Boring Mill
Radial Drilling
Horizontal Boring Mill
Grind and Clean
Grit Blasting
Paint Booth
Welding
Welding Fumes and Dust
Electro-Magnetic Fields
Asbestos
Solvent Vapour and Fumes
Machining
Metal Working
Metal Grit and Dusts

Known Chemicals used or produced:

Anti Splatter Paint
Caustic Acid
Chromates, Cadmium
Epoxy Resin Paint and Dust
Grits
HCL
Metal Fumes (Cadmium, Zinc, Chromium, Nickel
Metal Particulates
Metal Working Fluids (coolants and oils)
Silica Dust
Stainless Steel

February 5, 2017

Building #14 **Department: Powder Paint (upper) Structural Steel (main floor)**

Production Process **Chemical Exposure Risk**

Background for Powder Paint Operation:

Powder paint operation involved the spraying of electrostatic ionized powdered epoxy paint on metal (steel and some aluminum) products that involved two floors in building 14. This process was used specifically to coat housings of electrical panels for switchgear between 1977-1985. The entire process was controlled via conveyor belt system. There were very low ceilings on second floor with temperatures often as high as that of the bake ovens used (105°F). Steps in the Process:

1. Parts prepped and hung on hooks attached to a conveyor belt on first floor taking products up to the 2nd floor;
2. Hanging parts travel through a 3-wash open tunnel: hot wash, hot caustic soda bath, hot rinse;
3. Parts travel to semi-enclosed automatic powder spray area for painting;
4. Edges and any areas missed in spray area painted manually by workers using hand-held wands;
5. Newly painted parts enter a 50' bake oven for 2 ½ hours;
6. After baking, parts travel back down to 1st floor to be unloaded and shipped to various departments;
7. Hooks used to carry parts taken off conveyor and soaked in an (uncovered) "acid" bath to remove any sprayed powder paint. Tank was located at ground level and originally had no barriers to prevent falls (barriers added after worker fell in);
8. Responsibility for cleaning acid tank was left to the painters.

Observation: The process generated a great deal of floating paint dust that covered workers. Operators reported electric shocks from spray wands touching charged metal. Aluminum products were baked for 24 hours prior to painting, which meant coming to work at all hours to meet the production schedule. Run with three shifts of 5 workers per shift. The general

Workers exposed to epoxy resin paint dust in great quantities with nothing more than paper masks and paint overalls. They worked in an electrically charged environment and were exposed to extreme heat and electrical shocks. Chemicals used in the production process included: epoxy resin, caustic soda and acid.

Workers complained of excessive dust exposures; MOL tests identified dust levels close to TLV as ventilation inadequate. **MOL, 14A, March 17, 1981.**

JHSC: 9/27/79: re: heavy dust: "We have recurrence of this problem. (union rep) reports the collector bags have not been cleaned in almost two years. They probably need replacing. There is heavy dust accumulation in the area."
JHSC: 10/11/79: re: collector bags: The bags have not been cleaned or replaced in a long time. Also we tried to get info on epoxy paint dust from engineering lab but new policy guide has short-circuited that source of information."
JHSC: 12/20/79: re: epoxy paint dust: "Still waiting for research on possible hazards of epoxy paint dust."
JHSC: 2/12/80: re: epoxy paint dust: "Problem here is severe and health of workers seems to be reflecting those problems more and more as time progresses." Notes one worker on leave with severe rash, another experiencing bad cough and trace of blood in sputum, another worker removed from job with severe rash. Dust escaping is polluting not only the immediate work place but also structural steel and parts of GPC. The only process involving a chemical exposure on first floor was the use of caustic acid to clean the hooks following their use. Workers wore gloves and glasses but described the acid as "stinging" when splashed on them.

Any exposures during the 3-wash stage could occur when products moved out of the wash tunnel, which was self-contained.

Large amount of epoxy paint overspray due to electrostatic charge. Workers subject to electrical shocks due to electrostatic environment.

Production Process	Chemical Exposure Risk
area was near structural steel where a great deal of welding and machining took place.	Employees wore paper facemasks and white overalls – no respirators. Only exposure during baking process would occur as products moved outside the ovens. Workers exposed to fumes from newly painted parts and products. Workers exposed to acid residue and dirt particles when scraping and wiping tank. After a serious incident when a worker fell into tank with severe burns on his legs (and died two years later), a barrier was installed. Workers exposed to high level of paint dust, possibility of electrical shocks, high levels of heat (105°F), paint and cleaning fumes and additional chemicals and fumes related to welding taking place near-by. By-stander exposure to welding fumes was significant. Inspector noted significant escape of dust from paint enclosure and indicated that the paint operation was not sufficiently enclosed and ventilated. **(MOL Report # 41181CEAA; Building 14, April 14, 1981).** Inspector: "It appears because of inadequate enclosures and air velocity into the enclosure, significant amount of dust may escape from the booths." Concern of union committee members when new filters installed dust escaped and settled on machines 100' away. A work refusal initiated and then settled when told new filters would be installed on next shift. Inspector ordered that workers be provided with approved respirators.

February 5, 2017

Building 14/14A **Department: Structural Steel (66-85)**

Production Process **Chemical Exposure Risk**

Structural Steel Department:

General Description: In addition to the powder paint operation, building 14 contained the major operations of the Structural Steel department involving: large scale machining; cutting, rolling, welding, grinding, fabrication and de-burring; coating and painting of large steel (102"+dia.x 1"-2" thick) sheets. In addition to supplying metal sheets to other departments, this department fabricated large housings for the switchgear department in what was called the Tank Shop, north of the main aisle. A Shaft oven used to heat shafts in preparation for assembly was also located North of the main aisle. South of the main aisle major machining, welding, fabricating, clean and grind operations took place.

These operations generated large amounts of environmental contaminants including: welding fumes, metal and grit dusts, degreaser fumes and vapours, mists and fumes from metal working fluids, as well as large amounts of "white dust" containing fibreglass and resin (from machining, drilling, boring and grinding large epoxied fibreglass interrupter tubes).

Workers also used green layout paint that contained white lead, kerosene, trichloroethane, black oil and naphtha gas.

According to reports of GE retirees, respiratory protection and local exhaust ventilation was not provided.

Tank Shop (North End Bldg. 14)

Much of the production in the Tank Shop located in the north end of Building #14 was for the Switch Gear department (building #16). The shop was equipped with:

- Three large boring mills and a large radial drill;
- A paint booth;
- Three large welding tables;
- An aluminum welding operation;
- Three grit blasting operations.

This multi-process operation employed approximately 65 workers on three shifts. The operations consisted

Exposures in Structural Steel involved the following:

Machining involves the risk of inhalation and absorption of various MWFs including large amounts of coolants likely containing arsenic as a biocide as well as various cutting oils that could include sulfur, mineral oil and chlorine. These MWF would break down as a result of the heat produced during the machining process exposing workers to other toxic compounds. As well, metals would break down into various metal compounds that would further contaminate the fluids. Metals could include: chromium, nickel, zinc, mild steel, cadmium and copper. These inhalation and absorption exposures would affect other workers in the area.

Welding operations would expose workers through inhalation to various welding fumes and gases that would be produced through the welding process; e.g., heavy metals such as mild steel, chromium, nickel, cadmium, zinc, copper, aluminium -- as well as various gases produced during the welding process, e.g., ozone, phosgene from residuals of degreasers --or vapours from other areas containing substances such as trichloroethylene.

JHSC: 3/23/78: re: fumes and dust: Fumes and dust still a problem in this area. The dust is rising into Powder Paint, causing problems there. We have encountered problems getting test tubes for checking fumes and gasses but hope to find some shortly."

JHSC: 12/2/80: re: Oil coating fumes: "There are people with dermatitis on their forearms. Check for phosgene gas and carbon monoxide gas at Bldg. #14, spot welding where oil coating is heated."

MOL order regarding poor housekeeping and over exposures. The breakdown of some fluxes that were used in the welding process would likely be inhaled also. MOL order that all welding areas in bldg. 14 shall be cleaned up, indicating that housekeeping was very poor **(MOL, Building 14,Nov. 27, 1989).**

Production Process

primarily of fabricating very large circuit breakers ranging in size from 28" to 102" and the even larger FGK breakers.

This operation involved cutting, rolling, welding, grinding, grit blasting, buffing and machining, boring, and finally painting large plates of steel and stainless steel.

The operation used large amounts of metal working fluids (MWFs) laced with biocides containing arsenic compounds to kill bacteria and fungus that grows in the fluids. This generated large amounts of MWF mists and vapours.

Workers describe a "bluish smoke" that permeated the atmosphere in the entire shop ("After 15 minutes on the job, the work area was filled with blue smoke that lasted the rest of the shift" – GE retiree).

Welding operations in the area generated large amounts of welding fumes as well as thermal decomposition by-products from degreasers, applied by hand (with a cloth or brush) in preparation for the welding operation. These included: trichloroethylene, xylene and acetone.

Welding operations involved several types of welding including: submerged arc welding employing black granulated flux; and stainless steel welding of large tanks which generated heavy metal fumes containing cadmium, hexavalent chromium, and nickel alloys.

Much of the welding took place inside the large tanks being constructed, in confined space. Workers reported being overcome by the fumes from the degreasers and welding fumes. Workers (especially cleaners) also described becoming "high" from the fumes. Inside welders were not provided with air-supplied hoods when performing inside welds. And, the supply air was of questionable quality given that the air came from a compressor pumping air from the shop. The steel supply lines were equipped with oil sediment bowls to prevent lines from rusting.

After welding, workers would perform "grind and clean" operations on the welds as well as further machining using the boring mills. This process

Chemical Exposure Risk

In addition, workers were at risk of exposure to various dusts produced during the grinding and cleaning operations. In this case workers were at risk of inhaling fine dust particulate containing resin grits, various metal dusts such as mild steel, aluminum, chromium, cadmium, nickel, epoxy resins, and paint coatings.

Production Process	Chemical Exposure Risk
generated a great deal of black dust that workers were required to remove and discard. Workers would dry sweep and shovel large amounts of dust and discard into a tote box. This process generated airborne dust throughout this area. Dust was blown off work surfaces (and clothes) using compressed air -- a practice that was wide spread, further contributing to the airborne contamination. Workers were not provided with adequate respiratory protection and there was no local exhaust ventilation.	
Clean and grind operators were supplied with air-supplied hoods inside the tank while cleaning welds.	
The grinding operation involved using an air powered wire rotating brush as well as a bay-flex stone grinding wheel for buffing and smoothing welds. This task also removed anti-splatter paint further contributing to the mix of dusts generated in the process. Grind and clean operations took 8 to 9 hours to complete on the large breakers.	
After grind and clean, breakers were again wiped down with degreasers in preparation for painting and the application of undercoating. These paints contained isocyanates and/or epoxy. Degreasers were either TCE or Toluene.	
Specific Operations:	
Welding air-blast tank: Mild steel welding of inside seams using stick electrodes by an inside welder while outside seams were arc welded with aired carbon rods by outside welder. End flanges were welded with submerged welding using black granulated flux.	Inhalation of welding fumes containing mild steel and fumes from black granulated flux use.
Stainless Steel Tanks: All flanges (solid stainless) and seams were welded with stainless steel stick electrodes and outside seams arc aired with carbon rod electrodes to prepare the seam for full penetration to the inside weld. Inside seams were stainless stick welded. But the shell was made of mild steel and stick welded accordingly.	Inhalation of stainless steel welding by-products such as cadmium and hexavalent chromium
102" and FGK Breakers: Outside seams were submerged arc welded using black granulated flux. Inside seams and parts were stick rod welded. All	Same as above with respect to inhalation of welding fumes and residues of degreasers.

Production Process	Chemical Exposure Risk
three sizes of breakers were prepped with degreasers and anti-splatter paint by hand. The FGKs were stick welded inside and outside.	
Evidure torch (TIG) and aluminum welding (MIG): Asbestos blankets were used to cover some jobs to prolong cooling and prevent damage to the materials during welding operations. Asbestos curtains were hung around the perimeter of these welding operations.	Same as above.
After welding, all tanks were grit blasted, x-rayed, cleaned and grinded, horizontally machined, subjected to hydrostatic testing, then painted/coated and shipped to Switch Gear for assembly.	Exposure to ionizing radiation (from x-rays) a known carcinogen. Same as above.
Machining process: Bertram Vertical Boring Mill used for machining weld preps and trepanning plates for breakers to accommodate gaskets. White coolant (MWF) applied with a squirt bottle or black oil as a cutting fluid were both used resulting in MWF mists and vapours during the machining process due to high heat which caused the fluids to vapourize and mist.	Inhalation and exposure to MWF containing coolants and cutting oils. Ingredients likely include biocides containing arsenic.
Machine's tables, slots and ways were cleaned with kerosene, naphtha, soaked rags by bare hand and compressed air was used to blow off dust.	
Radial Drilling Process—Angle iron 3/8 to 5/8 thick were drilled, tapped, and spot-faced. Plate steel 11/4 thick for breaker domes 28" to 54" were drilled. Green layout paint used with naphtha gas as degreaser; white lead paste mixed with black oil used for tapping and white MWF (laced with biocide wafers) used for drilling. This process generated vapour and mist from all three chemicals because of heat generated during drilling.	Inhalation of fine resin dusts (epoxy or polyester vinyl toluene as well as fibreglass dust. **JHSC: 4/5/79: re: smoke hazard spot welding:** "Complaints from operators indicate minor to severe discomfort. One man out of work with suspected laryngeal cancer has other operators concerned."
Horizontal Boring Mill: Machined fibreglass interrupter tubes were bored, tapped, drilled and spot-faced, generating large amounts of fibreglass and resin dusts. Workers were provided with paper pants and shirts, but not adequate respiratory protection. Air Blast tank parts were also machined using black machining oil from a squirt bottle which created great amounts of fumes -- especially when	**JHSC: 3/25/80: fume hazard spot welding:** "Strangely enough not able to get MSDS on oil used as preservative on steel. Law says we can demand MSDS. Since supplier claims they don't know oil used, we simply can't accept that, since we know companies have disposed of chemicals such as PCBs. We can't risk that this anti-rust preparation could contain very dangerous products."

Production Process	Chemical Exposure Risk
machining on the inside of the tank. Black oil mixed with kerosene was used to polish surfaces using different grades of emery paper. White coolant with biocide was also used.	Inhalation of fine metal dusts and resin grits from grinding wheels.
The clean up of the (horizontal boring mill) machine was done with kerosene and a compressed air gun causing dust and vapours to become airborne and migrate to other areas. Operators used oil squirt cans for velocity when machining various parts for all metal breakers. This generated large amounts of fibreglass dust containing various resins (cured and uncured).	**Anti rust residues: Inspector notes that in Bay 68** –spot welding area--welded parts have residues of rust preventatives and that its evapouration during welding is causing eye and upper respiratory irritation at levels below the TLV of 5mg/m³. "No mechanical exhaust. The firm stated it was not required. They have supplied a bench fan to blow the smoke away…Operator stated his throat is sore." (MOL: Building 14, March 17, 1981). It was noted that: "Order issued to wear respirator until the inspector's visit."
Grind and Clean Operation: Workers used bay-flex buffers, stone grinders, belt sanders and vibrators that were air-powered to remove and smooth weld "grapes", weld splatter, and anti-splatter paint. The 102" and FGK tanks were rotated while being ground and cleaned simultaneously by both inside and outside workers. These operations generated large amounts of metal dusts and welding by-products. 102" tanks were rotated on large rollers while FGKs were rotated by crane for clean and grind. Inside grinders were supplied with air supply hoods and were required to sweep dust and debris out of the manhole opening onto the shop floor.	**JHSC: 2/12/80: re: fume hazard:** "Steel supplier does not know what the temporary oil coating consists of so (JL) will try to get sample of oil for analysis. Good luck (JL).
Grit Blasting Operations: Grit blasting took place in enclosed booths that air propelled alloy pellets. While these were enclosed, the worker had to periodically clean the dust holding chambers. When the levers were opened large amounts of dusts would be released into the environment. Workers described this as a continuously dusty job with no respiratory protection or local exhaust ventilation. Some grit blast operations were done by workers using a hand-held blasting nozzle and wearing protective clothing including an air-supplied hood with questionable air quality. Grits would have to be retrieved for re-use which involved shoveling out the alloy pellets, generating large amounts of dust during recapture.	Same as above.

Production Process	Chemical Exposure Risk
This operation utilized a 'wheelabrator' on two shifts using small alloy pellets propelled by a steel impeller.	
There was a build up of black dust that was released from the rapper with levers into a steel tote box. Workers described this operation as a dry, dusty and dirty job with lots of exposure to the dust.	
Small grit blaster was used on 3 shifts using large pellets. These operators wore air supplied hoods.	
Paint Booth Operation: Booth was equipped with a water capture system. All steel products were degreased with various thinners then primed with 'red primer'. These were applied by hand and brushed or sprayed.	Inhalation and absorption of paint particulates and vapours containing isocyanates, epoxy, and various solvents and thinners.
Structural Steel - Building #14 South	
General Description: That portion of Bldg. 14 south of the main aisle contained very large boring and milling machines, lathes, metal cutting and welding operations. This was a very intensive operation involving large volumes of product.	
Welding Operations:	
The west side and south end of the building housed major welding operations. This was an area approximately 600 feet long from the aisle to the end of bldg. #14. During the 1980s this department also operated a very large 'burner' used to cut large plates of structural steel into various patterns. This burner also in Bldg. 34. Welding operations were intensive, running 3, sometimes 4, 12-hour shifts. Welding took place on 4'x4'x6" thick welding tables whose surface was grated so welding waste could fall through. These tables were supported by H frames about 18" off the floor.	Same as above with regard to inhalation of welding fumes. These were high volume operations that generated large amounts of fumes and gases without adequate exhaust ventilation or protective equipment. Therefore risk of inhalation very high.
There was also a larger table available at the south end of building #14. It's important to note that welders regularly ground the surface of these tables to remove weld spatter and 'grapes' so that new materials laid true.	Same as above as well as large amounts of welding dusts settled on floors and surfaces.
Retirees reported more than one hundred of these tables used by welders in this area, with from 30 to	

Production Process	Chemical Exposure Risk
50+ welders welding at one time. Such heavy welding in the area produced very large amounts of welding fumes: “the welding fumes were so dense that sometimes you couldn’t see your workmate at the next table” Retiree.	
Welding fumes and dusts: Very large amounts of welding debris and dust would build up under each table. This dust would become airborne during cleaning and dry sweeping, as well as from traffic movement from vehicles and employees.	
Electro-magnetic fields (EMFs): A great deal of the welding was electric arc welding. The welding machines could operate at 600 amperes and produced very strong magnetic fields. Welders worked in close proximity to these welding units while others nearby worked in by-stander positions to these fields.	Electric welding involves very high amperages and produce very high EMF in the ELF frequency ranges. IARC has classified EMFs as a probable human carcinogen.
Asbestos: Asbestos curtains were hung around the entire welding area of about 550 feet. These asbestos curtains were in friable condition due to the amount of wear and tear and abrasion from product movement. Asbestos blankets were also used to cover product that was to be welded -- either to protect the product or keep it warm during the welding process. For example, large shafts were heated to between 300 and 500 degree F in an electric oven and then covered with a thick blanket of asbestos to keep the temperature consistent during welding. Welder would lay on top of an asbestos blanket that was in friable condition. When they were done, the front of their clothing would have a coating of asbestos fibres.	Inhalation of asbestos fibres very likely given the friable conditions of asbestos curtains and manner in which asbestos blankets were used by the workers.
Solvent vapour and fumes: In preparation for welding or machining these large steel plates were typically coated with residues of cutting oils/ degreasers/rust inhibitors.	Inhalation of solvent fumes was routine and chronic. These vapours and fumes from solvents were ubiquitous.
Machining Operations: Machining operations were located along the length of the eastern part of the building. It contained several large vertical and horizontal boring machines, milling machines, radial drills, grinders and lathes. This department also used	Same as above with respect to inhalation and absorption of MWF during machining operations.

Production Process	Chemical Exposure Risk
a 40' boring machine. Machining operations involved large volumes and sizes of product.	
Metal Working Fluids (MWF): All machining operations involved the use of large quantities of MWF to protect the equipment. MWF were drawn from tanks and sprayed on metals surfaces and cutting blades. These operations generated large amounts of mists, vapours and fumes. Workers described "large clouds of blue smoke rising and hanging in the atmosphere." The use of "Steel-Kut" machining oil was associated with many employee complaints of: dermatitis, breathing problems, skin rashes/burns. It was thought to contain mineral oil, sulphur, and chlorine. (Types of MWF: mineral oil, water soluble, semi-synthetic, synthetic, additives such as sulfur and biocides containing arsenic).	Same as above re: inhalation of MWF
WD-40 was applied with a squirt bottle to the high speed tool bits when turning on the 25' vertical boring mill,	**JHSC: 6/1/78: re: scorched fumes:** "Safety Committee was called re: a very bad working condition, high ambient temperatures due to atmospheric conditions and larger than usual shaft in oven, which in fact was too large for the unit and as a result was causing a terrific heat loss into the work area. Also the asbestos cloth still being used to cover the oven during heating was emitting a scorching stench that ranged over half the building."
Solvents used to clean: Tables were cleaned with various solvents, which included rags soaked in: MIK, 1500 thinner, toluene, roylene, naphtha, and alcohol.	**JHSC: 2/26/80: re: air pollution problem:** Since fire, doors between #14 and #16 have been kept closed because of TCE problems; a new situation has arisen in #14 as smoke and fumes from welding now being trapped in North part of bldg. Ceiling vents will not solve problem.
Metal Grit Dusts: Workers describe excessive dust buildup on floors and surfaces as a result of machining/ grinding.	**JHSC: 11/28/83: re: pigeon droppings:** "Complaint received on pigeon droppings on inspection table, lunch table, and stored steel area."
Compressed Air: participants noted that compressed air was used universally to clean dusts off surfaces and clothing. This practice continued to be used during the late 2000s.	
Balconies on 2nd and 3rd floors: Workers performing work on the balconies located above these operations on the ground floor were subjected to all the fumes, dusts, vapors generated on the ground floor. The operations on the balconies on the 2nd and 3rd floors were engaged in winding of small coils, assembly of switches and magnetic switches.	

BUILDING: #16 **DEPARTMENT: SWITCH GEAR**

General Description
General Working Conditions
Production processes/Machines
Assembling Breakers
Disassembling/Refurbishing old or damaged Breakers
Metal Clad assembly
Sulphur Pot Area
Other components
Magna Blast Breakers
Machining Operation
Exposure controls

Known Chemicals used or produced:

Aluminum, iron, copper, brass, magnesium, stainless steel, particles and dust
Asbestos and Fiberglass dust and fibers
Brominated fire retardants
Epoxy resins and dust (Glyptol)
MWFs (Cimcool. TimSol, Steel Kut, Roco, Dasco Tap, Chroma Tap, Kerosene)
Ozone
PCBs
Solvents (TCE, Royalene, Acetone, MEK, Toluene, Naptha Gas
Sulphur, lead, tar,

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Building: #16 **Department: Switch Gear**

Production Process **Chemical Exposure Risk**

General Description: Switch Gear Department was located in Building 16 north of the main aisle between Buildings 18 and14. There were no walls between these three building. It was entirely open. At its peak, employees numbered between 100 and 150 employees with 3 to 4 shifts. This was an intense production, high volume operation conditioned by the piece-rate system.

The production processes consisted of the assembly and fitting of very large circuit breakers, limit amps, metal clads, rectifiers, exciters, GPC relays as well as drive systems.

The assembly operation, carried out by assemblers and fitters, involved machining and milling internal electrical and mechanical parts both metal and fibre glass, as well as drilling. Assembly also involved various types of welding operations including aluminum and stainless steel, arc MIG and TIG welding. Grinding and cleaning of welds were also carried out involving grinding and buffing machines. These numerous machining operations required the use of various metal working fluids containing arsenic biocide agents.

Welding operation involved metal preparation with solvents, including trichloroethylene, acetone, naphtha gas, MEK, toluene, among others. The central area of the building was equipped with a tank of Royalene (TCE) degreaser that measured 8'x12'x6' and was heated.

Breakers were first prepped with primers and glyptol paints, then filled with PCB dielectric oil, and tested, drained, adjusted, refilled, re-tested until the breaker was fully functional. The east side of the shop contained three tanks of PCB oils.

The high voltage potential test (used for quality control) involved the application of very high amperage between 0 and 3,000 amp.

General Working Conditions: This was a very smoky and dusty environment with very strong odours of solvent, metal working fluid mists and vapours, and heavy welding fumes from various welding

General Risk Exposures: There was a very high risk of inhaling and absorbing various solvents used in the degreasing and cleaning tasks. Not only were fumes intense from the degreasing tanks in this area and elsewhere but also workers were applying degreasers by bare hand with rags over large surface areas. Some of these contain contained the contaminant benzene.

MWF and coolant mist were generated during machining operations with operators clothing soaked with these fluids. All three routes of entry were involved: inhalation, absorption and ingestion since workers routinely ate and drank at their work stations.

Skin absorption and inhalation of solvents highly likely.

Because these migrating fumes came in contact with welding operations, there was a high risk of inhaling phosgene gas.

The use of glyptol paint also generated vapours from the volatiles contained in the paints. These were readily inhaled and workers frequently complained about the fumes particularly where the paint was being sprayed.

Since this operation also involved filling breakers and transformers with large amounts of the PCB oil there was a high risk of inhaling and absorbing this toxin during filling and emptying procedures. PCB spills would involve clean up as well as residues left behind.

Fitters are also exposed to inhalable dusts from grinding and deburring operations. Workers would inhale metal and grit and resin dusts during these operations. These were performed without respiratory protection or local exhaust ventilations.

Machining operations would involve the high risk of inhalation and absorption of coolants containing arsenic and cutting oils. Soaked clothing as well as symptoms of adverse skin reactions and foul odours evidenced this.

Production Process

operations. The large numbers of operations going on at the same time contributed greatly to very high concentrations of contaminant mixtures. These operations also produced great amounts of welding, grinding, and milling dusts. The machining and milling with MWF produced large amounts of visible blue smoke. Workers said that there was always a blue haze in the air. Housekeeping was poor and dust and spills accumulated in the work environment.

There was no local exhaust ventilation only natural ventilation, and no adequate make-up air, so that atmosphere in the GE building was under negative pressure resulting in contaminants from other areas be drawn into building 16 (at the centre of the plant where ceiling height was the highest) which exacerbated the toxic atmosphere. (See H&S management memo regarding these negative air pressure conditions, as well as MOL inspection reports).

Eating and smoking at the workstation was routine and permitted by the management. This was a result of a work regime defined by the piece-rate system with its individualistic culture and lack of sufficient eating facilities.

Detailed production processes:

Assembling Breakers: Breaker assembly involved several "fitters" who would carry out a number of tasks to build a complete breaker. The breakers varied in size from 28", 36", 48", 54", 102" as well as the larger FGK breaker. Completing these would involve several days to a week. These tasks were carried out with the fitter inside the breaker shell. Fitters would:

1. Degrease the breaker shell by hand with rags soaked in TCE;
2. Fit and install various parts that had to be machined or ground to fit, including the bushings, welded studs, and other parts spot welded on the walls—some of which were made of asbestos and were machined to fit;
3. Prepare breakers for painting, which involved buffing and hand wiping with TCE;

Chemical Exposure Risk

There was also a high risk of ingesting these contaminants because workers regularly ate and smoked at their workstations.

The risk of these exposures was high given the volume of work and product use, the close contact with the contaminants, the direct handling and intricacies of the work tasks and finally the lack of adequate exposure controls.

Risk of exposure to very high magnetic field was very high given the proximity and strength of these magnetic fields based on the very high amperage.

Inhalation and absorption of cutting oils, inhalation of solvent vapours, inhalation and absorption of PCB oils was prevalent.

Exposure to PCBs while draining old breaker tanks. Wash down of PCB residues with solvents—TCE, toluene, MEK. Evaporation of PCBs enhanced during hand wipe down.

JHSC: 11/16/78: re: Ozone from welding: "Ventilation is in use but situation still very bad. There is a conglomerate of fumes present in the building and it is obvious that a broader control is only answer."

JHSC:1/25/79: re: Ozone build-up: "No improvement in this area. In fact, problem seems to be more intense. Not only that men in area feeling chronic problems from it but it seems to be much more

Production Process

4. Painting the breakers with epoxy glyptol paint inside (gray) and outside (green);
5. Filling the completed breaker with PCB oil dispensed from the PCB storage tanks;
6. Testing the filled Breakers at the 'high potential" testing area where a very high voltage was applied -- at up to 3000 amperes. High magnetic fields are produced during testing at extreme voltages in the high bay area of the building. (Noted during discussions that there seemed to be a high death rate among testers);
7. Depending on test results, Breakers could be drained of oil, adjusted, refilled and retested several times over.

This assembly operation produced a number of atmospheric contaminants: welding fumes, cutting oil mists, solvent vapours, paint fumes, metal and grit dusts. By-stander employees would be affected as well as the fitters who directly handled these contaminants. As well, PCB spillage during dispensing and draining would also contribute to the mixture of contaminants. PCB leakage also occurred during the testing phase. Air blast breakers were filled with SF-6 gas as an insulator in this type of breaker.

Disassembling and refurbishing old or damaged Breakers: This involved draining used PCB oils from the tanks, which exposed workers to spillage as well as handling leaky tanks. Once drained, electrical and mechanical components were disassembled and surfaces were hand wiped with TCE soaked rags producing large amounts of solvent vapours. Tanks were ground and buffed, prepped with TCE, and painted with glyptol prior to refitting. Tanks would also have to be hydrostatically tested for leakage.

Metal Clad assembly: This involved fitters assembling what were actually metal sheds used to hold electrical equipment. These were prepared in building 14 and then equipped with hinges and other components that had to be assembled. Fitters would perform drilling, grinding and machining to fit parts together.

Chemical Exposure Risk

concentrated (as reported by people coming into the area). Asked Health Dept. to make checks once again."

JHSC:2/15/79: re: Noxious fumes: "A reading of 6-16 ppm of TCE in welding area. Although well below TLV, when present in welding it becomes a different problem. Tests then made for HCL and TVA of 5 ppm was exceeded to a large degree. Reading went off scale completely."

JHSC: 9/27/79: re: Noxious Fumes: "About three times a week this (HCL) pollutant becomes very apparent. On Sept 27, a reading of 4.5-5 ppm was recorded. This originated from TCE in a cold process tank. (DM) a welder in area is on sick benefits after a throat operation. He has complained of respiratory problems for some period. Others are suffering discomfort as well. Task operator will be told to keep lid closed to control fumes."

JHSC: 12/20/79: re: Asbestos dust: "Diesel poles using asbestos sheets are being ground and cut, ventilation is totally inadequate. New material being slated from armature is also asbestos under another name. Although safer in its original form, hazard doesn't improve when cut or ground."

Inhalation of metal, paint and residue dusts from grinding and cleaning operations during refurbishing. Also exposure to volatiles from paint fumes.

Production Process	Chemical Exposure Risk
Sulphur Pot Area: This area included the use of hot open pots of sulphur, lead and tar with no exhaust ventilation. A mixture of lead, sulphur and tar were applied to seal joints to prevent leakage. These mixtures were contained in a heated liquid state and applied to the metal clad joints. Molten lead was hand ladled onto the part, then sulphur, and then it was covered with tar. Workers indicate that very strong pungent odours emanated from the various pots during application. Local exhaust was introduced much later in the department's history.	Inhalation of sulphur, lead and tar fumes was high given the state of the chemicals, the confined area to work in and the direct handling of materials. **MOL Report May 28, 1982. Order 0123, Bay 327, Bldg. 16** re: pouring lead sulphur without exhaust; also **Order 0126** re: silver solder booth, inadequate ventilation.
Other components: Connecting metal clads to breakers also involved fibre glass tubing used as insulators that were secured over bus bars then taped with black urethane tape, bolted, sealed with duct seal putty, covered with fibreglass tape and painted with a fire retardant paint. These fiberglass insulators were first taped with brown insulation, then taped with black urethane and finally sealed with duct seal containing asbestos and has a putty- like consistency. This was again taped over and painted with a brown fire retardant paint that came in gallon tubes. MSDS likely a brominated fire retardant. The outside of the metal clad was insulated with fibreglass.	Inhalation of fibreglass and resin dusts as well as particulate from materials containing brominated fire retardants was very likely during this operation. Inhalation of asbestos fibres likely during this operation since workers had to fit and work asbestos baffles in place. Exposure to asbestos dust likely inhaled given direct contact.
Other products such as rectifiers, exciters were assembled utilizing aluminum arc welding producing high levels of ozone gas as well as other metal and chemical by-products associated with aluminum welding operations. Preparation for aluminum welding included the use of naphtha gas.	Inhalation and exposure to MWF very likely given the amount of fluids used during these machining operations. Workers report that there were dense clouds of bluish smoke over these operations as well as mists surrounding the general atmosphere.
Magna Blast Breakers: These mechanical breakers are spring-loaded, motor-driven breakers referred to as electrical impact drivers. The bearing are spring loaded and 8"x11"baffles made of machined asbestos, then glued and bolted on by fitters. This disturbed the asbestos fibres, which were dispersed in the general atmosphere.	**JHSC: 2/12/80: re: Noxious fumes:** "It was noted by all present that heavy fumes reached the aluminum welding area about 3 minutes after VPI tank at south end was opened, even though tank was cold and had no load in it for some time. We are hoping that make-up air vents will reduce the negative pressure and perhaps better control of air movement in bldg."
Machining Operation: The machining operation was quite extensive, employing approximately 40 to 50 workers and utilizing 35 large boring, milling, drilling, and lathing machines, in addition to many smaller pieces of machining equipment.	**JHSC: 3/25/80: re: Noxious fumes:** "Despite two make-up air systems in place to reduce negative pressure factor, problem fumes still occurring. (e.g., complaints of ozone at 3 ppm vs. TLV of 1 ppm in north end welding area)." **JHSC: 4/8/80: re: Noxious fumes:** "Checks as required not being done on regular basis. (Union rep) asks that more people on floor be trained to take

Production Process

Very large motors built in bldgs. 8 and 10 were machined with a Mazak milling machine in bldg. 16. Important to note is that the Mazak machine, located in Building 16, was operated by Building 8/10 employees.

Machining also included large amounts of tapping of large machined bolts as well as a major cleaning and grinding operation utilizing large grit blaster, grinding, deburring and polishing machines. This operation milled, bored, drilled and turned steel, cast iron, copper, aluminum, brass, magnesium, stainless steel, and fibreglass structures.

In the latter case, workers would mill, bore and drill large fibreglass tubes 3'x4'x12"dia.1/4" thick. This operation generated large amounts of resin/fibre glass dust that workers complained about because it caused dermatitis and skin irritations.

When machining and refurbishing used 102" breakers, workers would encounter asbestos insulation originally used in the older breakers. The machining process would generate significant amounts of asbestos dust during the refurbishing operation. All machining operations, including tapping, used large amounts of MWF that were both automatically or manually applied by the operators. MWF included: TrimSol, Cimcool, Black Oil (containing sulphur compounds), Steel Kut, Roca, kerosene, and both Dasco and chroma Tap for tapping. This was a very high volume area that generated large amounts of solvent vapours, MWF mists and smoke as well as dust consisting of metal, fibreglass, and grit and resin dusts from all operations. MWF were recycled, and many times the fluids would become biologically contaminated.

Aluminum Welding in Bay 319 used very high amperages exposing workers to very high EMFs. Also, phosgene gas from migration of TCE.

MOCA: Exposed to MOCA produced and fitted.

Exposure controls: Up until the 1980's there was little or no local exhaust ventilation and no adequate respiratory protection provided to these machine

Chemical Exposure Risk

(air) samples. (Name) logged readings of 3 ppm, but neglected to warn workers of dangerous levels."

JHSC: 11/28/83: re: Xylol complaint: " Xylol fumes made (worker) dizzy and gave him a headache while washing his tools in a tank of xylol. Job is done for 15 to 20 minutes, 1-2 times per week."

JHSC: 10/21/86: re: Asbestos: "Workers not been included on assessment for asbestos in this area. They should be instructed on proper procedures for handling asbestos and included in the control program."

MOL:06/27/76: Ozone TLV exceeded during aluminum welding.

MOL:2/13/78: Ozone exposure during welding operation in bldgs. 16 and 30. Worker complaints irritated upper respiratory tract and eyes.

MOL:03/1/79: Hydrogen Chloride Gas higher than the TLV during MIG /argon gas welding in combination with TCE degreaser vapours from tank. Employer refused to replicate conditions for MOL tests.

MOL:03/17/79: HCL concentration MOL test unrepresentative.

MOL:03/17/81: Tool Room-tungsten carbide dust escaping during carballoy tool grinding. Dust accumulation high.

MOL:04/2/81: carballoy grinding dust revisited. High welding fumes.

MOL:05/20/82;05/28/82;06/2/82: Lead/sulphur/ chlorine pouring operation. Inspector indicated that worker shows all symptoms of over exposure. Issues stop work order.

MOL:05/8/86: Order for lead assessment under designated substance regulation for lead.

Production Process	Chemical Exposure Risk
workers. It was common practice for workers to eat, smoke and drink at their work-stations.	**MOL:11/27/89:** MWF/coolant mist clouds heavily emitted during machining; ordered to clean up the paint shop, which showed poor housekeeping.

BUILDING #16A — TRANSPORTATION/DIESEL EQUIPMENT

General Description
General Work Conditions
Production Areas

Diesel Production:

- **Diesel Control**
- **Circuit Boards**
- **Resisters**
- **Machining Area**
- **Welding Areas**
- **Winding Area**
- **Assembling Area**
- **Epoxy Dipping and Baking**
- **Painting Operation**
- **Diesel Offices**

Diesel Rebuilding:

- **Rebuilding Coils**
- **Re-machining**
- **Assembling Rotors and Stators**
- **Testing**
- **Painting**

Known Chemicals used or produced:

Aluminum, iron, copper, brass, magnesium, stainless steel, particles and dust
Asbestos and Fiberglass dust and fibers
Brominated fire retardants
Epoxy resins and dust (Glyptol)
MWFs (Cimcook. TimSol, Steel Kut, Roco, Dasco Tap, Chroma Tap, Kerosene)
Thermal decomposition
Ozone
PCBs
Solvents: TCE, Royalene, Acetone, MEK, Toluene, Naphtha Gas
Sulphur
Lead
tar

February 5, 2017

Building #16A **Department Transportation/Diesel Equipment**

Production Process **Chemical Exposure Risk**

General Description: This department built large motors and generators for transportation vehicles, mining equipment such as hoist elevators, crushing equipment etc. This included various control devices and circuitry to control the functioning of this machinery. The department was located between the induction motors and structural steel department and south of the switchgear areas (bldg16).

Open to adjacent departments: These building were not separated by walls and essentially shared the same air space. Work in 16A involved several operations that included: assembly of motors, building circuit boards and wiring configurations for controls, producing the various parts for motors. These processes included machining, drilling, grinding, cleaning, and various types of welding. This operation involved the use of boring and milling machines, lathes, radial drills, spindle drills, grit blasting units, burring booths and winding machines. These processes used various chemicals including: solvents and degreasers including TCE, toluene, MEK, acetone, and naphtha gas; a variety of MWF, epoxy resins and catalysts, asbestos, fibreglass, moca, and paints.

The large motors department employed approximately 200 to 250 workers on 3 shifts, mostly on day shift. This was a high volume production operation that ran 24/7. All chemicals were used routinely and directly, and in large quantities.

General Work Conditions:

Negative Air Pressure: There was no local exhaust ventilation and **little if any make up air**. As a result, the entire area was **under negative** pressure and major build-up of heat. According to a worker: ”It was a terribly hot building.” Consequently, cross contamination occurred regularly with **contaminants from other areas drawn into the area.** The use of large oscillating fans to deal with high temperatures, further disturbed and distributed contaminants. The atmosphere was very smoky, with a constant bluish haze over various work areas. This was particularly true in areas with welding fumes, MWF mists, and

Negative Air Pressure Impact on Exposures: Due to negative pressure in the building complex, contaminants from other areas and operations were drawn into this area. This was noted by the GE Safety Unit management in memos dated:

October 2, 1979 from A.K. Faggetter, Hygienist; and October 29, 1979 from P.J. Kyselka, Manager Plant Facilities Section.

This was particularly true for the migration of TCE vapour making contact with the aluminum welding operation in bldg. 16A.

Inhalation of phosgene gas as well as heavy ozone exposures. Worker reported symptoms of nose bleeds and irritated eyes, nose and throat indicating over exposure to both contaminants

Production Process	Chemical Exposure Risk
grinding operations. Housekeeping was very poor and dust build-up was very high. Personnel in the office located in the eastern area of the plant would need to clean their desks and other surfaces of settled soot and dusts each morning and after lunch.	
Workers also smoked and ate lunch at workstations and washing facilities were not easily accessible.	
Production Areas:	
Diesel Control: This area made control mechanisms and switchboards, circuit cards, rectifiers, reversers and resisters for diesel electric motors. This work involved an extensive use of **epoxy resins and catalyst identified as MOCA** in hand buckets that were mixed and applied by hand into molds, which were then placed in VPI tanks to ensure uniform coverage for approximately 2 hours. These MOCA molds were then baked in ovens.	Inhalation of MOCA vapours and dusts during mixing and molding operations was high since this was without any controls or respiratory protection. The MOCA was manually mixed and poured into molds. Vapour during the mixing and curing process would expose workers to the risk of inhalation. Further inhalation and skin absorption would occur during the process of filing, sanding and cutting the cured resin.
Circuit boards were also formed using a**sbestos fiber and concrete**, as well as epoxy resins. These were also placed in ovens for curing and hardening.	Workers were exposed daily to large amounts of asbestos fibers and dust with no personal protection.
MOCA, a synthetic chemical used to make urethane and a catalyst for epoxy resin, was also mixed in molds to form parts for high force/friction operations. Workers would saw, grind, file, and shape this product in its solid state thus causing large amounts of dust. **MOCA (methylenebis[2-chloroanaline]) is recognized as a group 1 carcinogen**.	**JHSC: 2/21/83: re: fumes in varnish area:** "Complaints of fume problem since air replacement bags (for ventilation system) out of commission." **JHSC: 8/28/85: re: varnish spray:** "Crane operators concerned about varnish spray while stators suspended from crane."
Resisters were made by assembling 8 tiers of asbestos board stacked in a layered grid, framed by heavy gauge steel dividers, contained in a 2'x2' frame. Copper coils were placed between the asbestos boards (boards served as insulators). Workers were in direct contact with asbestos and other bi-products when grinding and fitting these boards. The completed resisters were then soaked in linseed oil and baked.	
Machining Area: The machining area utilized 2 large horizontal boring machines, 1 large vertical boring machine, large radial drills, milling machines and lathes. Large 2" thick cast iron frames as well as plate steel were machined, milled, bored and drilled	Chemical names and/or MSDS needed of machine fluids, cutting oils, varnishes, degreasers, as well as composition of welding fumes.

Production Process	Chemical Exposure Risk
on large boring and milling machines, lathes and drills. The machining operation utilized large amount of MWF that was sprayed on both manually and automatically.	
Machining generated large amounts of MWF mists and bluish smoke as well as large amounts of metal particulate in the form of dusts. Machining also involved tapping, deburring, grinding, buffing of machined products producing more grit and metal dusts that were contaminated with epoxy resins and degreasing and MWF residues.	
Welding Area: The welding area was locate next to the machining area and was surrounded by asbestos curtains, which were in friable condition. Metals to be welded were degreased by over-head cranes dipping the metals in a 12'x12' degreasing tank containing Royalene (TCE). The tank was not covered and the degreaser produced large amounts of TCE vapour. In addition to TCE vapours, the air was filled with various welding fumes and dusts. Negative pressure promotes long distance migration of vapours and other contaminants to other departments.	Welders exposed dermally to large amounts of machine fluids. While protected from welding fumes by personal exhaust ventilation, captured fumes were vented into the workspace, putting other workers at risk. Due to continual friction and fraying of asbestos curtains and blankets, workers were exposed to significant amounts of asbestos dust and fiber. In sunlight, the air appeared to be filled with snowflake-like particles.
Aluminum Welding Area 16A, Bay 319: The aluminum welding area employed 8 to 10 welders involved in electric arc MIG/TIG welding on various aluminum alloy sheets pretreated with xylene degreaser. This was a high production area producing large amounts of aluminum fumes as well as other metal alloys, ozone gas, and phosgene as a result of the ultraviolet light coming in contact with solvent vapours from nearby TCE tanks and/or similar degreaser residues on the metal being welded. Some aluminum alloys welded also contained beryllium.	Ozone gas is classified as carcinogenic and also causes a narcotic effect and damage to the mucus membrane of eyes, ears and throat. Many complaints of eye and throat irritations. EMFs classified as carcinogenic and also an endocrine disrupter and can affect central nervous system.
NOTE: See report by A.K. Faggetter, hygienist for GE dated Oct. 2, 1979 documenting a heavy concentration of TCE escaping from TCE tank and finding its way to 16A aluminum welding in Bay 319 and producing hydrogen-chloride gas when arc welding came in contact with TCE. Also minutes of meeting Oct. 29, 1979 indicating that negative air pressure in buildings 16A and 18 was drawing in TCE vapours from TCE tanks.	Negative pressure in 16A are drawing fumes in from long distances in other departments. In contact with welding operations TCE produces phosgene gas that workers are exposed to. See Mgt. memos date: October 29, 1979 from P.J. Kyselka regarding degreaser fumes and negative pressure; October 2, 1979 for A.K. Faggetter regarding heavy concentration of TCE escaping and the formation of HCL gas. **JHSC: 1/22/81: re: aluminum welding:** "air testing shows 2ppm and 3ppm of TCE at doorway of degreaser."
	Workers were at high risk of inhaling epoxy fumes during dipping and baking operations. Workers

Production Process	Chemical Exposure Risk
Winding area: Involved the manual and mechanical process of winding of copper wire coated with epoxy and insulated with asbestos called 'deltabeston' copper wire. Approximately 50 wound coils were pressed into appropriate shapes and dipped in 2 VPI tanks containing epoxy. The dipped coils were hand squeegeed and baked in the oven. Following this, coils were ground and cleaned of any excess hardened epoxy resin. Coils were then assembled into motors by approximately 10 assemblers.	describe the intense fumes and odors during these operations. Exposures to resin dust also occurred during grinding and cleaning operations. Inhalation of paint and toluene vapours was highly likely. Exposure to significant amounts of toluene and epoxy resin due to the size of engine and motor parts.
Assembling area: Assemblers first inserted asbestos wedges into the coils and then into the motor frames. Asbestos wedges had to be fitted and pounded into the coils and frames. These large pieces were then moved by hoist or crane to the 10'x10' heated degreaser tank and dipped where vapours condensed on frames and drip dried almost immediately due to high temperatures.	Inhalation of asbestos dust from the cutting of asbestos sheets highly likely.
Epoxy dipping and baking operation: Assembled Motors were dipped by a hoist person (for less than 2 tons) or crane operation (if over 2 tons). In the same manner motors were dipped in VPI tanks for 2 hours, then brought to the baking ovens for curing. Subsequently, workers would hand grind excess hardened epoxy resin. The bake ovens were regularly maintained by grinding and sweeping hardened epoxy spills from oven surfaces.	**JHSC: 8/27/79 re: epoxy fumes:** "We still have no word re: this chemical. To date we have no idea what substance to test for…people working in area are becoming sick from the fumes." **JHSC: 9/27/79: re: epoxy fumes: "**(Management rep) was supposed to get information on the epoxy product being used but he got his buildings mixed up. No report as a result."
Painting Operation: This was an open 4'x4' area where one person, per shift spray-painted each motor with epoxy based black enamel paint over a grate containing flowing water. The painter pretreated the motors for painting by hand wiping them down with toluene.	Inhalation of vapour from solvents and paints likely.
Diesel offices: Staffed by (mainly female) employees who conducted clerical and other duties. The air in these offices was very dusty due to migration of dusts and fumes and gases from various operations machining, grinding, welding, degreasing and painting conducted in this department.	By-stander exposure to diesel fumes likely. Several workers in an adjacent office taken to hospital with dizziness were found to have high levels of carbon monoxide in their blood. Workers throughout area exposed to large amounts of diesel fumes from idling vehicles. **JHSC: 2/17/81: re: mica dust**: (need to address) long standing reports of mica dust. **JHSC: 3/28/83: Noise test:** "Request for noise test in Diesel Grinding area."

Production Process

Rebuilding Diesel Motors:

Background: After disassembly of used diesel motors in building 12 the parts were moved to building 16A for rebuilding and/or reassembly. The work processes included:

1. Rebuilding the Coils: Solid asbestos sheets were cut by sheers into strips 3'x1/2' used to protect electric coils from excessive heat. The strips were driven between engine components manually generating substantial amounts of asbestos dust.
2. Re-machining of old castings by welding on addition steel to attain proper size. These parts were then re-bored using large boring machines, which produced large amounts of welding fumes. These machining processes involved the extensive use of machine fluids and cutting oils (Only identified was cimcool). Welding fumes were captured by personal exhaust ventilation worn by welders but fumes were then blown out into general work area.
3. Stators and frames assembled manually with final closures welded shut by welder lying on asbestos blankets.
4. Testing Processes: Testing went on throughout the re-manufacturing process to ensure product met performance standards for quality control. Motors were run with high voltages called heat runs. This produced high EMFs and Ozone gas.
5. Paint Area: Finished motor sent to paint shop where it was wiped down manually with toluene in preparation for painting. After this degreasing, engines were spray painted with glyptol, a waterproof paint manufactured by GE (Port Union plant).
6. After final performance test, engines were prepared for shipping, then loaded onto trucks or trains parked with motors running.

Chemical Exposure Risk

Heavy use of MWF would highly likely involve the inhalation and absorption of fluid mists and smoke. Inhalation of welding fumes and asbestos fibre likely.

Exposure to magnetic fields likely given strength of fields and proximity to them. Also inhalation of ozone gas likely.

JHSC: 8/24/82: re: toxic fumes: "Workers in test area of diesel report irritation from VPI tanks. (union safety rep reports fumes as 'extremely harsh'."

MOL Reports:

04/06/59: Grinding area not locally exhausted. High concentration of grit resins dusts and metal dusts.

06/4/70: Worker suffering nose bleeds and upper respiratory irritation during welding aluminum—TCE, ozone, HCL gas exposures possible.

01/25/79: Aluminum welding assembly involving 6 welders. Worker complaints eye irritation. Ozone and HCL gas generate from TCE vapour and arc welding and ozone gas producing HCL gas. Ozone levels at 0.1 ppm; company records on HCL 0 to 0.4 in 1978.

06/26/81: Kozma furnace not adequately exhausted. Poor housekeeping noted. Ban saw cutting Mica generating lots of mica dust in Bays 405, 414.

05/8/86: Order issued for lead, silica, mercury benzene, and isocyanate assessment under respective designated substance regulations.

JHSC: 4/18/83: re: insulation fire: 200hp destruction test had gray foam insulation stuffed in ducts. When armature burnt out, insulation caught fire. Fumes from fire were high.

BUILDING: #17 (#21, #18N) **DEPARTMENT: CARPENTRY**

General Description

General Working Conditions

Production Process:

- **Building Structures and Fiberglass Molds**
- **Cutting and Drilling**
- **Fiberglass Operation**

Known Chemicals used or produced:

Acetone
Beeswax
Benzene
BPA
Cabasyl
Epoxies
Fibreglass
Formaldehyde
MEK
Peroxide
Styrene
TCE
Thinners (e.g., 1500 and Partal)
Toluene
Vinyl ester resins
Xylene

February 5, 2017

Building: 17 (21, 18 N) **Department: Carpentry Shop**

Production Process **Chemical Exposure Risk**

General Description of Carpenter Shop: The shop was originally located on the ground floor of Bldg. 21, and then moved to Bldg. 18. Then it was subsequently moved to a separate building located at the north end of the GE site and designated as Bldg.# 17. The building was clad with what was called 'ASBESTOS LUMBER' a nickname for asbestos sheets for external siding.

The shop was an open concept building approximately 200' X 300' with 20' ceiling height. The building contained approximately 40 – 50 non-metallic/woodworking machines, lathes, drill presses, band saws, table saws, planers, joiners, sanders, and grinders, etc.

Carpentry employed approximately 80 – 90 workers on 3 shifts. The majority of workers were on day shift, as was most of the plant.

The shop also had a 10'x10' oven with double door entry of 5' x 6' in height to accommodate products that needed to be heated or cured. The carpentry shop also had a specialized area for laying up fibreglass molds or housings. Some were huge, produced for the large motors area. The area also had a small degreaser tank.

General Working Conditions: The shop had poor ventilation, with little or no local exhaust ventilation and was also affected by poor replacement air, which created negative pressure. Workers were not provided with adequate ppe including rubber gloves for handling acetone or respirators for spraying various resins on fibreglass. It wasn't until the 1980s with the enforcement of the new OHSA that protective equipment began to be provided. Prior to 1980s protective equipment was not made available.

The atmosphere in the shop was generally very smoky and dusty and heavily contaminated with solvents (acetone, MEK, xylene and resin fumes such as styrene and formaldehyde). Housekeeping in the shop was poor with large amounts of dusts from sawing, sanding and grinding operations on equipment and floors.

From the descriptions of the various work tasks performed in the Carpentry Shop, workers were likely exposed to a number of toxic chemicals used in production through inhalation, absorption and ingestion.

1. There was a great deal of inhalable/respirable dusts generated without adequate local exhaust ventilation. These dusts contained various wood particles that would contain formaldehyde from glued wood laminates, epoxy and polyester resin dusts from sanding and grinding fibreglass molds. Also included, were mineral dusts from cutting asbestos and fibreglass sheets and cloth. Asbestos and composites like Textalite were frequently cut with saws and then drilled, planed and shaped generating lots of dusts;
2. There was a great deal of solvent and resin vapours generated from laying up epoxy and polyester resins, and curing these in ovens. The use of epoxy and isocyanate paints that were sprayed or rolled on added to the vapour mix. Large surface areas required great amount of paint/solvent, thus producing large amounts of vapour/mists;
3. The curing oven generated a great deal of fumes and vapour as a result of heating various coatings. This process produced a number of thermal decomposition by-products when epoxies and polyester resins were heated including BPA, Formaldehyde, and benzene;
4. Also contributing to these routes of exposure was a lack of local exhaust ventilation and PPE;
5. Housekeeping was poor and dusts and other volatiles were not looked after;
6. Workers used a great deal of solvents for cleaning up paints and resins which were mostly applied by hand with rags soaked with TCE, MEK, toluene, xylene, and acetone. Many of these are PAHs, containing benzene. Workers also handled mold-release agents.

Production Process

Types of raw materials worked on included: Asbestos Lumber and boards, fibreglass, various woods such as maple, cherry, oak, etc. and composites such as Textolite. Workers would also cut various metals such as steel and aluminum. This shop used large amounts of plywood sheets for construction of parts and structures. Plywood laminates used contain many types of glue treated with formaldehyde compounds.

Chemicals used: Acetone and MEK (for cleaning equipment) and Styrene, Thinners such as 1500 thinner, Partal, and beeswax, which were used as mold release agents. Cabasyl, a spray was also used. Various resins were used in large quantities in liquid or powder form. These were both epoxies and vinyl ester resins. Workers used a great deal of fibreglass cloth of different grades in molding process. These chemicals were handled in 5-gallon pails.

Production processes: Workers were engaged in building various wooden structures, building molds for fibreglass parts and molds, and laying up fibreglass and resins in the molds. Mixing of resins, fillers, and additives for layups was done; as was cutting of composite asbestos lumber, other composite materials and pressure treated materials. These materials were dry cut without dust suppression measures taken. The saws utilized stone cutting blades, which were changed to diamond saw blades after 1980. Asbestos board was grey in colour and would produce large amounts of white dust when cut. Asbestos dust and cuttings would fall under the large saw table, and sometimes into the sewage system through drain grates in the floor. After cutting Carpenters would move to drilling and beveling the edges, depending on where the product was going. All of these products were supplied to other areas of the plant for use in motors and generators. This held true for all raw materials brought into the carpenter shop. With cutting asbestos, wood and textolite -- and having a fibreglass molding operation -- the dust factor was huge, especially with the poor ventilation system. Workers spoke of smells, coughs, and eye irritations experienced. Asbestos and fibreglass dust were part of the overall debris. Parts were layed off (scribed onto the material) and cut by hand using

Chemical Exposure Risk

These would be inhaled and absorbed through the skin;

7. The chemical, styrene, was used extensively as a component of resins and gel-coats as a thinner. This was inhaled and absorbed through the skin;
8. Mixing resins by hand also produced a great deal of chemical vapour from off gassing resins and catalysts;
9. Workers ate and smoked at their work-stations, increasing the risk of ingesting chemicals they were using or were in their work area.

Dusts were generated in large amounts without respiratory protection and local exhaust ventilation, were inhaled routinely. Operators worked directly and closely, carrying out detailed tasks using substances in large quantities.

JHSC: 9/9/80: re: Dust sampling: "Non-metallic machine shop report identified 20% of dust sample checks indicated higher than TLV on dust and fibres."

MOL: 04/26/79: Investigation of asbestos exposure concludes confirmed risk of exposure for carpenters and very high risk of exposure for maintenance personnel. Recommendations re: controlling asbestos exposure: wet asbestos when removing, enclose area, use respirators, clean up area, launder clothes in plant. No orders issued.

MOL: 06/7/79: Asbestos concentrations tested. Found in excess of the TLV.

MOL: 11/16/82: Investigation of worker complaint of illness, e.g. tiredness, headache, feeling sick during silver soldering. Inspector indicated that exposure likely to cadmium oxide, but no air sampling were carried out. Suggestions made for local exhaust ventilation. No orders issued.

These chemicals were routinely and directly used and applied by hand. They were inhaled and absorbed through the skin routinely, and in large quantities.

Production Process

handsaws or sabre saws, and also drilled on small drill presses. Some products had rubber seals pop-riveted on.

Fibreglass operation: Spray nozzles containing razor blades in the tip were used to cut fibreglass strand that would feed into the nozzle. As part of this process there would be two 45-gallon drums -- one containing a resin, the other a hardener. The resin and the hardener would be pumped together from the drums into the spray hose along with the fiber strand. When sprayed onto the mold the razors in the nozzle of the sprayer would cut the strand to create the fibreglass product. Could be sprayed with several coats to reach desired thickness. Two or three people would be waiting to roll the product down with rollers to make sure fibreglass adhered to all areas of the mold. This same process is used extensively in the boat building industry using similar chopped fibre/resin sprays. Atmosphere was heavily contaminated with styrene. Local exhaust ventilation and PPE inadequate for these operations.

Chemical Exposure Risk

In addition to various wood dusts inhaled, workers routinely inhale asbestos fibre from cutting and sawing asbestos board and sheets for non-metal fabrication. These were handled directly and routinely with detailed tasks by hand.

Workers directly handled large amounts of fibreglass and polyester and epoxy resins and hardeners directly and routinely. They inhaled and absorbed various fumes from resins such as styrene, MEK peroxide, BPA, formaldehyde in large volumes given product size and the detailed work performed.

They also inhaled fibreglass resin dusts during sanding and grinding tasks on cured fibreglass and resins.

BUILDING: #18 **DEPARTMENT: INDUCTION MOTORS**

General Description
Die Cast Rotor Production: 140, 180 210 motors
Spin Cast Production for 520 and 580 motors
Machining and metal cutting
Coil and winding process
Coating parts with epoxy shellac
Additional Factors associated with exposure risks
Assembly of medium size motors

Chemicals used or produced:
aluminium, lead and steel particles/dust
arsenic
asbestos
“black paste”
brominated fire retardants
dasco-tap
decomposition by products (BPA, PAHs, formaldehyde, benzene)
duct seal
dusts (mica, copper solder, metals, fibreglass, asbestos, epoxies)
Epoxies
Formaldehyde
glyptol/shellac
MEK
MWFs
TCE
toluene
varsol

February 5, 2017

Building: #18	**Department: Induction Motors**
Production Process	**Chemical Exposure Risk**

General Description: Induction Motors (referred to as small motors) were built in building #18. The following is a description of the building of one component of induction motors—the production of 'die cast' and 'spin cast' rotors. This involved the production of punch sheets using a large punch press as well as the machining of space blocks. In the early days this was done in building 18, but later punching and space block machining was carried out in building #12 and plates delivered to this department in building 18. With die cast rotors for #140, 180 and 210 motors, steel sheets were punched to create predetermined holes and then annealed in an annealing oven. When partially assembled a casting was made by pouring molten aluminum into the form. This was further ground and machined and fitted with a shaft and installed in the stator. The rotors for the 580 motors were produced using spin cast process including the use of asbestos and Kozma furnace in the production.

Summary of Chemical Exposures: Oil mists and vapours from various types of chemicals including many different MWF; dusts and residues from treated papers and tapes that contained brominated fire retardants; fumes from heavy metals such as heated aluminum and lead; heavy concentration of heavy metal dusts from grinding, sanding and buffing metal castings; dust and fumes from epoxy coatings that were heated and baked; dusts from fibre glass and asbestos used as reinforcement and insulation; MWF and metal particulate from machining operations; various epoxy paints and coatings; degreasers and solvents such as TCE, MEK, and varsol.

Die-cast Rotor Production of 140, 180, 210 Motors:

Punch Press operation: 3' wide steel sheets coated with oil were sprayed with varsol and sent through a high powered punch press to cut out predetermined holes in the sheets. During the punching process the impact of the press would cause the residues on the plates to vaporize. Steel sheets were fed manually by the operator, at a rate of 10 sheets per second. This created dense mist oil residues that would coat the operator and his clothes.

Inhalation and skin absorption of oil mists and varsol. There was no local exhaust ventilation and no adequate respirator equipment and workers handled these directly. This would also involve ingestion because workers ate and smoked at their workstations.

Annealing the plates: The punched plates were manually placed on a conveyor, which carried the plates into an annealing oven run at a temperature of 300 to 400 degrees Fahrenheit. The oven opening at each end was approximately 3'x4'. Annealing would take 5 minutes. Annealed plates then taken off conveyor at exit end by operator wearing asbestos gloves to handle the hot plates. Participants indicate that fumes were strong at both ends of the oven and permeated the area. An asbestos blanket hung over each end but did not provide a seal. The asbestos blanket was worn and frayed from contact with plates and belt when passing through.

Inhalation of fumes from residues on metal surfaces during the annealing process involving heating between 300 and 400 degrees F. Thermal decomposition by-products such as PAHs. Workers would incur exposures because these were handled directly in great volumes, e.g. 10 sheets per second. Workers indicate heavy fumes /odours during annealing. No local exhaust ventilation.

Production Process	Chemical Exposure Risk
Die Cast operation: Punch sheets were placed on a stationary arbour where they were stacked and separated with spacers between each sheet. Once stacked the sheets were covered with fibreglass paper, which formed a barrier for the pouring of aluminum/lead alloy into the cast to form the structure of the rotor. Prior to the pouring operation, a "black paste" was applied to the bottom of the cast.	Inhalation and skin absorption of chemical treated (flame retardants—brominated retardants) paper applied by operator around the casting. Also exposure to fibreglass particles from fibreglass paper.
Aluminum/lead pouring operation: An open furnace containing a trough of molten Al/Pb supplied the operator with molten mix (60:40). The operators manually scooped the mix out with ladles and then poured its contents into the die formed by the stacked sheets and fibreglass paper wrap. Operators produced 40 to 50 die-casts per day for the 140, 180 and 210 motors. Operators reported heavy fumes during this process of pouring molten Al/Pb.	Inhalation of aluminum and lead fumes from heated vat and pouring operation handled directly by the workers at high volume with no local exhaust ventilation. Production volume was high and would influence the concentrations of alloy fumes workers would be exposed to.
Aluminum oven maintenance: Regular maintenance was manually undertaken 2-3 times per week to remove slag from the molten trough with rakes. Operators were provided with heat shields, but no respiratory protection. Operators report heavy fumes during maintenance. No local exhaust ventilation provided for ovens.	Further inhalation of aluminum and lead fumes during maintenance operation. This would involve higher concentration because the workers were dealing with removal of slag for an intense period.
Shaft placement into rotors: Shafts were pressed into the rotors with a pressing machine. Operators applied an asbestos based 'black paste' called Duct Seal on to the rotors. The rotors were then placed in a tote box to another station where it was turned and balanced in preparation for installation into the stator.	Inhalation of vapours from 'black paste' Duct Seal as well as skin absorption when in contact with skin.
Grinding, sanding and buffing of die cast for fitting: Operators would manually grind and sand to smooth casting surfaces which produced lots of fine dust. **Machining:** Rotors would also be machined to proper size for installation of coils and placement in stator. Machine oils could be used in this operation.	Inhalation and absorption of large amounts of air-borne particulate containing heavy metals, epoxy paints, fibre glass, treated paper with fire retardants as a result of grinding, sanding and buffing.
Spin Cast Production for 520 AND 580 Motors: 1. Plates were punched in same manner as 'die cast' process and placed on arbour; 2. Space blocks were inserted between plates	Exposures same as above for die cast.

Production Process	Chemical Exposure Risk
and an asbestos insulation called 'fibre fax' was pressed with bare hand into the spaces created by space blocks. This required that the workers tear off chunks from a large sheet of asbestos. The tearing and stuffing of asbestos chunks created a substantial amount of dust. Workers did not use respirators nor was there any local exhaust ventilation;	Inhalation of asbestos fibres from tearing and stuffing asbestos in rotor spaces.
3. Next, asbestos tape was used to wrap and seal the rotor cast, which was subsequently painted with 'glyptol' epoxy paint in preparation for oven curing;	Inhalation and skin absorption of epoxy paints and asbestos fibres from asbestos tapes.
4. The rotor cast was then placed in a casting oven where the rotor was baked overnight;	
5. After baking, the molten Al/Pb mix was poured into the cast and spun in a Kozma aluminum-casting furnace. Here the mix was poured in mechanically and through centrifugal force penetrated all cavities in the casting thus producing a significant amount of Al/Pb fumes in the vicinity of workers;	Inhalation and skin absorption of fumes and vapours of epoxy coatings and thermal decomposition by-products such as BPA, formaldehyde, benzene. Inhalation of fumes and vapours from aluminum and lead as well as residues of coatings.
6. The completed rotor was then cleaned with spinning wire brush powered by compressed air to clean off the glyptol paint and asbestos tape. An air chisel was used to remove excess aluminum casting. The process would take 1 to 1½ days. This cleaning process generated a great deal of dust containing epoxy, Al/Pb, and asbestos fibres. Local exhaust was not functioning at most times.	Inhalation of heavy metal dusts, epoxy paint dusts, fibreglass tapes from power grinding over an 8 to 10 hour day without local exhaust and/or adequate respiratory protection.
Machining and Metal Cutting:	
Shafts were machined and prepared on metal lathes, cutting machines, and keying machines. These machines used large quantities of MWF including trade name Dasco-tap, a cutting fluid containing methyl chloroform. There were instances where workers were overcome by the fumes from this substance. There was no local exhaust ventilation.	Inhalation and skin absorption to mists and aerosols of various metal working fluids such as Dasco-Tap and others treated with biocides and other ingredients.
Red cutting oils used created clouds of mist and aerosol that surrounded the operators and those standing by in the vicinity. Some of the MWFs contained toxic biocides (e.g., arsenic) to control	Descriptions by workers of "clouds of mist" and aerosols hanging in the atmosphere as well as reports

Production Process	Chemical Exposure Risk
bacterial and fungal growth, which would be included in the mist and aerosol generated by machining.	of irritated eyes, noses and throats, and dermatitis would support relatively high exposures.
Welding took place on a regular basis in the machining process producing large amounts of welding fumes.	Inhalation of welding fumes as well as residues of degreasers and thermal decomposition by-products. This would involve: PAHs, heavy metals, et al. By-stander exposures to MWF and metal particulates. Handling coated wires in the winding process.
Degreasing was also a part of this process and utilized several types of degreasers including TCE, MEK, et al.	
Coils and Winding Process Production:	
Winding process performed by women working near the machining area for the production of coils to be inserted in the stator slots. Several tapes were used in this process containing fibreglass and Mylar as separators and stiff fibre glass wedges were also inserted into the coils.	Inhalation and absorption of ingredients in treated tapes—e.g. fibreglass, flame-retardants, et al.
Coating Parts with Epoxy Shellac:	
Parts were slowly rotated above a 20 gallon trough 3' deep with a controlled spray of shellac coating the parts for ten minutes. This process produces a great deal of fumes and over spray. Note: Ventilation was a serious problem in this and other buildings because of the building configuration, the use of compressed air for cleaning and removing dust from work surfaces, parts and workers' clothing as well as cooling their bodies. The whole ventilation system was under negative pressure that created a tendency for toxic fumes and dust to be transported to other areas. Also, ceiling-high walls did not separate buildings -- at most, there were low partitions separating work area.	Inhalation and skin absorption of heated epoxy shellac. Likelihood of high exposure due to spraying operation and heating of shellac. **JHSC: 8/24/82: re: thinner fumes:** Large paint tank in north end of #18 has very high (level) of thinner fume by smell of it. Workers have complained they get "high from fumes when mixing the paint with the large paddles."
Additional Factors Associated with Exposure Risks:	
Work Organization: work organization was characterized by the 'piece rate system'. This resulted in intense work activity, circumvention of exposure control measures by management and workers to meet production quotas.	Inadequate ventilation both local exhaust and general in addition to the work organization based on the piece-rate system as well as poor housekeeping, hygiene practices such as eating and smoking at the work station and circumventing exposure control measures where available, supports the validity of the conclusion that the risk of exposure was high in these operations.
Practices and Hygiene: As in many other parts of the entire GE operation workers ate their lunches and sometimes smoked at their workstations. This was conditioned by the piece rate system and the	**JHSC: 8/20/84: drinking fountain:** "There has been a long delay in respect to correcting the distasteful

Production Process

unavailability of safe eating facilities. There was also a problem with the availability of potable drinking water.

The use of compressed air to clean work surfaces, parts, clothing, and to cool workers' bodies was prevalent in this building and throughout the entire GE facility.

Assembling Medium Size Motors: This process involved approximately 100 to 150 employees on two shifts.

The processes involved:

Parts received from Punch Press

Coil Winding

Coil insertion into stators:

Cutting asbestos (or fibre glass, mica) wedges and separators

Insertion of asbestos/fibre glass wedges with asbestos 'felt' backing:

Insertion of separators composed of treated paper, fibre glass, asbestos:

Assembling punch sheets and piling sheets:

Connecting leads by brazing with a torch applied to SilPhos solder:

Lacing with cotton or fibre glass cord to hold coils in place

Testing connections:

Dipping assembled motor in a dip tank (large and small tubs) filled with epoxy resin:

Then baked in oven:

Grinding excess cured resin:

Chemicals/Material by-products produced by processes:

Production of dusts (asbestos, fibreglass, mica, epoxy resins, (copper/solder dust) from cutting, inserting

Chemical Exposure Risk

water at fountain in Bay 523. This Committee has received numerous complaints."

Exposures risk during assembly:

This operation involved exposure to several toxic chemicals in the form of dusts, liquids and fumes vapours or mists.

The likelihood of inhalation and absorption of these chemicals was relatively high given their physical state, the proximity to the work, the intensity of the work, the lack of local exhaust ventilation or ppe.

These workers inhaled various fibres (asbestos/ fibre glass) from cutting and shaping wedges and separators, pressing materials in slots and general handling. Also inhaled metal fumes from brazing leads, resin applications and baking, and application of solvents (TCE,MEK, Toluene).

MOL Reports:

MOL:09/17/75: Investigation regarding zinc chromate paints. Exposure identified as low because it dried quickly and hard. Orders issued for better housekeeping and no eating, drinking or smoking. Recommends: adequate exhaust ventilation and good hygiene practices.

MOL:06/30/81: Hozma and Kozma furnaces generating large amount of smoke and fumes escaping from under the canopy. Orders issued for local exhaust ventilation. GE management request 'minimum exhaust required'.

MOL:09/30/81: Aluminum fumes from Kozma furnace. Prior orders issued to address escaping fumes into plant. Suggestion to redesign the fume hood to proper size.

MOL:03/31/82: Paint and solvent vapour affecting worker who is stirring paint into a dip tank. Order

Production Process	Chemical Exposure Risk
wedges, separators, grinding resins, and brazing leads. Production of fumes and vapours from brazing copper and solder, and the application and baking of epoxy resins. There was no local exhaust ventilation nor was PPE provided.	issue to "reconnect the local exhaust instituted to greatly reduce exposures."

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BUILDING: #20 **DEPARTMENT: DRIVE SYSTEMS**

General Description

Printed Circuit Board Production

Work processes:

Etching:
Rotating Track
Flow-Solder
Solder Benches

Semi-Conductor Production

Work processes:

Degreasing and etching
Metal fusion and cleaning
Assembly

Known Chemicals used or produced:

Acids: ferric chloride, HSC, sulfuric acid
Degreasers: Acetone, TCE, MEK
Heavy Metals: lead, cadmium, chromium, mercury, copper, gold, tungsten
Thermal by-products:
Polymers: PVC, VCM
Phthalates: DEAP, BBP, DBP, DIBP
Brominated fire retardants

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Building: 20 **Department: Drive Systems**

Production Process	Chemical Exposure Risk
General Description: Drive Systems was located in building #20 and consisted of two electronics production departments: Electric Circuit Board production and Semi-conductor production. These related production facilities used significant amounts of degreasers, acids, and heavy metals including: lead mercury, cadmium, and chromium 6. Except for specialized areas in semi-conductors, these departments lacked adequate local exhaust ventilation. Workers were also exposed to chemicals that were contained in the parts they handled including: PVC, VCM, fire retardants such as PBBP, PBDP and phthalates (DEHP, BBP, DBP, DIBP) these latter were imbedded in the laminated insulated substrates of the boards.	**Major exposures:** Given the quantity of production and lack of PPE and other effective exposure controls operators were likely exposed significantly to a number of very toxic chemicals, chronically. These exposures included acid mists, solvents such as acetone, TCE, MEK, and heavy metals including: lead, cadmium, chromium, mercury, copper, and gold. Other exposures were polymers, such as PVC, VCM, phthalates, and brominate fire retardants.
Printed Circuit Board Production:	
This production process employed approximately 25 to 30 workers who were mainly female.	
Workers were provided with pre-printed circuit boards that were laminated fibreglass epoxy insulated substrate with a thin layer of copper foil laminated on one or two sides.	
Etching: Laminated board was etched in an acid mix of ferric chloride bath creating tracks in accord with the pre-printed circuit. A male technician did the etching in an etching room, which was equipped with general ventilation and a fume hood over a sink.	Risk of exposure to acid mists generated by acids interacting with substrates and copper. Copper fumes from removal/breakdown of copper. The potential of inhalation significant.
Rotating Track: After etching, the etched boards were sent to the rotating track where 4-6 operators inserted the various electronic components (diodes, capacitors, resistors) in the circuit boards.	Workers handled components barehanded thus were exposed to residues of metals and polymer contaminants from the acid bath. Risk of slight inhalation and absorption through skin. Also likelihood of ingestion from workers eating and drinking at their workstations.
Flow-Solder: After the rotating track process, the boards were sent to the flow solder room where a male technician would operate the flow solder machine which was inadequately ventilated and subject of health complaints and MOL investigations and issuance of orders.	Workers are likely exposed to lead solder fumes containing lead, cadmium and flux. In addition these workers are exposed to the solvent vapours indicated above as well as resins. This likely through both skin absorption and inhalation. Over exposure indicated by complaints of physical symptoms as well as the volume of production carried out by 4 to 6 women soldering the printed circuit boards.
Solder Benches: A number of female operators (5 or 6) equipped with soldering irons engaged in touch up soldering of the soldered boards to	

Production Process

ensure proper connections. This area was filled with heavy lead solder and other breakdown products from applying heat to the PVC boards. These could have lead, cadmium, chromium, VCM, brominated fire retardants and phthalates. The area had no ventilation and no PPE was provided. There were only portable fans to blow fumes away from operators. After touch up, soldering boards were degreased with isopropanol alcohol and toluene and then dipped in poly-butyl-methacrylate resin.

Note: Frequent complaints of respiratory irritation and difficulty breathing. MOL investigation

Semi-conductor Production:

This department employed approximately 15 to 25, mainly women, workers in the production of various semi-conductors such as diodes and Silicon Controlled Rectifiers (SCR). This production used tungsten, gold, a mixture of acids and solvents including: acetone, TCE, MEK and ceramic coverings. The operation involved 1) etching the surfaces of gold, tungsten and silicon discs in preparation for construction of the electronic components; 2) the fusion of gold leaf on the tungsten disc and 3) the layering of these and placement into a ceramic covering.

Degrease and Etch: Operator would first degrease and etch the gold flake and tungsten disc with acetone/TCE and then bathe these in acid usually ferric chloride, HCL, sulfuric acid or a mixture of this with other compatible acids. This was carried out over a sink equipped with a fume hood.

Fusing of Discs: After etching, the operator placed a tungsten disc on to a hot plate. This was followed by placing a gold leaf on the tungsten in order to fuse the two metals. Once fused these were removed quickly to a beaker in order to cool.

Disc cleaning: After fusion, the discs were transferred to a beaker with acetone and toluene for cleaning in an ultrasonic shaker machine which measured about 4'x3'. This was carried out in the open.

Chemical Exposure Risk

The Flow Solder operation as well as the bench soldering was a major source of heavy metal (silver, lead, cadmium), solvent fumes and vapours, with a high risk of exposure.

This was recognized in the **October 7, 1981 MOL inspection report.** Inspector noted that the local exhaust ventilation was ineffective and could be interfered with by random air currents. The inspector noted that the complaints of eye, nose and throat irritation were indicative of "over exposure" and ordered the employer to conduct a lead exposure assessment to determine level of skin absorption as well as exposure to isopropyl alcohol from solvent. Workers reported frequent headaches during the flow solder operation. Two workers were reported to have had epileptic seizures as well. Workers complained about strong solvent and resin odours as reported in **MOL: December 30, 1981** investigating worker complaints and detecting isopropanol and toluene in the work atmosphere through air monitoring.

JHSC:6/30/81: Workers in vicinity of deep-wave soldering machine complain of dizziness from fumes. Hood reading approx.. 50-75 F.A.M. (using Kester flux #1571 and Kester flux thinner #104.

Although there seemed to be effective engineering controls meant to provide an extra modicum of protection to "products" being made, there were conditions that would allow exposure of the operator to the acid mist, solvents, and possible heavy metal residues. Etching was carried out in the open but with a fume hood over the sink where the etching was performed.

Since workers could detect prominent acid odors, it is likely that workers were being exposed. This could occur where materials were handle without protection. In areas where materials were cleaned with acids or solvents in the open, the likelihood of exposure would occur during the shaking process with solvents.

There were a number of cancers in bldg. #20 including several women employed in each of the

Production Process

Alternative layering of discs: These discs were then transferred to an assembly area where the gold fused tungsten discs were alternatively layered with the silicon disc and then placed in a ceramic container.

Diode assembly: Some of the larger diodes were assembled on an aluminum heat sink.

The only protective equipment provided was for those working with acids in the clean room including a pair of yellow rubber gloves, a polyester smock, and a fume hood over the sinks where acids were mixed. There were noticeable odours from the acid fumes as well as from solvents such as acetone. Workers reported acid burns and eyes, nose, and throat irritation from acid mists and solvent vapours.

Chemical Exposure Risk

two operations, which should be investigated. These included several cases of lung, breast, and brain cancers, as well as lymphoma.

Since this work was carried out in the open area without local exhaust ventilation, it is highly likely that workers were exposed to solvent vapours.

Likely exposures via inhalation and absorption to solvent vapours and residues from manual assembly.

BUILDING: #21 **DEPARTMENT: NUCLEAR**

General Description
General Working Conditions
Exposure Controls
Nuclear Bundle

Work Processes:

Sand Blasting
Beryllium Deposition
Other Procedures

Chemicals used or produced:

Beryllium
Degreasers
Detergents (caustic soda)
Graphite
Silica
Uranium Oxides
Zirconium (Nickel Zinc, Tin)

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Building: #21 **Department: Nuclear**

Production Process **Chemical Exposure Risk**

General Description: This department is dedicated to the production of nuclear fuel bundle structures and loading of these bundle tubes with uranium pellets for CANDU nuclear reactors. The nuclear division is located in its own separate building #21 on Monaghan Road at the west entrance to the GE complex.

From the mid 1960s to the present, the department has employed 120 to 150 workers on 4 shifts, 24/7, producing 18 to 20 fuel bundles per shift or around 3 bundles per hour. The work is tedious and stressful because of the precision required and fear of radiation and beryllium.

General Working Conditions: This is viewed as the cleanest work environment in the GE complex. But at the same time the toxicity of the materials, namely uranium oxide and beryllium, present a high hazard. In addition to handling uranium oxides and the potential for exposure to beryllium, there are other potential exposures e.g., to silica, graphite, degreasers, and detergents of concern.

Exposure Controls: Local exhaust ventilation has been provided and air seems clean. Radiation and beryllium exposures were monitored and federal and provincial regulations were applied. Workers have been provided with lab coats and cotton gloves, but no respiratory equipment except during maintenance and cleaning operations. In the latter circumstance, air supplied respirators are provided. A shower is provided outside the beryllium room.

Nuclear Bundle: The nuclear bundle produced is comprised of between 26 and 36 nuclear fuel tubes made of an alloy of tin-zirconium. Fuel tubes are held in parallel to one another by a pair of end plate frames. In the assembly of the bundles, small zirconium spacers are brazed to the surface of the zirconium tubes. The spacers are applied to the tubes by a brazing process. These spacers and pads are coated with beryllium.

Beryllium Exposure: According to a paper delivered at the 11th International Conference on CANDU Fuel, current fuel bundle production using Beryllium would not be able to meet the new TLV of 0.05ug/m^3 proposed by the ACGIH. The paper also indicates that current health research on Be exposures shows that Chronic Be Disease (CBD) is on the rise despite exposures being below the current 2ug/m^3 TLV and provincial OEL for Be. This has a direct bearing on the GE nuclear facility in Peterborough. (see J.G. Harmsen*, et al, 'Beryllium Brazing Considerations in CANDU Fuel Bundle Manufacture' 11th International Conference on CANDU Fuel, Niagara Falls, Ontario, October 17-20, 2010). IARC classified Beryllium as a Group 1 carcinogen.

JHSC: 8/23/83 re: degreaser urine test results: "Urine tests on full and part time degreaser operators showed that all had traces of TCE in their urine. Dr (C) explained if TCE is showing up in urine then operator is being over exposed. (Foreman?) told group he was satisfied that operators were working safely and problem is not caused by method of operating."

JHSC: 8/18/84: re: graphite oven: "When ovens are being cleaned workers are being exposed to heavy concentration of fumes."

JHSC: 11/18/86: Be air sampling: "Sample results indicate higher than normal levels of Be for 1st and 2nd quarters of '86. The latest quarter shows levels now back to normal. Employees wore respirators for a time. Since early October, no longer needed. Employees would like this reported on their charts and also recorded with their family physicians."

Exposure Risk to Be: Throughout the Be coating process, there are many opportunities for Be dust to become air borne and inhaled by workers. Measuring out the Be powder, placing it in the crucibles, placing the crucibles in the Be furnace, opening the furnace doors to remove or adjust the strips should they come loose during the process, punching the separators and bearing pads, and

Production Process

Chemical Exposure Risk

PROCESS

Sand Blasting: Zirconium metal sheets used to make spacers are degreased, then sand blasted in the sand blasting room and washed in detergent.

Beryllium (Be) Deposition: Next beryllium is applied to the sheets' surface by vacuum vapour plating deposition under negative pressure conditions in the beryllium furnace located in the 'beryllium room'. The beryllium is purchased in 2 lb tubs in powder form. The powder is hand weighed into a crucible in 5 to 10 g batches in a fume hood. The crucibles are used in a vacuum plating system to deposit a thin layer of Be on zirconium alloy strips. The operator wears a smock, shoe covers and a half face respirator with a high efficiency dust filter (NIOSHTC-21c-135). A maximum of 4 batches are processed per day. During maintenance a full-face air supplied respirator is worn. Coating operators can spend from 1 to 4 hours per day. Longer hours are required during equipment maintenance.

Be plated strips are then processed on two small automatic punch presses. The spacers are stamped on one machine and bearing pads are stamped on the other. Both processes are enclosed and locally exhausted. Punchings are collected in a plastic bag. There are up to 4 operators in this room at a time. Punchings are taken by cart to the coining room to be contoured to tube shape by two operators. These operations generate Be/Zr dusts.

Spacers and pads are tack and brazed to the tubes on 4 tack and braze units. This is done using small RF induction furnaces in enclosed and locally exhausted units.

Other Procedures:

Ultrasound testing to ensure the integrity of the tubes;

Sandblasting in preparation for coating;

Rough cutting the length of the bundles;

Applying liquid graphite to the inside of the tubes;

Baking the graphite coated bundles in oven;

tacking and brazing these to the tubes. All of these procedures can generate Be dusts. And the potential for these eventualities to be realized is reflected in the monitoring results undertaken by the MOL.

Throughout the years of the GE Beryllium coating operation there have been several instances where beryllium-monitoring levels exceeded the old 2.0ug/m^3. Note also, that most of these reported levels exceed the new, currently proposed, TLV of 0.05ug/m^3. See MOL inspection reports as well as work refusal investigations. Report by H.M. Nelson, Industrial Hygiene Branch indicates personal sample results of 41.5 ug/m^3 of Be in the breathing zone during hand sawing of Be bar to obtain beryllium dust for coating. This hand sawing was contrary to what the regulatory agency recommended for the safe handling of Be. Accordingly, the inspector notes: "The sawing of bar stock is a very crude operation. It would be better to either purchase correct size bar stock or obtain powdered Beryllium". **(MOL reports: Building 21, March 23,1965)** Be sampling results obtained the next year were still not satisfactory. Test conducted by GE Safety Unit showed levels of 1.97 ug/m^3 and 1.95 ug/m^3 very close to the TLV of 2.0 ug/m^3. In 1964, prior to GE opening the nuclear unit, the Department of Health recommended three precautions be taken to minimize exposure to "beryllium…considered to be about the most toxic material handled industrially" including: 1) purchase Be in a powdered form to reduce direct contact; 2) place Beryllium room under negative pressure to prevent Be contamination of other areas; 3) separated locker and cleaning areas. **(MOL: Building 21, April 11,1964)**. These recommendations were ignored resulting in excessive Be air contamination of 41.5 ug/m^3 in 1965, demonstrating GE's callous disregard for the health of workers and its poor safety culture.

Note also that these reports indicate that in some instances these measurements were taken when the coating process was not in operation. Be vapours can escape when Be coating oven is opened or being cleaned. Small amounts of Be inhaled or absorbed through the skin can cause serious disease, including

Production Process	Chemical Exposure Risk
Cutting the bundle of tubes to length; Filling tubes with uranium pellets (while not enriched pellets still emit alpha particles); Execute final cut, then weld end caps to the bundled tubes.	cancer. Exposure usually peaked during maintenance operations in beryllium coating operations. Air borne Be flakes noted by workers during brazing operation led to a work refusal in 1983. Tests conducted by the Safety Unit indicated that level of Be was high but below TLV **(MOL: Building 21, February 15, 1983).** During punching of the spacer from the beryllium coated sheets, beryllium dust/vapour is generated, potentially exposing workers to a very potent carcinogen and sensitizing agent. While the main route of entry would likely be inhalation, skin absorption should not be ruled out given the wearing of cotton smocks and gloves. **Uranium Oxide Exposure:** **Monocyte Suppression:** Alpha radiation exposure from Uranium oxide is likely to occur through inhalation given the direct close handling of uranium pellets during the loading process. This is likely evidenced by the low monocyte counts for workers who worked in the nuclear department. This was indicated in the report prepared by Dr. R. Chase at the L.A.M.P Occupational Health Program for the United Electrical Workers, entitled The CGE Nuclear Project: Report on the Investigation into Possible Monocyte Suppression in Uranium-Exposed Workers. It is proposed that reduced monocyte production is a measureable effect of radiation exposures as heavy metal uranium settles in the bone and emits alpha particles. That study found that 44% of GE nuclear workers had reduced monocyte counts that were abnormally low—15-20 times lower than expected in a sample of healthy men and women. When compared with thorax burden counts the prevalence of low counts was across all exposure categories. This suggests that monocyte production is sensitive to levels of radioisotope absorption lower than those experienced by CGE workers. This evidence confirmed the hypothesis that absorbed radioactive particles has a detectable effect on the white blood cells (monocytes). According to Dr. Chase…"Therefore, there are valid and persuasive reasons to suspect

Production Process	Chemical Exposure Risk
	that workers are being affected by their exposure to uranium." **Uranium over exposures:** Inspection reports from the Department of Health indicate instances where biometric monitoring results for uranium in urine far exceeded the allowable concentration of 16.0 ug/L. In one case, worker levels were 1.5, 1.5, 10.6 and 195.0 ug/L for 4 employees **(MOL: Building 21, June 16, 1965)**. **Beryllium dust over exposures:** MOL reports in 1979, reported high beryllium dust readings in the beryllium room requiring remediation and use of respirators until dust readings were within TLV limits **(MOL: March 1, March 9, and June 1, 1979)**. Other considerations: In performing the above tasks, workers position the bundles at groin level. Some of the other procedures potentially expose workers to other hazardous dust from metal cutting zirconium tubing and silica from sand blasting. Participants described an incident where an explosion occurred during brazing, resulting in heavy beryllium contamination.

BUILDING: #22 **DEPARTMENT: WIRE AND CABLE**

General Description
Banbury Mixer Operation
Tuber Operation
3 inch Lead Press
Cotton Braiders
Lacquer Processes
Open Saturation Tank
Tar Pots
Carding Machines
Asbestos, Water and Enamel Carding Machine
Glass Machines
Winding Area

Chemicals used or produced:

Asbestos
Coal Tar volatiles
Creasol, Benzol
Dromus Oil
Dusts/fibres: Asbestos, Mica, Cotton, Jute,
Epoxy Resins: Vinyl Chloride, “lacquer,” “varnish”
Metals: lead, mercury, copper, antimony,
MWFs
Okum
Rubber ingredients: clay, silica, lampblack, fatty acids, red lead, Vulkene,
Thermal Decomposition By-products: lead, phthalates, benzene, formaldehyde, BPA,
butyl perbenzoate, dibutyl phlthalate, dimethyl anline, methyl methacrylate, trichlorahexane, cyclo hexanone, styrene,
Thinners: TCE, Toluene, Acetone, Xylene, varsol
Vinyl ester resins

February 5, 2017

Building #22

Department: Wire and Cable

Sources: Sonya Lal, 2006 (OHCOW retrospective) and Advisory Committee

Production Process

General Description: The Wire and Cable department (1945-80) built conductors capable of carrying heavier currents at increased voltages. It was a large department employing between 200-300 people working 4 shifts. Formex, a magnet wire, was also built to support insulated wire for the windings of motors and numerous outside clients. It is important to note that between 1957-1960 many GE employees transferred between the Wire and Cable and Armature Departments as an alternative to layoffs. (Source: Lal, 2005 OCHOW report)

Production Processes:

Banbury Mixer Operation: This machine produces semi-liquid rubber for external coatings. Ingredients include: clay, silica, lampblack, fatty acids, and red lead (OCHOW has detailed list). It operates at 400 degrees C for 20-30 minutes per batch. Ingredients manually added to hopper by workers from platform (70 to 80 lb. bags of the different ingredients are opened with a knife then poured in). It has an exhaust canopy but is often not used.

Tuber Operations: There were two types of tuber production: Rubber tubers and PVC tubers. 40 employees (plus 12 on stranding machines) worked between the two operations loading semi-soft rubber or PVC pellets into hoppers. 1. Rubber Tubers: Finished product acted as extruders to insulate cables which consisted of three coated wires covered with a rubber tube. Insulation between wires included: fiberglass to 50s, asbestos to 60s and jute fillers with oakum in 70s. Exhaust fans in area often turned off by workers because it interfered with piecework 2. PVC Tubers: There were 7 PBC extruding machines. PVC pellets were poured into hopper of machine, stranded then vinyl chloride insulation (Vulkene) used as insulation in cables.

3-Inch Lead Press: (located alongside tubing area): Copper wire is run through troughs of molten lead (up to 20' in length) heated to 1300 degrees centigrade. One worker operated press that pulled wire through dies in lead-filled trough while a second

Chemical Exposure Risk

Exposure sources: dermal/lung exposures to various ingredients. Fumes from hot mix. Reports of health issues: heart attacks, cancers, COPD. Fumes traveled south throughout building then re-circulated. No exhaust system so fumes trapped within bldg. area (all windows required to be closed due to fume complaints to other areas/buildings, e.g., cafeteria).

1,3 butadiene used in rubber production process.

Significant exposures to fumes from both heated ingredients and thermal decomposition by-products.

For rubber, ingredients included: clay, silica, lampblack, fatty acids, and red lead. For by-products, query 1,3 butadiene?

JHSC: 8/24/78: re: Banbury mixer: "The present ventilation is next to useless. A strong suggestion has been made to operators to wear filter masks. This means a hot and uncomfortable work environment and we hope to expedite installation of ventilation to remove the pollution at source."
JHSC: 8/10/78: Banbury mixer: "Dust samples (Mercapto Imidazoline?) were taken and registered very high."
JHSC: 8/24/78: re: Banbury mixer: "Hazard is reduced (re chemical Mercapto Imidazoline) by having material in solid form rather than powder but there are still dangers involved if precautions not followed. Operators have been asked to avoid barehand contact at all times yet they don't seem to recognize the importance of this precaution."
JHSC: 9/21/78: Banbury mixer:
"Mercapto Imidazaline still being used. It is imperative we get a resolve immediately."
MOL:06/2/77: Workers ignoring safety precautions.

Production Process	Chemical Exposure Risk
worker wound the wire (1/2" coating of lead on wire) onto reels. Winder wore asbestos gloves, breaking off excess lead. Dromus oil often applied to avoid sticking in winding process. Lead Pots manually fed 80 lb. ingots with bare hands. Exhaust fans usually kept off due to cooling effect, which slowed down the process (thus was costly to piece workers). Before winding onto reel, wire went through water bath that produced steam and mist.	For PVC, breakdown products included: lead, phthalates, vinyl chloride, benzene, formaldehyde.
Cotton Braiders: (10 workers per shift, 3 shifts): These included 80 cotton and 18 asbestos braiding machines, the purpose of which was to spindle braids of cotton or asbestos over wire. Worker first dipped asbestos fibers into isopropyl alcohol to ease through machine (each worker had own 5-gallon pail of isopropyl alcohol at workspace). After cotton or asbestos was braided, hot wax was applied to prevent fraying of braid.	Same as above.
Lacquer processes: Newly braided (cotton, asbestos) wires were heated in oven then run through rubber dies and coated with lacquer, then baked. Exhaust system used consistently as aided in process (unlike other areas where it was considered an impediment).	Both workers exposed to lead fumes, with dermal and inhalation routes of exposure. Additional exposures: The stripped off pieces of oil coated lead were returned to pot where oil would react, creating heavy fumes. Workers ate their lunches in area with lead-covered hands. It was difficult for workers to wash their hands during the day for a number of reasons: 1. They were paid by piecework, thus taking time off the floor could significantly cut their pay. 2. Washrooms and cafeteria were both located a significant distance away (only 20 minutes were allotted for lunch). 3. For a number of years water available to workers was recycled (gray water from the plant and later from well on the plant property. Signage throughout stated water was not potable).
Open Saturation Tank: This contained creosol mix to soak cotton used for braiding which was then allowed to drip-dry (the area was heavy with fumes).	Dusty, noisy work area. Asbestos was raw material, no protective equipment to prevent inhalation of dust. Workers handled asbestos daily. Compressed air system used to blow dust off equipment, causing asbestos to be air borne and to travel throughout building and other departments because of negative air pressure.
Tar Pots (molten tar): There were four pots, with one worker per pot. Cotton wire (Braidex) was dipped in hot tar (by hand or machine?) then run through die, sprayed with wax and rolled onto reel.	Bake oven emitted heavy fumes of lacquer plus fumes from varsol and toluene (added to thin the lacquer).
Carding Machines (#31, #32): Employed rolls of asbestos on reel- to-reel machines (25ft long, 5ft apart). A ten-inch roll of asbestos covered 600 ft. of wire. Speed varied between 30 and 40 feet per minute, depending on wire. Carding #31: was set up like bunk beds with 2 lines moving at the same time. Process involved Wire taken off reel and run through ball of asbestos (6ft long x 8 ft. wide). Combs run across ball of asbestos spreading the fibers over moving wire. (Excess Fibers from top line exhausted into bins on roof while excess fibers from lower line dropped into bins underneath). Fiber coated wire	

Production Process	Chemical Exposure Risk
was then run through wax pot and onto 2nd reel. (The paraffin wax process was exhausted to roof). Carding #32: consisted of 2 “dry run” machines (no waxing process) consisting of one line which carded 10 to 12 inch balls of asbestos in one line operation with excess fibers vented to roof bins. These bin vents often got plugged due to the amount of fibers causing more fibers to be dispersed at the process level. (The 10” roll of asbestos covered 6000ft of wire).	Area heavy with fumes from the creosol mix coming from open tank. Inhalation (and possibly dermal exposure to chemicals) exposure risk to fumes which could include creosol, varsol, treated wax, and coal tar volatiles.
Asbestos, water and enamel carding machine: This machine coated wire with asbestos, then a coating of varnish. Combs spread asbestos on wire then wires sent through heated pot of varnish, then baked at 80°F and drawn through water pot to cool. The wire was then drawn onto a reel.	Air was filled with fibers, exposures further exacerbated by: large overhead cranes and machines shaking dust loose, open windows and large amount of pedestrian and truck traffic.
Glass Machines: Varnish treated fiberglass rolls wrapped around copper, run through heated pot of varnish, then baked.	Maintenance workers emptied (through doors on side of bins) the loose asbestos fiber into bags by hand with no protection. (Sometimes they had “snowball” fights; the company sold bags of loose asbestos to workers or the broader community as “insulation”).
Winding Area: Three shifts: 26-day workers; 15 in afternoon; 15 at night. Finished and tested copper wire put on rolls to meet product orders. Doors left often in summer (across from asbestos filled carding area).	Lung and dermal exposure to asbestos and cotton fibers. Same maintenance procedure as above. 4-6 workers, usually on weekends, would clean the asbestos bins with no protective equipment. Entire cleaning of 8’x8’ bin took entire shift. Asbestos fiber handled by hand and stuffed into bags or boxes. Observation by a supervisor was that these workers “looked like snowmen.” No shower or change room available, asbestos likely taken home in cars, on clothes and carried throughout the plant.
	Asbestos exposure; machine vented to roof. Additional exposure to fumes from heated varnish (likely a resin-based product and its by-products).
	Fumes from thermal decomposition by-products. Workers used compressed air to disperse dust, also dry swept, shoveled fiber waste into barrels, then dumped in landfill sites.
	Workers exposed to various types of fibers -- but fibers also further dispersed by them.
	MOL reports:
	MOL: 12/27/45: Introduction of synthetic resin with formaldehyde as a major component for electrical insulation. Also noted plans to expand porcelain

Production Process	Chemical Exposure Risk
	manufacturing. Need to change ventilation to handle silica dust exposure. **MOL:5/11/53:** Identified use of benzol, butyl perbenzoate, dibutyl phthalate, dimethyl aniline, methyl methacrylate, styrene, trichlorohexane, cyclohexanone, and phosphate. Inspector notes these are hazardous. **MOL:3/24/68:** Housekeeping very poor. Thick layers of dust noted. Workers eating and drinking and smoking at workstation; overfilled dross bucket. 8 melting units with no exhaust. **MOL:01/5-6/71:** "asbestos handling considered to be worst in the entire plant. It was realized that the company not fully aware of hazard associated with asbestos dust" "Workers in 22 SW corner are unnecessarily exposed to asbestos fibres produced in this area." Suggested area…"should be segregated from the rest of the building." **MOL:03/27/71:**Pyrax samples are above the TLV. Inspector recommends workers wear respirators. **MOL:07/7/71:** Follow up visit on asbestos in SW corner. Levels at one of the carding machines was the worst recorded at the laboratory. While housekeeping improved there were still large amounts of fibre on the machines and floors. **MOL:07/19/72:** Five of six Asbestos fibre counts are above the TLV. **MOL:09/20/72:** Mica dust from machines is very high. The only machine with exhaust Is above the TLV. So one can "expect higher level at machines not exhausted. Order issued for proper enclosure and adequate exhaust. **MOL:02/6/73:** lead concentrations at lead pots and extruders above the TLV of 0.15mg/m^3. Housekeeping in lead handling area poor. Workers not wearing respirators. Exposures need to be assessed. **MOL:06/7/73:** Inspection re: mercury, lead and epoxy use. Mercury spills are apparent; lead levels above

Production Process	Chemical Exposure Risk
	TLV/inadequate exhaust ventilation; workers handling epoxy resins without gloves or respirators. Evidence of epoxy related dermatitis noted. **MOL:08/13/73:** air sampling and visual inspection "demonstrate that a significant exposure to mercury still exists." Asbestos clean up not complete and area not fully enclosed. **MOL:08/8/75:** Union complaint concerning exposure to vinyl chloride and the death of 6 workers who worked with the PVC production and extruding. Samples taken, but no exposure risk found. Union questioned sampling, e.g. accuracy of draeger tubes, not test for thermal decomposition by-products. **MOL:09/17/75:** Asbestos and mercury—exhaust system for asbestos not working. Asbestos fibre counts close to the TLV. All mercury areas are "….heavily contaminated with mercury." **MOL:10/16/75:** Asbestos levels in drive systems exceed the TLV. **MOL:05/4/77:** Asbestos claim investigated. Asbestos exposure minimized by the wcb because the claimant was an office worker at the time he became ill. However, his employment records show he had significant exposures at the plant in departments heavily contaminated with asbestos. **MOL:06/2/77:** Investigation of exposures to dusts, solvent vapors and gases. Inspector notes heavy odors around blister pack machine; need to advise workers of hazard of antimony and lead in the Banbury area; preventive maintenance on machines using toxic substances; practice good hygiene. **MOL:05/11/79:** Workers' complaint of eye and throat irritation. The new CEECO machine works at faster speed and increase in exposure to oil mist during machine operation and possible exposure confirmed. **MOL:09/6/79:** air sampling for oil mists aborted because of machine breakdown. Inspector concludes all tests under TLV.

Production Process	Chemical Exposure Risk
	MOL:06/22/80: Asbestos assessment; possible exposure confirmed. See comments made regarding numerous asbestos exposures observed.
	MOL:03/25/80: Asbestos paper used as insulation being removed with wire brush exposes workers to asbestos fibre.
	MOL:08/12/80: Lead exposure confirmed in the PVC compounding area. Although urine lead-levels did not exceed the TLV, inspector notes need for better housekeeping for cleaning up the compounding area with a vacuum cleaner rather than sweeping.

BUILDING: #22, 24, 26 **DEPARTMENT: TRACTION MOTORS**

General Description
Metal Machining
Resin Coating
Baking Resin Coated Parts
Brazing and Welding
Cleaning and Degreasing
Cleaning and Grinding
Sand Blasting
Power Washing
Powder Painting
Induction Brazing

Known Chemicals used or produced:

Arsenic
Decomposition by-products: BPAs, benzene, formaldehyde
Resins: vinyl toluene, glyptol
Detergents
Welding/Brazing fumes: flux core, hard wire, lead, silver, steel, silflex
Degreasers: MEK, TCE
Silica, sand
Dust/particles: asbestos, resins, metals, epoxy paint, silica, sand,

February 5, 2017

Building #22 (CIR. 1994-2004) **Department: Traction Motor Production**

Production Process	**Chemical Exposure Risk**
General Description: Traction motors is essentially an assembly operation of traction motors used to run locomotives and heavy equipment in mining operations. The operation ran 24/7 with 3 shifts, employing many employees. The operation produced 2 motors per hour—approximately 80 per week. This was a very intense operation that ran from 1995 to 2013 (18 years). The operation occupied the three buildings #s 22,24,26 that housed the wire and cable operation until 1980, and drive systems until1994.	Summary: Inhalation and absorption of MWF (biocides) mists, metal dusts, degreasers, epoxy resins and thermal decomposition by-products such as BPA, formaldehyde, benzene, complex mixtures in welding fumes, brazing fumes such as lead, silver, silica dust, detergents, epoxy powder paints.
The operation involved: large scale machining, epoxy resin coating and oven curing, brazing and welding, cleaning, degreasing and grinding of parts, sand blasting, power washing and epoxy painting.	
Metal Machining: Metal machining involved large scale drilling, boring, machining, cutting utilizing large amounts of cutting oils, cooling fluids collectively known as Metal Working Fluids (MWF). These vary in composition, e.g. some contain toxic biocides to prevent bacterial growth. The machining process generates large amounts of metal particulate as well as aerosols and mists of MWF. Heated fluids will also produce thermal decomposition by-products in the form of smoke. Focus group participants confirm that these were the conditions during the machine operations.	Inhalation and skin absorption of MWF mists and aerosols (some with biocide). Inhalation of metal dusts of fine airborne metal particulate. Inhalation and skin absorption of degreaser fumes. Risk factors include: poor local exhaust, heavy production schedule, poor PPE, poor PM. Symptoms: worker complaints and treatment for irritated eye, nose and throat, dermatitis. Atmosphere visibly saturated with mist and aerosol.
Resin Coating: Vinyl Toluene Resin coating of parts in Vacuum Pressure Infusion Tanks. These tanks were equipped with automated lids that slowly opened when process was complete and was provided with a lip exhaust system to capture vapours and fumes from the resin tanks. While an improvement over the older models, workers in distant departments would complain about the fumes from Fractional Motors reaching as far as buildings 16 and 14. Workers in Fractional frequently complained and experienced symptoms—headache, eye, nose and throat irritation sign exposure taking place.	Inhalation of uncured epoxy resin fumes during dipping process even though local exhaust provided at the lid lip of the VPI tanks. Fumes from wet parts being transported to the ovens for curing and baking. Odours were very strong from this operation and could be detected in other areas of the building as well as building 22. The strong odours were detected as far as buildings 14 and 16, indicating that fumes

Production Process	Chemical Exposure Risk
Baking resin-coated parts: Resin-coated parts were baked in ovens for 7.5 hours twice. These were large ovens that were not totally enclosed. During the baking process workers would squeegee resin around the parts to ensure resin penetrated thoroughly and evenly.	were very dense during the dipping and curing operations. Exposure risk was high.
Brazing and Welding: Both brazing and welding were extensive. Welders would braze 20" long bars of copper using silver solder—"Silflex". This produced large amounts of solder fumes throughout the area. Induction brazing would produce large amounts of fumes and smoke.	Inhalation of resins and thermal decomposition by-products from the baking process, e.g. BPA, formaldehyde, benzene, et all. Both the MOL and MOE investigated this operation frequently because of complaints. Workers symptoms: irritated eye, nose throat, dermatitis.
Cleaning and Degreasing: Cables were cleaned and degreased with MEK and TCE. Residues would produce various decomposition by-products during the brazing process. There was the possibility of the formation of phosgene gas. Great amounts of vapour, fumes, and strong solvent odours reported by workers during cleaning process.	Inhalation of welding fumes from brazing. Inconsistent local exhaust ventilation. Poor general ventilation. Building was under negative pressure and low ceilings which, in combination with negative air pressure, tended to disperse contaminants to other areas. Inhalation and skin absorption of degreaser fumes and vapours as well as thermal decomposition by-products. Frequent complaints by workers of this degreasing operation.
Welding: There was extensive welding of various types in traction production. This involved MIG, TIG, Flux-Core, Hard wire, torch cutting of heavy steel. The welding area in building 22 involved welding braces to stators and balancing weights to rotors before machining. Cutting torches used to remove bridges from stators before machining. Extensive "torch brazing" was carried out at the "Brazing Tower." These areas had heavy welding fumes and inadequate exhaust ventilation and frequent complaints. Safety inspectors conducted numerous investigations of worker complaints.	Inhalation of large amounts of brazing and welding process fumes. Likelihood of exposure high given the amount of brazing and welding and the lack of adequate local exhaust ventilation and general ventilation. While some ventilation hoods were provided they were not adequate to draw the fumes away from the welders. Consequently, the MOL was called in many times to investigate the "Brazing Tower" operations.
Cleaning and Grinding of Parts: Bore cleaning operations were subject of concern and complaints from workers about exposures to fine cured resin dust produced by the grinding and buffing operation to reduce high spots caused by excess cured resin in the bores. Workers would also sand and buff "spigots" and "tap holes." This process produced great amounts of "brown powder" dust from cured resins. Workers were only provided paper dust masks.	Inhalation of very fine powdered resin dust from grinding, sanding and buffing of bores, surfaces, and tap holes. Powdered resins would also be ingested and absorbed through the skin. There was no adequate exhaust ventilation. Workers were provided with paper dust masks. Over the years workers ate their lunch at the workstations.

Production Process	Chemical Exposure Risk
Sand Blasting: Sand blasting with Silica of parts in enclosed cabinet was to prep parts for fitting. Parts were placed in automated blasting cabinet. When blast was complete the workers would open the door to remove the part. The workers would use compressed air to blow off dust from the part and surrounding surfaces and clothing. Workers describe this as a very messy process with grit and dust all over. This was difficult to maintain and they would have to continually add silica to keep the operation working as sand would become contaminated with other substances on the parts.	Inhalation of fine silica dust and other contaminants in the contaminated silica. Likelihood of inhalation and exposure is high given the volume of silica used, lack of exposure control and the use of compressed air to blow of dust on parts, machines and clothing, and the lack of adequate PPE.
Power Washing: Power washing of parts with a mix of detergent was done after machining and fitting. This produced a great deal of aerosol of detergent and degreasers. This work was done in preparation for powder painting with epoxy.	Inhalation, absorption and ingestion of aerosols containing detergents and other degreasing agents high.
Powder Painting: Parts were painted with epoxy powdered paint. Powdered epoxy paint was sprayed on heated parts (rotors) and then baked in an oven. This produced great amount of paint particulate as well as fumes from the baking process—thermal decomposition by-products from epoxy paints. Workers did not have adequate respiratory protection or local exhaust ventilation.	Inhalation, absorption and ingestion of powdered epoxy paint particulate as well as thermal decomposition by-products from the baking process. This latter issue might involve BPA, formaldehyde and benzene, et al.
Induction Brazing: Induction brazing in the "winding area" involved electrical fusing of solder with an induction current. This operation produced a great amount of smoke from the melted solder. While "smoke eaters" were provided they were fraught with frequent problems with clogged filters. Cleaning the smoke eater filters exposed workers to large amounts of residues from the smoke produced by the brazing process.	Inhalation of solder fumes and other degreasing residues on parts. Workers report frequent symptoms and complaints of irritated eye, nose and throat and headache. Workers also reported bad taste in mouth when cleaning 'smoke eater' filters.

BUILDING: #23 **DEPARTMENT: ELECTROPLATING**

General Description

General Work Tasks:

1. **Preparation of Tanks**
2. **Dipping and Racking**
3. **Periodic Monitoring**

Specific Process:

1. **Metal Pre-Treatment**
2. **Electroplating**
3. **De-plating or Stripping Process**
4. **Plating, Cleaning and Maintenance**

State of Industrial Hygiene Controls

Known Chemicals used or produced:

Beryllium
Degreasers
Detergents (caustic soda)
Graphite
Silica
Uranium Oxides
Zirconium (Nickel Zinc, Tin)

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Building #23/16N — Department: Electroplating

Production Process — Chemical Exposure Risk

General Description: GE operated several electroplating operations (1950-95) over the years. Initially, plating took place at the NE corner of building 16 (25 years) then in 1974 moved to #23, a newly constructed building which was separate from the main GE buildings. Electroplating was closed down in 1995.

The building (#23) was approximately 25,000 sq. ft. with a basement waste treatment facility of 6000 sq. ft. The department employed 10 - 12 employees on one shift, 5 days per week.

There were between 5 and 6 large plating lines depending on client demand. These plating lines utilized approximately 85 dipping tanks with plating solutions of cyanide acid and various metal salts -- including two large vapour degreasing tanks containing trichloroethylene for various metals, and trichloroethane for aluminum. Additionally, the process included several acid and caustic soda baths for cleaning and etching, as well as rinsing tanks.

Each plating line used tanks of 100 to 300 gallon capacity. The small automatic plating line had eleven 30-gallon tanks and one 200-gallon tank. The automatic lines did not require operators to approach the cyanide tanks.

During its early operation, the plating department provided in-house plating services to GE's various departments. In the latter period, production increased as the plating department served a variety of customers requiring specialized plating for their products.

The various lines included: brass plating, zinc plating, chrome plating, nickel plating, and silver plating. Plating solutions contain various metal salts and acids, alkaline materials, and other additives to impart stability or functional properties to the solutions.

General Work Tasks:

1. Preparation of tanks:

General Description of Exposure Risks in the Plating Operation:

Pre-Plating Stages:

Exposure risks in the plating department were high, both daily and routinely given the following risk factors: Workers directly handled toxic solution ingredients in large containers pouring and mixing in the plating tanks (various forms of cyanide acids, mixed with various metal salts, formed the plating solutions). The risk of inhaling dusts, while pouring and making skin contact with powders and liquids during mixing and from spills was high.

Eating and smoking at the workstation put workers at risk of ingesting various toxins.

Workers also handled solvents, acids and alkaline solutions for pre-treatments of metals. There is risk of inhalation and skin absorption as well as ingestion due to the practice of eating and smoking at the workstation. Not having access to washing facilities increases the risk of ingestion of these toxins (See MOL inspection reports, 1986).

Workers were also exposed through inhalation and absorption, when leaning over plating tanks while retrieving baskets and racks with parts being plated.

Finally, it is important to consider the large volumes handled by these workers and the frequency of these mixing tasks as well as the provision of inadequate protective equipment (Audit, 1984, wearing of cotton not rubber gloves, not wearing eye protection).

Exposures During Plating

The following routine exposures are highly likely given the risk factors concerning inadequate local exhaust ventilation reported, the build- up of various salts caked on surfaces and exhaust systems, routine direct contact with the plating tanks and solution and identified poor housekeeping practices:

1. Metal salt mists generated above the electroplating baths containing chromium, nickel, zinc, silver, brass compounds;

Production Process

direct handling and preparation of degreaser and acid solutions for pre-plating; preparation of plating solutions to be dispensed from large drums into the tanks;

2. Dipping and racking:
This involved manual loading and unloading of racks or baskets; moving the (racked) parts from tank to tank -- usually with the help of an overhead hoist;

3. Periodic monitoring of operation:
Employees were required to enter the plating tank area to check on operating conditions of the plating baths and maintain level of solutions as required.

Note: Cyanides were purchased in 10 to 100kg containers, (e.g. silver cyanide in 10kg, zinc and sodium in 100kg). These chemicals were handled manually by workers while pouring into tanks to make, or maintain, plating solutions.

Dust and splashes during manual handling of powder frequently occur resulting in contamination on skin and clothing.

Note: several MOL reports and environmental assessments available identify this risk. Workers ate lunch and smoked at work- stations. No easily accessible washing facilities were available and no lockers to change clothing.

Specific Processes:

1. Metal Pre-treatment: Prior to plating, base metals were thoroughly cleaned to ensure adherence. This involved use of solvents, acids, and alkaline solutions. Degreasing solvents were used to remove grease, oils, etc. The plating shop had two large vapour degreasing tanks 8'x4'x6', one for trichloroethylene and one for trichloroethane. According to GE retirees, benzene was used to degrease in the plating laboratory area. Acid solutions used to remove metal oxides were referred to as pickling. Alkaline solutions were used to remove oils and solid soils through detergent action. These were sometimes agitated by the infusion of gas bubbles. These pre-treatment solutions were usually located at the beginning of the plating lines. Water

Chemical Exposure Risk

2. Acid/alkaline mists generated in the pre-treatment phase were very much present in the atmosphere as viewed as likely cause of severe corrosion of structural beams in the building itself. These were also indicated by workers' symptoms of eye, nose and throat irritation;
3. Cyanide mists, both cyanide salt mists and hydrogen cyanide mists, were likely air contaminants, given that both were naturally generated by the electrolysis process;
4. Organic Solvent vapours and mists were highly likely given that both solvents were contained in very large (8'x6'x4') vapour degreasing tanks. Both trichloroethylene and trichloroethane were present in the atmosphere.

In assessing exposure one must consider not only air concentrations, but also the fact that these solvents will be deposited on the skin and clothing, thus absorbed through the skin. And since workers were smoking and eating at the workstation, they also ingested these contaminants. One must look at the total burden and the chronicity of these exposures.

Given the conditions of workplace, the routineness of exposures, the direct handling and volume handled daily, then toxic exposures must be considered high from an industrial hygiene perspective.

The other contributing factor re: exposure risks has to do with the serious issues of poor housekeeping and maintenance, the improper storage of acids and cyanide, leaking tanks and drums of cyanide and acids, and improper labeling. The 1984 audit notes: "Allowing chemical salts to build-up on tanks, side shields, and in exhaust ducts openings. This accumulation of materials adds to the internal environment and increases employee exposure to hazardous substances See P. 4, consultants "Audit", 1984. (See: Briggs, 1984 below).

Maintenance and cleaning tasks increased the risk of exposure. Removing caked on metal and acid salts involves scraping and grinding which increases

Production Process

rinse-tanks were usually located between the various pre-treatment tanks.

Vapours and mists from the various treatment tanks were readily apparent, including a toxic mix of solvent vapours and both acid and alkaline mists and vapours. Workers reported heavy odours of solvents. According to workers, eye, nose and throat irritations were prevalent in the department.

Note: An engineering report indicated that structural beams in the building were significantly corroded from exposure to the various acid and alkaline vapours generated by both the pre-treatment and plating processes (reason for closure of plating).

2. Electroplating Process: During the electroplating process, an electric current passes through the plating solution resulting in the deposition of the plated metal on the cathode.

The electroplating process results in the release of hydrogen and oxygen gas bubbles, which, as they rise, entrain plating solution droplets. These are carried into the atmosphere and form a mist containing: cyanide; metal salts such as chromium, nickel, zinc, arsenic and cadmium; and acids, including hydrochloric acid, nitric acid, sulfuric acid, and chromic acid mists.

The generation and emission of these contaminants in the atmosphere depend on the current efficiency associated with the different plating solution, e.g. chromium plating is low efficiency of 12 to 15% resulting in severe misting, while nickel plating is high efficiency resulting in much less misting. Solvent emissions are also part of the environmental mix, particularly trichloroethylene below the TLV (See MOL report).

Asbestos:
Insulation on Crown plates frayed in some areas. Likely exposure to asbestos.

3. De-plating or Stripping Process: This involves stripping the base metal of previous coatings by dipping the metals in solutions of cyanide acid. This

Chemical Exposure Risk

dispersion of contaminants and risk of inhalation, absorption, and ingestion.

Potential exposure to cadmium, tungsten and cobalt noted by inspector (MOL:8/5/81). Recommendations made for good housekeeping and local exhaust ventilation and/or appropriate respiratory protection.

MOL:5/28/82: Toxic inhalation/absorption hazards noted and orders issued. Order#119 noted build up of cyanide waste over dyke under merry-go-round.

Given the lack of local exhaust ventilation noted in the MOL report cited below, it is highly likely that the workers inhaled cadmium fumes from the silver brazing operation.

Further evidence of exposure is the respiratory symptoms reported to the Ministry of Labour in 1981 and the subsequent issuance of orders to protect the worker from exposure to a toxic substance i.e. silver solder fumes and cadmium (See MOL:4/15/81).

Given the deficient state of engineering controls and the frequency and duration of exposure in tending to plating tanks, e.g., sampling solutions, dipping and removing plated materials from plating tanks, there was significant risk of inhalation and absorption of contaminants.

is a hazardous process since it can readily generate hydrogen-cyanide gas (HCN).

4. Plating Cleaning and Maintenance: Maintenance tasks included cleaning out slurry from clarifiers, removing various caked on plating salts from tanks and exhaust systems. These tasks were a significant source of exposure. Since an Audit called for increased cleaning and maintenance, the risk of exposure increased substantially.

5. Silver Brazing: The silver brazing area was located in the SW corner of Bldg. #23 and measured about 20'x12'x20' and shared the general ventilation system of electroplating department. There was no local exhaust ventilation. A pedestal fan was used to blow the fumes away from the worker.

One employee worked 40 hrs/wk. The work consisted of joining various metal parts (stainless steel, copper, brass, bronze, elkonite, etc.) with a natural gas torch at temperatures between 1300 to 1800°F. Most commonly used solders were: easy flow 45 (silver, copper, zinc, nickel and cadmium [24%]) and Easy Flow 3 (silver, copper, zinc, nickel and cadmium [17%]). Up to 50' of 1/16th used per shift. Fluxes included: Handy Flux A1 and Johnson Matthey Flux and Mattiflux 3A. The former contains fluorides and zinc chloride while the latter contains fluorides.

State of Industrial Hygiene Controls:

1. Engineering Controls: Local exhaust ventilation was provided, but an environmental assessment indicated serious deficiencies in exhaust ventilation including inadequate capture velocities and insufficient make-up air, starving exhaust from extracting contaminants.

Note: See several plating department reports identifying deficiencies in the local exhaust systems.

Examples include: Nitrous Oxide fumes from nitric acid because nitric acid tank exhaust not functioning properly; plating chemicals leaching out of exhaust ducts; exhaust ducts plugged with chemical salts; exhaust ducts partially blocked by chemical salts

Production Process **Chemical Exposure Risk**

resulting in plating fumes and mists to contaminate the area (Harvey Briggs, Associated Environmental Consultants, "Environmental, Health and Safety Audit, Peterborough Plating Shop, Canadian General Electric Company, Peterborough, Canada, 1984).

2. PPE/Housekeeping: Reports indicate that housekeeping and cleaning were not routinely performed. Evidence of improper storage of hazardous materials; staff wearing cotton, instead of rubber, gloves; not wearing safety glasses; employees smoking and eating in plating shop; workers leaning over plating tanks to remove plating baskets or racks while mist are being emitted all indicate poor housekeeping and safety practices. Briggs states: "Housekeeping and preventive maintenance at plating facility is a full time job and will require more than a Friday afternoon wash down" (P. 9, Briggs, 1984).

(Harvey Briggs, Associated Environmental Consultants, "Environmental, Health and Safety Audit, Peterborough Plating Shop, Canadian General Electric Company, Peterborough, Canada, 1984).

BUILDING: #24 **DEPARTMENT: FORMEX**

Formex Operation

Process:

Steps: 1-6

Known Chemicals used or produced:

Asbestos

Acetone

Enamels: Alkenex, Formex, Formes, Formex A1, HLM, ML, MLR

Fumes: enamel, degreasers, copper/enamel

Degreasers/Thinners: Toluene, MEK, Varsol, Acetone

Metals: copper

Thermal Decomposition By-Products: BPA, formaldehyde, benzene

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Building # 24 **Department: Wire and Cable (Formex)**

Production Process	Chemical Exposure Risk
Formex Operation: Refers to applying enamel coating on copper wire. End product is Formex wire with varnish (enamel) on it. No MSDS available on "varnish" epoxies which included: Straight Formex enamel, Alkenex, Formex A1, MLR, Formes, ML, and HLM which were contained in 45 gallon containers and thinned with Toluene or MEK. "Alkenex" described as "the worst" was supplied by Davenport (likely the GE plant in Toronto on Davenport Ave). Operation involves 26 machines and 16 reels.	Inhalation of potent fumes linked to a number of brand epoxy "varnishes" including uncured epoxy fumes and decomposition by-products such as BPA, formaldehyde, benzene et al.
Process:	
1. Copper wire drawn through gas converter, which creates atmosphere of carbon monoxide circulation until proper thickness (diameter) is achieved.	Inhalation of copper fumes linked to heating and drawing through dies.
2. Next, wire goes through annealing oven to soften wire prior to coating stage. Gas coming off annealing is exhausted outside (system changed from water exhaust to catalytic converter due to neighbor's complaints of brown film on their windows).	**JHSC: 8/14/79: re: asbestos:** "Asbestos is used to stuff openings on annealing oven in formex. Alternative materials available!"
3. Wire then goes through vertical dipping process. Pump placed in 45 gallon drum containing heated (30°F) varnish which travels up and down a series of loops while coating copper wire -- excess varnish drips into large troughs.	Inhalation of both copper and varnish fumes during dipping and heating operations.
4. Wires then travel along vertical ovens at 3 different temperatures (150, 175, and 200 degrees). Three-inch gap between vertical ovens allows fumes to disperse.	
5. Workers regularly maintained sheaves (part of machine) from a catwalk above the varnish coating operation, by scraping excess varnish off the vertical "sheaves" 10-12 times per shift applying varsol and acetone by brush to clean them. They would "trouble shoot" by cleaning sheaves 1-3 times per hour without personal protection.	Inhalation and dermal (face, eyes, arms, hands) exposures to varnish, varsol, acetone, and muriatic acid, and perhaps other chemicals during maintenance activities.
6. Involved dipping sheaves in muriatic acid bath in 6'x5' open troughs, then drip-drying the sheaves for 5-6 hours. This later process created heavy vapours and led to frequent complaints of severe eye irritation.	

BUILDING: #26 **DEPARTMENT: WIRE AND CABLE**

Shaved Mill Operation
Butt Welding
Tin Pot Operation
Tar Pot Operation
Mercury Test Area
5-Inch Lead Press
Hassel Machine PVC Mixing Operation

Known Chemicals used or produced:

Asbestos
Coal Tar
Degreasers: TCE
Dromus Oil
Dusts: copper, asbestos, silica, flame retardants,
Fumes: brominated/chlorinated flame retardants, welding, degreaser
Granulated resin
Metals: Copper, Tin, Lead, Mercury, other heavy metals
Muriatic Acid
Pigments
Thermal Decomposition By-Products: phthalates

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Building # 26 **Department: Wire and Cable**

Production Process **Chemical Exposure Risk**

Shaved Mill Operations: Wire reels delivered to shaved mills (#131 and #132) by crane and lift trucks. Then Degreasing/cleaning of wire prior to and during shaving done in solution of TCE and "soap." Pails of solution is poured into large troughs and handled with cotton gloves.

Butt Welding: Welders spot-weld end of one reel of copper wire to another creating an "endless" reel. Process involved fusing of wire ends with electrical injection. Welders fused between 60 and 3000 lbs. of copper daily.

Tin Pot Operations: Tinning of wire employed three pots of tin, with 6 copper wire reels on each side of pot. Wire was run through muriatic acid and a die and then run through a water bath to cool (done by machine). Process ran at 300' per minute. Note: when fumes exhausted through roof, trees in surrounding area were damaged as reported by supervisor in OCHOW report.

Tar Pot Operations: (one employee per shift dedicated to this job) Coal tar pitch applied to mining cables (cables used in mining operations). BX armour wrapped around cable then interlocked. Jute burlap treated with coal tar pitch applied and wrapped around the wires. Cables were 4"-5" in diameter. 10,000 feet of tarred cable produced per year.

Mercury Test Area: 4-5 operators per shift tested Formex wire for continuity. Wire was run through open mercury filled trough (10"x12"x1 ½). Workers used bare hands to draw hot wire through trough (wire was slippery). Noted neurological symptoms and thickening of nails in workers signs of mercury poisoning.

5 Inch Lead Press: Copper wire is run through troughs of molten lead (up to 20' in length) heated to 1300 degrees Centigrade. One worker-operated press that pulled wire through dies in lead filled trough while a second worker winds the wire (1/2 coating of lead on wire) onto reels. Winder wore asbestos gloves, breaking off excess lead. Dromus oil applied to avoid sticking in winding process. Lead pots manually fed

Risk of daily exposure of workers to exhaust from lift trucks. Fine copper dust visible (from shaving process) that was swept or blown with compressed air. Workers noted dust up to 2" thick. Shaved mill and crane operators both exposed to copper dust and TCE solution. Bodies and clothes covered in copper dust that turned green. Complaints of burning skin and eyes. Workers often ate in work area.

Daily exposure to welding fumes, and copper fumes. Butt-welding generated significant smoke and fumes. Vapour residue of degreasers on wire being fused.

Significant chemical exposures from fumes from acid bath and tinning pots. Exhaust system shut down most of the time for "more efficient" cooling.

Exposure to coal tar volatiles (molten tar pots). Exhaust system usually shut off (interfered with maintaining temperature of coal pots). Workers identified that "no respiratory equipment was provided." Numerous employees complained of, and were diagnosed with, lung complications in this work area (likely related to muriatic acid exposures and coal tar fumes). Lack of ventilation resulted in heavy accumulation of odors throughout the area.

Biological monitoring carried out on workers in mercury test area. Those with high levels of mercury transferred to other departments.

MOL:06/7/73: "large mercury globules noticed under machines." Mercury vapour measured at 0.04 to 0.05 mg/m^3 at breathing zone; 0.01 to 0.02mg/m^3 at floor level. TLV=0.05mg/m^3. Urine analysis little or no absorption. Orders issued for: no eating, housekeeping, personal hygiene and urine test every 3 months.

MOL:09/17/75: High mercury concentrations—0.06, 0.08,0.05,0.08,0.04 mg/m^3 exceeded TLV. Employer failed to comply with previous order regarding mercury exposure. Recommend to re-issue order 3-month compliance deadline. No charges filed for non-compliance.

Production Process	Chemical Exposure Risk
80 lb. ingots with bare hands. Exhaust usually kept off due to cooling which slowed down the process (which was costly to piece workers). Before winding onto reel, wire went through water bath that produced steam and mist.	**MOL:06/7/73:** Inspection re: mercury, lead and epoxy use. Mercury spills are apparent; lead levels above TLV/inadequate exhaust ventilation; workers handling epoxy resins without gloves or respirators. Evidence of epoxy related dermatitis noted. **MOL:08/13/73:** Air sampling and visual inspection "demonstrate that a significant exposure to mercury still exists." Asbestos cleanup not complete and area not fully enclosed. (Re: 5 inch lead press) Both workers exposed to lead fumes. Dermal and inhalation routes of exposure. Exposure Notes: The stripped off pieces of oil coated lead returned to pot where oil would react, creating heavy fumes. Workers ate their lunch in area with lead-covered hands.
Hansel Machine (1975) PVC Mixing Operation: Nine different colours and mixes used. Hopper (4'-5') manually filled with granulated resin. Machine extruded strips of PVC that were diced to form pellets. Dicer produced a lot of dust with heavy fumes created during the mixing process. This was a heavy PVC production area. In addition to vinyl chloride monomer this process used several tons of lead per month as well as phthalates, pigments, asbestos, silica, brominated/chlorinated flame-retardants, and various other heavy metals depending on the specified recipes	Exposure to chemical fumes and dust including: PVC fumes, VC fumes, phthalate fumes, silica, lead, flame-retardants, asbestos (up to 20 or more ingredients depending on product specifications). Dicer produced a lot of dust, as did loading the hopper. Workers exposed to heavy fumes during mixing process. Accumulated dust dry-swept and/or blown by compressed air. Exhaust system usually turned off. No gloves, safety glasses used by workers who often ate at their workstations. Exposure risks occurred during ingredient handling by opening bags, handling material, pouring material into hoppers, and during mixing and heating phase, during the extrusion phase, and during the purging and maintenance procedures. **JHSC: 12/1/78: re: PVC mixer malfunction:** Mixer unit overheated causing rapid decomposition of materials in process. Reaction gave off HCL acid fumes, which engulfed (worker) and partially incapacitated him. He managed to evacuate area and sent out for treatment. Letter sent to manufacturer re: installing of backup system to sense excessive temperature build-up with automatic cutoffs. **MOL:01/21/47:** "Girl Fettling Area"- located at west end of bldg.#26 noted high silica dust counts approaching TLV. Also, 8 of 9 air samples above the mercury TLV.

Production Process	Chemical Exposure Risk
	MOL:01/27/47: Overdue exams regarding employee examination for lead poisoning. Levels at lead pots: 1.0 and 0.3 mg/10m³ noted to be lower than TLV.
	MOL:05/05/47: "ideally, testing should be enclosed booth as spray painting." Need to keep close check on amount of mercury used. High loss (of mercury) indicates further checking necessary.
	MOL:10/31/47: Update on company's clean up of mercury: "some progress has been made". Request for toxicity information on PCBs but no information "found".
	MOL:02/24/49: Pyranol sampling: "amount found is higher in spots that we like."09/12/55: review of varnish coating process during the Formex process. Smoking in the workplace acceptable 10 and 20 feet from the varnish area. Name of varnishes difficult to read eroded print—'formex, invarek'.
	MOL:06/04/63: Mercury exposures in condenser checking area and formex testing area. Globules of mercury on switch boxes and floor. Evidence of continued mercury problem.
	MOL:12/16/68: Fluoride fumes from welding flux in brazing area using silver solder. Recommendation to test the air for fluoride fumes.
	MOL:05/31/68: Lead in the PVC pelletizing area. Test for lead fumes, but not results shown in building 26.
	MOL:10/16/69: Analysis of epoxy paint by MOL identified it contained uncured epoxy resin, pigment and solvent. Catalyst consisted of epoxy resin modified with amine and solvent. Epoxy paint contents: toluene, xylene, ethyl cello solve, and unidentified keytone. Catalyst contents: normal butyl alcohol, toluene and xylene.
	MOL:08/12/80: Tinning section identified as a confirmed area for lead exposure.

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BUILDING: #30 **DEPARTMENT: BUS DUCT**

General Description
General Working Conditions
Cutting and Rolling Aluminum Sheets
Bus Duct Assembly
MOCA Production

Known Chemicals used or produced:

Asbestos
Chromate paint
Fibreglass
Welding fumes MIG, TIG
MWF
Ozone
Fire retardants
Etching chemicals
Vinyl wash,
Yellow zinc chromates
Green zinc chromates
Dasco tap
Epoxies: green and orange epoxy enamels, MOCA
Fumes: enamel paint, degreasers, aluminum/stainless steel/copper welding
Metal Dusts: aluminum, stainless steel, copper, tungsten
Solvents: TCE, 1,1,1-Trichloroethane, toluene
Thermal decomposition by-products: aluminum alloy, tungsten, magnesium, hexavalent chromium
Black fibreglass tape irathene tape

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Building: #30 **Department: Bus Ducts**

Production Process **Chemical Exposure Risk**

General Description: The Bus Duct department was essentially devoted to the construction of 'bus ducts' which were electrical conduits housing copper bus bar conductors for high voltage transmission constructed with electrical grade aluminum alloy and copper bars. It employed 15 to 20 workers per shift.

This involved primarily aluminum welding and copper brazing as well as some stainless steel welding. It also required metal grinding, sanding, and planing -- as well as degreasing in preparation for painting. Upper levels of the building contained: machining, painting, degreasing, MOCA production, aluminum cutting, sawing, drilling and rolling.

General Working Conditions: There was little local exhaust ventilation particularly in the aluminum welding operation. Atmosphere was dusty, smoky and contained solvent odours and vapour. Housekeeping was described as poor. MWF use was high during aluminum machining and planing. MOCA production process was poorly ventilated. Ventilation was blown downward and was also affected by the negative pressure in the GE complex. Fumes (MOCA, MWF, welding) from the operation on the 3rd floor were sucked down the elevator shaft to the ground floor.

Cutting and rolling aluminum sheets: Aluminum plates were cut to size using band saws and hand held circular saws. Aluminum was treated with MWF. The cut sheets were then rolled with large rolling machines shaping them into bus ducts. The sheets were next deburred, bevelled and sanded. After cutting and shaping, aluminum was degreased by hand and prepared for welding.

Bus Duct Assembly: welding individual ducts together, using TIG and MIG electric arc welding assembled the bus ducts. 5 to 6 welders on each shift carried this out. This work produced large amounts of aluminum welding fumes as well as high concentrations of ozone gas and residues from degreasers. Welders were provided with 20" oscillating fans to blow the ozone away from the welders. This was problematic because it caused dust Workers in this department were regularly exposed directly or as by-standers to the welding processes. This led to inhalation of aluminum and stainless steel welding fumes as well as fumes from copper brazing operations and vapours from solvents.

Welding Fumes and Gases: The aluminum arc welding operation involved TIG and MIG welding that produced heavy concentrations of aluminum alloy as well as tungsten and magnesium by-products from the intense heat. Aluminum also produced heavy concentrations of ozone gas. These emissions were not well controlled since there was a lack of local exhaust ventilation and no adequate PPE. Ozone gas is classified as a group 1 carcinogen by IARC. The operation of 20" fans to address the ozone gas only dispersed fumes and other contaminants to other areas of the building to be inhaled by other workers. Exposure to ozone gas was a frequent complaint from by-stander workers and welders. Consequently, welding fumes and ozone were blown around the building and sucked into the paint shop.

JHSC: 3/19/81: re: ozone: "Extremely high ozone reading. [It took] one pull when usually 5 pulls on drageur [test tube] and ozone reading went off the scale."

JHSC: 3/23/82: re: ozone fumes: "Air filtering system was installed but not enough masks for all workers. Airflow in bldg. causes heavy concentration of ozone at east end of bldg. where paint booth located. One worker constantly wears an air supply mask when welding is being done, even though he himself doesn't work on welding, saying 'he feels better since he started wearing it'."

Solvent Exposures: Workers were also exposed to various solvents that were used to degrease in preparation for welding or painting. These solvents such as 1,1,1 - Trichloroethane, toluene were applied by hand with soaked rags. These were inhaled in close quarters as well as being absorbed through the skin since they were applied with bare hands.

Production Process

and ozone to migrate to other workers. Respirators were optional and were rarely worn by welders.

Asbestos blankets were used during welding to protect plated parts from welding splatter. Welders lay on these blankets during welding and would be covered with asbestos fibres upon completion.

Solvent degreasers were trichloroethane, 1,1,1-trichloroethane, and toluene applied by hand cloth.

After welding bus ducts were cleaned in a Vinyl wash containing acid. These were then painted with zinc chromate yellow or green enamel paint as a finish coating. Paint spray generated heavy paint odours and vapours. A vertical exhaust fan was provided.

The paint booth used 5-gallon pails of acetone, lacquer thinner, naphtha gas, MEK and isocyanate paints.

It was noted in plant documents that the west end loading bay of bldg. #30 contained unlabeled 45 g drums of PCBs stored for shipping to Montreal.

Work conditions: Ventilation was poor. During winter, the air was heavily contaminated because natural ventilation from windows and doors was sealed shut. There was no local exhaust ventilation.

MOCA Production: MOCA was mixed and produced on the third floor of bldg. #30. This involved mixing the MOCA epoxy catalyst by hand in small batches to produce 6”x4” rectangular pucks. The MOCA catalyst came in drums in powdered granule form, which produced dust in the mixing process. These pucks were used and fashioned by hand to fit onto mining hoist drums in Bldg.# 10 south. MOCA is classified by IARC as a group 1 carcinogen.

Chemical Exposure Risk

Paint Exposures: These workers also painted bus ducts with chromate yellow and green paints along with pre-treatments with solvents. Chromate paints contain hexavalent chromium, which is highly toxic and classified by IARC as a group 1 carcinogen.

Exposure to asbestos dust was also a part of regular welding activity since asbestos blankets were used to protect plated parts from welding splatter. Welder exposed to asbestos fibre from lying on the blankets during welding process.

Metal Dusts: Exposure to aluminum and other metal dusts was also prevalent because of the major sawing and grinding of aluminum sheets for creating bus duct structures. The process of cutting, machining and grinding produced inhalable metal dusts throughout the department.

MOCA Exposure: The MOCA mixing and curing process exposed workers to a highly toxic polymer that is classified by IARC as a group 1 carcinogen. This was mixed without any exposure controls. Mixers as well as by-standers were exposed to this highly toxic material. Because they were handling this so intimately, mixers would be at greater risk of exposures. Management personnel were either unaware of its toxicity or were giving false information to employees. One worker described how a foreman took a handful of MOCA powder and stuck it in his face and saying, “you could put this on your breakfast cereal in the morning, and it wouldn’t do you any harm.”

JHSC: 10/11/79: re: MOCA hazards: “In an instruction sheet from OG White, Industrial Hygienist of GE Schenectady, (MOCA) workers are instructed to shower before changing to street clothes. Also, company to supply freshly laundered clothing for workers each shift. It is obvious that our fears regarding MOCA dangers were well founded.”

MOL: 12/13/78: Worker complaints regarding the generation of ozone gas during the MIG/TIG welding of aluminum. Ozone levels detected at 0.3ppm exceeded the TLV for ozone gas. MOL:05/28/82: No exhaust ventilation during pouring of molten metal operation on 3rd floor.

BUILDING: #34 **DEPARTMENT: STEEL CUTTING**

General Description

Steel Cutting

Steel Welding

Layoff Painting

Known Chemicals used or produced:

Asbestos

Cutting Oils

Glyptol white lead paint

Fumes: metallic silicate fluride (from flux), lead oxide (lead primer paint) ozone, carbon dioxide/monoxide (welding) varsol, cutting oils (MWFs)

Degreasers: TCE, Toluene

Dust: Metals: carbon, magnesium,sulphur, phosphorus, iron, silica, lead; Other: epoxy

Rust Inhibitors

Thermal Decomposition By-Products: phosgene, silicate fluride, zinc oxide

Varsol

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Building: # 34 **Department: Steel Cutting**

Production Process **Chemical Exposure Risk**

General description: This department, employing 50-100 people working 2 or 3 shifts, was dedicated to cutting mild-steel plates with oxy-acetylene torches, which were then fit by grinding and assembled using electric welding. Plates could vary in dimension but were anywhere from ¾" to 4" thick and as large as 10'x20'. As well, these sheets were pressed into shape. The department had very large shears, a 100-ton press and a large rolling mill used to roll steel. This operation was moved into bldg. 34 in 1984 from bldg.14.

Steel Cutting: The steel was cut with large shears and a series of very large oxy–acetylene cutting torches (referred to as burners) that were mechanically maneuvered in a pre-determined pattern. Cutting oil, varsol, and rust inhibitors could be used in the shear cutting process resulting in chemical exposures in the form of vapours, fumes, and dust.

The building measured about 400x100x30 feet and was ventilated by doors and windows and a powered roof fan. Approximately 30 production workers were employed for 40 hours per week.

Steel Welding: The welding area measured about 30x40x25 feet. It is not separated from building 34 by walls and shares the general ventilation with this building. Smoke eaters were provided for welders but do not provide complete welding fume extraction.

Stick welding using flux-coated mild steel rod and shielded arc welding using uncoated steel wire and 75-25 argon-carbon dioxide are welding methods used. In the latter method, a flow of 30 to 45 cubic feet per hour of shielding gas is used.

Eight workers worked in this area and welding comprised at least half of their day. No respiratory protection was worn.

With up to three welding operations going on in addition to the large oxy-acetylene cutting, very heavy welding fumes were generated throughout the department. These fumes would migrate to other areas of the plant. Degreasing was also extensive for the preparation of sheets for assembly welding.

Workers in this department were chronically exposed to various welding fumes, primarily through inhalation.

Since workers ate at their workstations, dusts containing various metal compounds were also ingested. Evidence of accumulated dust on surfaces in the work area and on adjacent work surfaces in offices would indicate wide spread contamination and exposure to welding dusts and fumes.

Upper respiratory tract symptoms reported by workers indicate major inhalation of welding fumes and dusts. This is also supported by the fact that workers did not wear respiratory protection and that housekeeping was poor.

Local exhaust with smoke eaters provided limited protection and simply dispersed welding fumes into the general atmosphere of the workplace.

Mild steel alloys include carbon, magnesium, suphur, phosphorus, iron, and silica which are contained in both welding fumes and dusts in addition to by-products related to degreasers (TCE) and MWFs (e.g., varsol, cutting oil) used. Additional materials that create by-product fumes/vapours/dusts are linked to epoxy products such as the lead oxide primer paint used in layoff painting. There is strong evidence of significant exposures to these products because of the large size of materials used, thus large amounts of chemical products used/produced in work processes as the following MOL reports substantiate. Participants recalled a cluster of heart attacks among personnel.

MOL:09/03/82: investigation of worker complaint regarding upper respiratory tract irritation from welding fumes. Inspector confirmed over exposure to welding fumes but no specific component identified. CO test performed but no welding fumes tested. Recommended consistent use of portable local exhaust.

Production Process

There was inadequate local exhaust ventilation with smoke eaters providing limited exhaust ventilation; necessary respiratory equipment was not provided.

Workers reported irritated eyes, nose and throat as well as headaches. A great many visits to the company hospital by the workers were for severe headaches.

There was no ventilation in this building. It was always smoky, depending on the number of welders. Fumes would travel to the GPC area. This was a 200' long building with welding and cutting soot on all surfaces. The office desks in the area would be covered in soot throughout the day.

Layoff Painting: Lead paint was used to mark steel pieces where cutting was to be done. Painting was done by hand on layoff tables. Lead paint was thinned with naphtha.

There were great quantities of lead paint, burners creating fumes, and major welding with MIG and 'stick' welding in bldg. 34.

Asbestos blankets used where parts needed protection from welding operations.

Balcony 2nd floor: This area carried out assembly and wiring, packing and shipping as well it had a small paint booth. Fumes and dusts from the operations below would migrate up to this area thus creating serious by stander exposures to these contaminants. This together with paint fumes from the paint booth and the production of Flamonal and other wires contributed significantly to these by stander exposures.

Chemical Exposure Risk

MOL: 11/18/82: Investigation of worker complaint regarding welding fumes. Air concentration for welding fumes exceeded the TLV of 5mg/m³. Concentrations ranged from 1.2 to 6.5 mg/m³.

MOL: 12/6/82: Investigation of excessive smoke and fumes from large burners cutting steel. No local exhaust ventilation. In fact, the smoke was not exhausted at all. No orders issued. Employer indicated it would provide smoke eaters in future.

Worker health symptoms indicative of problems of over-exposure to welding dusts and fumes were identified in Joint Health and Safety Minutes In addition there was evidence of significant dermal exposure to lead paint and fumes, as large amounts of lead primer was used on steel pieces that could be upwards of 25-40 ft. in size.

JHSC: 12/8/81: Re: dust control in burner area: "Write a letter to manager and ask him to experiment with next precipitator that comes in and see if we can come up with some sort of exhaust for burners area."

JHSC: 12/8/81: Re: dermatitis: "Report that employee working at layoff table has serious dermatitis from working with white lead paint. Notes Glyptol paint contains 2% lead."

Significant stand by exposures through inhalation.

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ADDENDUM 1

EXPANDED DISCUSSION OF THE QUALITATIVE METHODS USED IN THE GE RETROSPECTIVE EXPOSURE PROFILE STUDY

The purpose of this study was to develop retrospective exposure profiles of production processes at the GE plant in Peterborough, Ontario. This was prompted by what was perceived as an extraordinarily high rate of cancer among GE employees and the concerns of the former GE workers that the information gathered to date about exposures was not comprehensive and did not reflect the true extent of exposures and actual work conditions at the plant during their tenure at the plant. With the exception of a very comprehensive retrospective exposure profile study of two departments by Occupational Health Clinics for Ontario Workers (OHCOW) industrial hygienist, Sonya Lal, there was little information about exposure conditions. Up to that point what was relied upon were company work records, some company hygiene data and a narrowly based exposure matrix developed by the company industrial hygiene staff. In effect, there was little or no information gathered in a comprehensive manner to get an accurate picture of the day to day operations of the various production processes and the extent of exposures.

It was the view of the researchers that a comprehensive retrospective exposure profile of the plant's major production activity could be carried out utilizing a mixed qualitative research methodology. The researchers chose qualitative research design and methodologies because this approach would best provide a deep and rich understanding of the day to day operations by reconstructing the major production processes as experienced by the employees themselves (Brown 2003).

In essence, by reconstructing the production processes/product being produced, materials/chemicals used, detailed tasks carried out, and available exposure controls a "measure" of the extent of exposure could be developed via inferences based on identified risk factors for exposure (Brown 2003; Brophy et al. 2012). Increasingly, researchers in public and occupational health are turning to qualitative methods either on their own, or in conjunction with quantitative methods, to determine the impact of environmental and workplace contamination on human health (Brown 2003; Brown et al. 2006).

This option is most appropriate because it is able to account for the complex context in which exposures take place in the work environment such as work organization, work regimes, and power relations at the point of production, exposures to complex chemical mixtures and recognition of all routes of entry, and the functioning and availability of exposure controls (Keith et al. 2015; DeMatteo et al. 2012; Simcox et al. 2012; Boice et al. 1999; Steward et al. 1991). In contrast, much of the exposure context is left out of quantitative data related to the extent and probability of exposures.

The published works of many environmental and occupational health researchers using qualitative methods offer a compelling argument for the validity of qualitative approaches in health research. Qualitative research is context-dependent and up-close with the people and the phenomena being studied; it uses expository techniques and works to create an interactive dialogue between, and among, the participants, which acts as a check against bias and error. In this sense, the on-going social dialogue with participants provides a self-correcting process leading to verified knowledge (Brown, 2003). Additional relevant references consulted on qualitative methods include: MacEachen et al. 2016; Marano et al. 2000; McDonald et al. 2004; Morgan et al. 1998; Needleman and Needleman 1996; and Patton 1990.

Verification Methods Used in Qualitative Research:

This retrospective exposure profile study was designed and conducted in accord with validated qualitative research methods to ensure the generation of reliable and credible information about the GE production

process -- and the interaction of workers with those processes. This was undertaken in an effort to construct exposure profiles for major production processes in each department.

The strength, or "rigor" of scientific research is achieved by meeting the conditions of both reliability and validity. This is true in both quantitative and qualitative research, but the route each takes is different (Kvale 1989). In quantitative research this is primarily achieved post hoc through statistical analysis of study results (i.e., calculating "p-values"). In contrast, qualitative research relies on the continual use of verification strategies from beginning to end because of the dynamic, interactive nature of this type of research. In practice this requires researchers to continually move between research "design and implementation to ensure congruence [i.e., a "good fit"] among question formation, recruitment, data collection strategies, and analysis" (Morse et al. 2002 p.10). Not surprisingly "investigator responsiveness" is viewed as essential, if not the most important strategy to ensure reliability and validity because it is the mechanism by which researchers identify and correct errors before they are built into a developing model. Other significant verification strategies or mechanisms used in qualitative research include: methodological cohesion, an active analytical stance, adequate sampling, and saturation (Cresswell 1997; Morse et al. 2002).

Participant Recruitment Process and the Formation of a Permanent Focus Group: The GE Retiree Advisory Committee:

An example of the investigators' efforts to achieve congruence among the various components of methodology mentioned above is reflected in the shift from the original research design of conducting 15 or more "one off" focus groups to a permanent, on-going working focus group and purposeful recruitment of other GE workers with special knowledge and experience. Based on pre-testing of the focus group approach, the investigators recognized the need to make adjustments to ensure that group composition and structure were appropriate in the context of a complex industrial operation as well as the nature of our information sources, and theoretical framework. Throughout the researchers were mindful of the need to follow a responsive/"iterative" process (Lincoln and Guba 1985).

In March 2016, an initial attempt to develop a retrospective exposure profile study of the GE plant was undertaken by a group of GE retirees and researchers using focus group methods organized around individual departments or areas. In an effort to recruit informants, the researchers and research coordinator made numerous presentations to retirees groups and provided signup posters that were displayed at community and retiree meetings to recruit GE workers according to the department or area where they had worked. Two trial or "pre-test" focus group sessions were held to test the questionnaire and data collection sheet. It was immediately evident that this "one-off" method of focus group interviews would not lead to an accurate and detailed documentation of work exposures in the GE plant due to the complexity and number of products developed and work processes employed over time.

Several meetings ensued among the GE retiree/research team to discuss problems encountered and whether there were other ways to conduct a more in-depth and detailed exposure profile study. After considerable discussion, a consensus was reached that a "permanent focus group" be formed made up of retirees and researchers who would commit to the time required to retrospectively document the work processes, chemicals and physical exposures, department by department, with the intention of inviting other GE retirees, with significant and additional information, to these group meetings.

It was also decided that alternate sources of information would be required in addition to what was to be provided by the focus group and key informants. These sources included Ministry of Labour (MOL) health and safety inspection reports, joint health and safety committee minutes, internal health and safety reports, material safety data sheets (MSDSs), technical production manuals . Many of these were provided by the

former Local 524 union health and safety committee representative, John Ball, and supplemented by additional MOL reports via a Freedom of Information request. Subsequently, the union deconstructed these reports and placed the original documents and summary information on a database for these and other documents. This also included joint health and safety committee reports, MSDSs and internal memoranda and report. The process was aided by a set of hazard maps that were developed by OHCOW a few years prior and those developed by deceased retiree, Gary Lane and his colleagues, Jim Dufresne and Roger Fowler. These various documents would play a crucial role in the process of triangulation of the different sources of information in confirming the accuracy and reliability of informant information.

Securing a meeting space where the Advisory Committee was free to set its own hours and display the large GE departmental reference maps (and other materials associated with the project) was a major breakthrough. Once a local meeting site was established, the commitment was made to meet twice a week on Mondays and Thursdays from 1-4 pm (and as it turned out often as late as 6 pm) for the purpose of carefully documenting, building by building, the work processes and exposure risk factors at Peterborough GE.

Initially, the retiree component consisted of 3 women and 5 men, who had each worked at GE between 35 and 45 years. As a group, they were highly knowledgeable about many, and for some, nearly all departments (several as mobile welders, one as a job dispatcher who moved throughout the plant, another as part of a roving labour gang, and most having worked at multiple job categories throughout the GE facility over their work lives). In addition to these eight GE retirees, two retired health researchers acted as facilitators and quickly became immersed in the "GE environment" themselves. One of the retiree members served as study coordinator, taking responsibility for communications and minutes.

The framework for the group's functioning was that it be open to other retirees or community members who might express interest and that as we progressed in our work we would seek out retirees with expertise in particular departments and/or work processes to ensure as complete and accurate information as possible would be documented. At one of the early meetings, a number (4) of GE retirees who had worked in the maintenance department were invited specifically because of their plant-wide experience and knowledge of numerous work processes as well as various maintenance processes that were relevant to exposures. During the process additional retirees joined the Advisory Committee.

For the first month or so, meetings became "educational sessions" for the two researchers to establish a "common knowledge" about GE, as retirees patiently described the basics of motor and electrical components production; introduced researchers to the physical and cultural environment of the GE plant through pictures, stories, and GE documents; shared generic videos of specific work processes; and sensitized researchers to the tremendous variation and number of motor/electrical-related products that were produced at GE over the period of time they worked there.

At the same time, retirees received an orientation into the basic principles of industrial hygiene, to ensure a common meaning to the structured and open-ended questions that guided the discussions of focus group meetings. This included concepts of (chemical) routes of entry into the body, the basic body systems and points of vulnerability to toxic chemicals and physical agents, and the hierarchy of exposure controls.

Over time, our "mainstay" Advisory Committee grew to 13 people as several other retirees joined. During the course of 8 months spent documenting work exposures at the GE plant, the meetings were attended by no less than 8 and as many as 15 participants for special sessions. Most meetings included 8-10 Advisory committee members. In addition to inviting other GE workers to meetings, information was obtained from retirees on a person-to-person basis and by phone. Meetings were focused, lively, and participatory and while there were some with greater scientific knowledge or experience related to the topic at hand, discussions were inclusive based on the high level of shared work experience among retirees.

Perhaps the most important characteristic of all who comprised the research team was a shared commitment to take whatever time was required to produce a high quality and accurate representation of GE work processes and the exposure risks these posed to employees. With this sense of dedication to accurately depicting the production process at GE, the Advisory Committee became a highly functioning research team. Team members soon became proficient in the methods of qualitative research -- in their mode of questioning, attention to detail, doggedness in getting the complete picture, sensitivity to negative or contradictory information, and importance of pursuing information through a variety of avenues. In all, more than 75 GE workers and/or family members contributed to this project. Their names are listed in Appendix 1. We approximate that together, those who participated represent between 2000 and 2500 work years at Peterborough GE. This was truly participatory research in action.

Theoretical Framework and Concepts:

This research design was guided by a theoretical framework that was based on concepts derived from the discipline of industrial hygiene with particular emphasis on risk factors affecting exposures. Our approach was a risk-based approach. That is, all efforts were directed to determining: the probability or risk of exposure given the manner in which production was carried out at the plant; steps or tasks involved in the production process; the materials used, how they were used; the quantity used, its physical state(s); the size of the products being produced; the existence and functioning of exposure controls; odours/smoke, symptoms; work practices; housekeeping; provision of protective equipment; health and safety training; knowledge of the hazards; work organization; the general atmosphere and work regimes. All of these factors contribute to the risk and probability of exposure.

In conjunction with the limited hygiene data available, these risk factors provided indirect measures in our efforts to reconstruct the exposure histories of the industrial processes. By “indirect” is meant that inferences about the extent of exposure could be made from detailed descriptive information about the interaction between the worker and the work process and the identification of risk factors. The researchers also took measures to account for the long latency period for cancer ranging from several years to several decades between first exposure and diagnosis. This involved profiling exposures dating back thirty or more years by exploring processes as they existed many years ago and tracing their evolution over time. In this latter regard, the investigators were fortunate because the GE work experience of the participants ranged between 35 and 45 years.

Conduct of Advisory Group Discussions:

Focus group discussions were guided by a series of both structured and open-ended questions on a department-by-department basis – which in turn were also guided by, and consistent with, the theoretical framework that informed the study design. As time went on discussion became less formalized as everyone knew what information was required and a more naturalistic dialogue took place, unless we had a visiting participant and then we reverted to the more structured approach. This process of group discussion went on twice a week for nearly 8 months, usually with the addition of other invited retirees because of their in-depth experience with certain processes within a department. The general set of questions asked of retiree informants included:

How many years did you work at GE?

How many years did you work in this department?

What was produced in your department?

Describe the major production activities in this department?

Give us a breakdown of the processes required to complete each of these products?

What materials and chemical were used in production?

What form did these take, e.g. liquid, mist, vapor, gas, dust or solid?

How much of the chemical was used, e.g. pint, quart, gallon(s), tanks?

How was the chemical applied, directly handled, by hand, close by, confined space, isolation?

How long did you use this chemical?

Describe how the product was applied?

Were there any odors, fumes or smoke?

Did worker show any adverse symptoms?

Was the government inspector called in, work refusal, complaints?

Was protective equipment provided, what type, was it used?

Was there local exhaust ventilation provided?

If so, was it working to remove contaminants?

What was the state of housekeeping?

What was the general impression of the work environment?

What were some of the obstacles to getting safety problems addressed?

Did workers eat, drink or smoke at their workstation?

INFORMATION GATHERING, DATA ANALYSIS, VERIFICATION METHODS

Advisory group discussions were documented through written notes taken by two researchers and the (GE worker) project coordinator. This was a practical decision due to economic and time constraints but was found to be advantageous. The notes generated were regularly compared for accuracy and clarification after committee meetings; often this would be done through phone conferencing. Discussions on the information gathered would focus on accuracy and what were felt to be gaps or inconsistencies in the accounts. These issues would be noted and brought up at the beginning of the next meeting for clarification, or the project coordinator would email members requesting further information or a review of relevant industrial hygiene literature prior to the next meeting. Upon reflection both research facilitators found the note taking to be valuable since it required active and focused listening at all times, and reinforced through repetition and sensory input complicated and detailed information about GE production processes to which the facilitators had only recently been introduced. In the course of documenting the meetings there emerged a growing "parallel" list of exposure risks that came to be viewed as "common" to all GE workers.

The dynamic of focus group discussions was lively and argumentative at times, with members often raising question about factual accuracy. Discussions were open, frank but respectful. The tenor of discussion produced a cross checking of facts and eventual agreement and consensus. This was a major strength of

the focus group dynamic in that it was a check against error and personal bias—an important part of the verification process that went on throughout. A shared commitment to produce an accurate report on the work conditions in the GE plant underlie and tempered the desire to achieve consensus.

Attribution:

The descriptions of the production processes and work conditions are not attributed to any one individual. The information gleaned from the focus group process is attributed to the focus group as a whole including those who participated from time to time. The names of all participants are listed in Appendix 1.

Dynamic Interaction and Verification:

The nature of the dynamic interaction among participants contained its own verification process which acted as a check for accuracy and bias. There were occasions in which participants disagreed with another's account which would bring forward a lengthy discussion until the issue was resolved leading to consensus. Also, the researchers found that different participants often described similar accounts of exposure conditions or events independent of one another, serving to reinforce confidence in the accuracy of participants' recollections and descriptions of production processes.

Hazard Mapping Process:

The research methods incorporated hazard mapping techniques (Keith 2001; Keith 2004) in the utilization of several large 3'x4' block diagram maps with a floor plan of the locations of all departments. These maps depicted the layout of the plant, identifying various production processes and the location and use of various chemicals and other hazardous materials. They were posted on the walls around the room with two others placed on the conference table where we worked. Three types of maps were used to aid discussion. These included: A map locating major carcinogens used at GE, which was developed by OHCOW via participatory mapping sessions around 2004. Two other maps produced under the leadership of GE employee, Gary Lane with Roger Fowler and Jim Dufresne in 2015-16 identifying the departmental or area location of chemicals used, including solvent and resin tanks and certain production workstations. These latter (Gary Lane) maps represented two different periods of time and provided the location of major chemicals used in different production processes for these different time periods. These maps were vital to discussion and documentation throughout the conduct of the study.

With these maps as backdrop we asked focus group participants to describe the work flow, job tasks, chemicals used and how they used them, the quantities used, the sources of ventilation, etc. (See research questions above). Importantly, the researchers found that the graphic representation helped participants recall details and more clearly describe conditions.

Other Sources of Verification:

Another element of the research process that assisted in data verification was the addition of available documentation of conditions in the plant from external and internal sources. Included among these, was a collection of official GE reports, minutes and internal memos that were deconstructed for identification purposes and then inputted into Unifor's RAWC database. Documents included: over 700 Ministry of Labour/ Department of Health inspection reports, Joint Health and Safety Committee Minutes, internal company correspondences, MSDSs, all of which have been entered into storage and retrieval data base by UNIFOR, the union representing GE workers. These documents were used to provide additional information about the production process and to confirm or challenge conditions described by meeting participants.

Advisory Committee members also consulted the industrial hygiene literature for additional information on specific industrial processes. For example, we reviewed, in depth, the scientific industrial hygiene literature on electroplating processes, plastics production and welding operations. This could form the basis for discussion of similar processes in the GE plant to note similarities and differences. Despite claims by the company that chemicals were contained within "departments", memos from the company safety managers revealed and confirmed that the ventilation system was under negative pressure, causing substantial cross contamination between departments and processes. MOL inspection reports confirmed consistently poor housekeeping, and poor to non-existent local exhaust ventilation. These are noted in the main body of the report and the full inspection reports, memos, or MSDS can be easily retrieved from the Unifor RAWC database.

Issues Related to Adequate Sampling and Saturation:

Despite limited resources, other than Advisory Committee members themselves, a robust and methodologically strong resource for assessing workplace exposures was produced. The breadth and depth of the work lies in the fact that there were not two researchers on the committee but thirteen. In effect, the Advisory Committee "lived and breathed" this project for months, with individual members spending many additional hours on the phone, visiting people, searching the Internet, visiting local libraries, tracking down known sources of information that others held or might have access to, all to ensure that the information generated was as accurate and complete as possible -- given the complicated and continually changing workplace that was GE.

During the months spent writing up the report, the authors would often send out a request to the coordinator for confirmation or additional information and she would immediately email our request to other committee members. We were never disappointed and usually received more information or documentation than we asked for. For the most part those who participated were front-line workers; a few managers/leaders participated (though more were asked) and had first worked many years at GE outside of their management roles. There were areas and departments with fewer employees where it was difficult to locate past workers; they had died, moved, were ill, or not able or want to come to a meeting -- though some consented to phone interviews. Among committee members and invited participants were a number of workers with in-depth knowledge of the GE plant through their work experiences who were integral to work developing risk profiles.

The research facilitators were continually amazed at the high level of discussion and sophisticated knowledge exhibited by GE workers. They all viewed their years at GE as having been a tremendous education and knew they had been involved in work that reflected the "cutting edge" of the modern electrical age. As workers, they proudly described being "trouble shooters" that worked out problems in production or even developed new techniques that then served as a template for work processes at other GE plants.

The participants were scientifically astute and took personal interest in the work they and their co-workers did and could discuss the work processes of most other departments from a place of knowledge and interest. The work "ticket" system at GE allowed, and even encouraged, training in other departments, as a personal insurance policy against unemployment or as the opportunity to try something new, or seek higher pay. The majority took advantage by obtaining these additional "tickets" and their work records reflected positions throughout the plant.

There is a mistaken tendency to view "blue collar" workers as less informed and less thoughtful than the professionalized sector of society. While this could be no further from the truth given the dynamic encounter experienced in this study, this prejudice remains a major impediment for having their workplace health concerns addressed by government and company officials. Given the human and temporal limitations associated with this project, other than having access to GE's own detailed information on the Peterborough

plant, the advisory committee believes they have done all that was possible to meet the requirements of "sampling adequacy" and data "saturation."

Sample Adequacy: In total, over 75 participants contributed information about plant operations generally, and details about individual departments or work processes. They represented every part of the GE facility and represented work experiences spanning 35 to 45 years and were thus able to give a dynamic picture of the plant over the years. This is a more than adequate sample to provide a comprehensive and accurate account of the production operations.

Saturation: The investigative group processes which took place over approximately 3 years and intensely for 8 months provided exceptionally rich, comprehensive and detailed information about the major production processes at GE. Researchers will always desire more information and never feel satisfied that they have "everything." However, it is without hesitation that the authors assert that the information gleaned from all sources—focus groups, one on one interviews, reviews of records, reports, etc. provided this investigation with sufficient information to provide a reliable and validated picture of the exposure conditions at the GE facility between 1945 and 2000.

Issues Related to Methodological Coherence:

Methodological coherence refers to the fit of the various components of qualitative research (sampling, interview questions, analytical procedures, specific audience or purpose) with the data. Morse et al. (2002 p. 12) note that "to meet analytical goals, the fit of these different components must be coherent, with each verifying the previous component and the methodological assumptions as a whole." Throughout this work the investigators remained sensitive to the fit between the various aspects of data collection and the purpose of this work which was to provide an alternative source of information on the risk of exposure to chemical and physical agents for workers at the GE facility (1945-2000). In addition, consideration was given to how this information could best be presented to provide a detailed but accessible exposure assessment that would provide a more realistic picture of workplace conditions. The final report and its structure can be viewed as an "organic" result of the methods of inquiry employed and industrial hygiene science viewed through a broad, historical, social science lens. By contextualizing work and work processes, we believe a richer and more robust picture emerges of the actual work experience of those employed at Peterborough GE during the years 1945-2000.

(March 29, 2017) Robert DeMatteo and Dale DeMatteo

February 5, 2017

ADDENDUM 2

THE LIMITATIONS OF THE SCIENCE

In considering the retrospective exposure profiles some perspective is in order with regard to current interpretations attached to numerical exposure levels to various chemicals as well as the results of epidemiological studies. Firstly, there is the assumption that no harm should have come to workers if exposure levels were below the regulated occupational exposure limits or Threshold Limit Values set by the American Conference of Government Industrial Hygienist (ACGIH). Secondly, there can be the interpretation of negative epidemiological studies as indicating that there is no association between the disease and the chemical exposures studied.

In response to these assumptions it is important to recognize that the validity of these approaches is being challenged by a large and growing number of researchers in the field of occupational and environmental medicine. In what follows the authors present a summary of those critical findings that raise serious questions about the reliability of occupational exposure limits and TLVs for assessing exposures as well as the misuses and misinterpretation of epidemiological findings. While epidemiological study is a powerful tool in studying the relationship between disease and its causes, its methods must be carefully scrutinized to avoid misinterpretation of the results.

ARE THE OELS/TLVS PROTECTIVE?

General Background on ACGIH TLVs:

The American Conference of Government Industrial Hygienists (ACGIH) was established in 1938 at a meeting in Washington, D.C. This organization is known worldwide for the annual publication of its list of Threshold Limit Values for Chemical Substances (TLV-CS), developed by the TLV-CS Committee. Many governments have adopted these TLV guidelines as legal exposure limits.

Briefly, TLVs "refer to airborne concentrations of chemical substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, over a working life time, without adverse effects. TLVs are developed to protect "workers who are normal, healthy adults" (ACGIH 2016). According to the ACGIH, TLVs are "developed as guidelines to assist in the control of health hazards" (ACGIH 2016). They are claimed to be the result of reviews of scientific literature by the TLV-CS Committee. While they are not legal limits, many have been adopted as such by governments around the world, including Ontario.

Early Criticism of the ACGIH/TLVs:

In a study published in 1988, Barry Castleman and Grace Ziem described the corporate influence on the development of TLVs. They explored the incentives for the chemical industry's promotion of higher TLVs allowing them to reduce regulatory and liability costs. Their research showed that the TLVs for numerous substances depended largely, and in some instances entirely, on unpublished corporate communications and reports which contained scientifically unreliable or unsound information. Their studies also document the industry connections of TLV committee members (Castleman and Ziem 1988; Ziem and Castleman 1989; Castleman and Ziem 1994).

Roach and Rappaport have also criticized the validity of the assertion that TLVs are health-based limits. In reviewing the annual (1976 and 1986) Documentation of the TLVs, produced by the TLV-CS Committee, only

a minority of studies showed no adverse effects below the TLV. The authors observed that, to some extent, many TLVs represent what industry perceives to be technically feasible rather than health related (Roach and Rappaport 1990).

In a 1993 follow-up article, Rappaport argued that the Occupational Safety and Health Administration (OSHA) should adopt a speedier permissible exposure limit (PEL) approval process, so that unreliable/invalid ACGIH TLVs need not be relied upon as default limits. The author noted that the ACGIH TLVs are slowly being lowered, but more for carcinogens than chemicals that cause other serious health effects (Rappaport 1993).

Additional Studies:

Additional studies have been published that build on the themes put forward by Castleman, Ziem, Rappaport, and Roach. What follows is a small sample of the finding of these works: A quantitative international comparative study of exposure limits by Linda Schenk et al, identified the tendency for limits to decrease over time, but noted the wide variability between limits for the same chemical in different countries (Schenk et al. 2008). Another article described the Netherland's reassessment of exposure limits in the mid-2000s. While originally having adopted the ACGIH TLVs, the government's reassessment determined that over half the values were either too high -- or not scientifically supported as a health-based limit (Stouten et al. 2008).

Rappaport also identified that many occupational exposure studies have very small sizes or do not include exposure measurements at all. He identified that exposure measurements were most often included in studies that dated from the 1920s to the1960s (Rappaport 2009). Another article, co-authored by the same author (Rappaport and Kupper 2008), discusses the origins of, and debates surrounding, occupational exposure assessments, including the ACGIH TLVs and the US federal government's OSHA standards. The authors noted that following the critical articles of Castleman and Ziem, and Roach and Rappaport, the ACGIH changed its approach to TLVs, applying "more stringent health criteria as evidenced by the increased rate of reduction of TLVs, especially for carcinogens" (Rappaport and Kupper 2008). For example, the TLV for Benzene decreased 2.5 fold from 1957 to 1974, and then 20 fold from 1974-1997. The authors remain critical of the OSHA standard setting process on the grounds that it is interpreted as an average and not a limit, and that feasibility is sometimes judged by the standards of heavily polluting industries, even though the majority of industry could feasibly achieve a much lower PEL (Rappaport and Kupper 2008).

A short article by Castleman (2006) reviewed the adoption of the TLV for trichloroethylene (TCE). Illustrating a legacy of corporate influence on TLV development, he noted that the minutes of a 1981 meeting regarding the TLV for TCE were recorded on DOW stationary -- and that DOW was a major manufacturer of TCE (Castleman 2006). Importantly, with respect to reform of the ACGIH, Castleman further argues that: "even with the best motivations, it is simply beyond the resources of a volunteer committee, with little financial support…to repair the accumulated damage of so many years of flawed TLVs on the list" (Castleman 2006 p.308).

The other aspect of the impact of corporate influence is what renowned endocrinologists Frederick vom Saal called the "funding effect." In an extensive review of 115 in vivo and in vitro studies of the effects of Bisphenol A, 94 studies found significant effects. Thirty-one found significant effects at doses below the "safe" threshold. While no industry-funded studies have reported significant effects, over 90% of government funded studies did report significant effects. According to vom Saal and Hughes, some industry-funded studies used experimental rats that were not appropriate for studying estrogenic response and others ignored the results of positive controls (vom Saal and Hughes 2005). Nonetheless, chemical manufacturers continue to discount these published finding of positive studies because no industry studies have reported significant effects. Similarly, the work of Gennaro and Tomatic explores "business bias" in epidemiological studies and its influence on study outcomes (Gennaro and Tomatic 2005).

LIMITATIONS OF REGULATORY TOXICOLOGY AND ITS IMPACT ON STANDARD SETTING

Regulatory toxicology suffers similar tendencies to understate adverse effects as a result of questionable paradigms used for testing for adverse effects -- and is also vulnerable to corporate influence. This is played out in the current rift in the scientific community between regulatory toxicologists who rely on computer simulations called "physiologically based pharmacokinetics" (PBPK) modeling and health effects researchers, including endocrinologists, developmental biologists and epidemiologists, who draw their conclusions from direct observations of how chemicals actually affect living things. While the debate may seem esoteric, the outcome will have a significant impact on environmental and occupational health. It is shaping how government regulates environmental and occupational health and how workers are protected (or not) from toxic exposures -- as well as how we assess disease causation from these exposures (Brown and Grossman 2015; Huff 2007; Rappaport and Kupper 2008).

The origins of the PBPK testing paradigm (that uses computer simulations to track how chemicals move through the body) began in the mid-1980 among scientists at the Wright-Patterson Toxic Hazards Research Unit (a Department of Defense facility) at the Wright-Patterson U.S. Airforce Base in Dayton, Ohio. Known as in silico, these computer models are presented as an alternative to testing chemical in vivo (in live animals) or in vitro (in a test tube). They allow scientists to estimate what concentrations of a chemical (or its breakdown products) end up in particular organs or tissue, and how long they take to exit the body. This information can be correlated with experimental data, but sometimes is not. The simulation model testing is faster and cheaper for both industry and regulators, but it has serious drawbacks. A major problem is that, by itself, PBPK testing does not provide a picture of the health impact. In contrast, biological studies and experiments are designed to discover how chemicals interact and affect biological processes. Supporters of PBPK acknowledge that the method is always limited by the quality of the data that goes into the model. The problem is that modelling is vulnerable to the manipulation of data input as well as the final risk assessment, as both are subject to influence because of financial or other ties toxicologists may have with industry (Brown and Grossman 2015).

The literature is replete with instances where PBPK studies were used to make chemicals appear safer. For example, industry funded/associated research institutes such as CIIT/Hamner, utilizing PBPK modelling methods, have down played the risk and delayed regulation or implementation of more rigorous exposure limits for a number of widely used and commercially lucrative chemicals. These include formaldehyde, trichloroethylene, BPA, methylene chloride, styrene, acrylonitrile, and the pesticide chlorpyrifos (Brown and Grossman 2015).

Studies somewhat critical of current practices in occupational medicine and public health were published in a 2008 issue of New Solutions: A Journal of Environmental and Occupational Health Policy. Included was an article by Bohme-Rankin and Egilman identifying that "corporate science" is becoming more widespread, characterized by "manipulation of evidence, data and analysis [and], ultimately designed to maintain favourable conditions for industry" (Bohme-Rankin and Egilman 2008). In a similar expose/advocacy piece entitled "Industry Influence on Occupational and Environmental Public Health," James Huff provides numerous examples of the impact of industry influence on occupational and environmental and public health research by not only funding research, but in creating its own infrastructure for health research (Huff 2007). Similar observations have been made in medicine with respect to the pharmaceutical and medical technology industries (Angell 2009; Lexchin et al. 2003).

LIMITATIONS OF REGULATORY EPIDEMIOLOGY

In considering these different approaches to a comprehensive understanding of the health impact of exposures in complex industrial processes, a word about the inherent limitations of epidemiology and toxicology is in order. For example, epidemiological studies often suffer from poor research design, misclassification of exposures and insufficient statistical power to detect a risk to health. Together these factors are largely responsible for understating the extent of risk and premature conclusions for lack of association. For example, numerous studies reviewed by Goldberg and Lebrecht found non-significant excess risk because there was insufficient statistical power to detect a risk of a particular magnitude. In their review of 115 occupational breast cancer studies, these authors found that the median number of breast cancer cases was 19 with an average of only 64 cases. Only five studies had more than 100 cases. They note that even though 75% of studies had statistical power above 80% the small number of cases seriously limited the ability to detect risks in subgroups and test for exposure trends (Goldberg and Lebrecht 1996). The challenge for researchers lies in overcoming the inherent limitations of the dominant scientific paradigm for establishing causation.

The Case of the Peterborough GE Health Study:

These same scientific problems are associated with the Peterborough GE Health Study by Hosein and Ghiculete, which in its "Phase II" case control exploration, concluded that there was no association between the lung cancers identified among GE workers and the toxic chemical exposures at the plant, when in truth the study lacked the statistical power to detect such an increased risk. In this study the authors admit on page 47:

"From the table below we see that for an exposure variable with a prevalence of about 45%, in this study would have more than 80% power of detecting a relative risk of 2 or greater.

However, for an exposure variable with prevalence in the range of 5 to 10 percent we would have 80% power of detecting relative risk in the range of 2.5 to 3.0". (Hosein and Ghiculete 2003)

Thus one of the serious problems with the above study is its small samples size. Although the authors state the lack of statistical power accurately in the above quote, they do not identify this serious limitation in their conclusions. In effect, a true relative risk of less than 2 could not be detected as statistically significant. To detect a risk lower than two fold the study would require a considerable larger sample size.

The authors conclusion on page 78 stating that "…there was no association between lung cancer deaths and any of the carcinogens…" is misleading (Hosein and Ghiculete 2003). It would be more correct to state that there was no statistically significant association observed between lung cancer and any of the carcinogens. And it should further be explained that this result could arise because, in fact, there was no association or because there was an association that could not be detected due to the small sample size. This is what, in epidemiology is referred to as a negative error—a study that (by design) cannot find an elevated risk that is, in fact, present.

Also, the GE health study likely suffers from serious misclassification of exposures, which is a major source of systematic error that can bias the study towards the null hypothesis. This assessment is based on the resulting retrospective exposure profiles of work processes and exposure conditions constructed in our study. This methodological problem has been explored in the epidemiological literature indicating that such errors can seriously understate the true relative risk (Dosemici et al. 1990; dos Santos 1999).

Making Cancer Clusters Disappear:

Making cancer clusters disappear is not unique to the Peterborough GE cancer cluster. A similar situation arose in 1979 when the U.S. Occupational Safety and Health Administration discovered a cluster of 23 primary brain cancers called glioblastomas among workers who worked at vinyl chloride plant owned by Union Carbide/Dow Chemical in Texas City, Texas. The main suspect was vinyl chloride (VC). According to OSHA, after investigating the cluster for 3 years, this was the largest cluster of brain cancers ever reported. During this time, industry studies were finding higher than expected occurrences of brain cancers at vinyl chloride plants, and in 1979 the International Agency of Research on Cancer had taken the unequivocal position that vinyl chloride causes brain cancer (Heath 2016).

Yet today, according to the Center for Public Integrity, "the scientific literature largely exonerates vinyl chloride." After a second IARC review in 1987 which supported the brain/VC connection (IARC 1987), the Chemical Manufacturers Association (CMA) commissioned Sir Richard Doll to review published VC epidemiological studies (Doll 1988). While Doll found an elevated rate of brain cancers, he reported that these were not statistically significant, but did not report the confidence intervals (Doll 1988). Also Doll did not acknowledge his funding source, which was the Chemical Manufacturers Association (Sass et al. 2005). It is important to note that prior to this, evidence of a brain cancer association with vinyl chloride exposure continued to mount after 1988. For example, a 1991 study by industry researcher Otto Wong reported significant excess deaths from brain cancer and concluded that "this update confirms the excess in cancer of the brain and [central nervous system]" (Wong et al. 1991). Wong's study was among four such studies to find excess of brain cancers among vinyl chloride workers (Doll 1988; Tabershaw and Gaffey 1974; Mundt et al. 2000; Wong et al. 1991).

However, two years later Wong published a retraction saying, "we conclude that our finding of an excess of brain cancer among U.S. vinyl chloride workers reported earlier was not likely related to the chemical" (Wong and Whorton 1993). It was noted that Wong was under heavy pressure from the Chemical Manufacturers Association to recant since he had not received permission to publish the study from the CMA (Sass et al. 2005).

To cast further doubt on the brain cancer connection, a 2000 industry review of brain cancer deaths at vinyl chloride plants found that the relationship between brain cancer and vinyl chloride "remains unclear" (Mundt et al. 2000). Based on that industry study and others, IARC reversed its position on vinyl chloride and brain cancer in 2008. It was apparent that misclassification of exposure played a significant role in suppressing the true elevated work-related mortality rate by manipulating the exposure criteria thus excluding most of the brain cancer deaths (Sass et al. 2005; dos Santos 1999).

According to David Heath of the Center for Public Integrity, "a Center for Public Integrity review of thousands of once-confidential documents shows that the industry study cited by IARC was flawed, if not rigged" (Heath 2016). According to their review, the study relied upon by IARC did not report all brain cancer deaths. In fact, they only included one of the 23 brain cancers in the original Texas City cluster, thus eliminating the cluster.

These flawed industry-sponsored studies, as well as the use of industry supported PBPK modelling for the U.S. EPA risk assessment process, played a large role in lowering the cancer risk from vinyl chloride exposures. The industry supported PBPK model estimated that the VC risk was 150-fold less than originally set by the EPA. In the final analysis, industry pressure and the intrusion of industry funded research as well as industry's participation in both risk assessment and peer review processes was largely responsible for the lowering of the VC cancer risk assessment and elimination of the EPA regulatory protective adjustment factor (Sass et al. 2005).

Egilman and Howe demonstrate, through a critical review of a number of crucial industry funded studies, the vulnerability of epidemiological study to purposeful manipulation through systematic misclassification of exposures, questionable statistical analysis, and the misinterpretation of epidemiological results. They also note how the over valuation and reliance on epidemiology in determining causation has been at the expense of other types of scientific information such as case reports, analogy and pathology. They point out that both Bradford Hill guidelines and Koch's postulates do not make "…. epidemiology a requisite component in the process of determining that there is a risk" and neither espouses the superiority of epidemiology (Egilman and Howe 2007).

According to these same authors, "Epidemiological studies often suffer from design limitations that do not account for the inconstant nature of workplace conditions and exposure levels, the often delayed expression of disease, which can remain latent for 50 years or longer, and the fact that studies often omit minorities and women" (Egilman and Howe 2007). The authors warn that industry insistence that epidemiological evidence be paramount in determining health risk, and thus regulatory initiatives as well as tort and workers' compensation litigation, would represent a major setback for public and occupational health.

It is essential for those involved in the application of science to be sensitive to the ethical and methodological problems with science as well as its limitations. Science, at its best, is only as good as the current knowledge available and the quality and independence of research that informs that knowledge.

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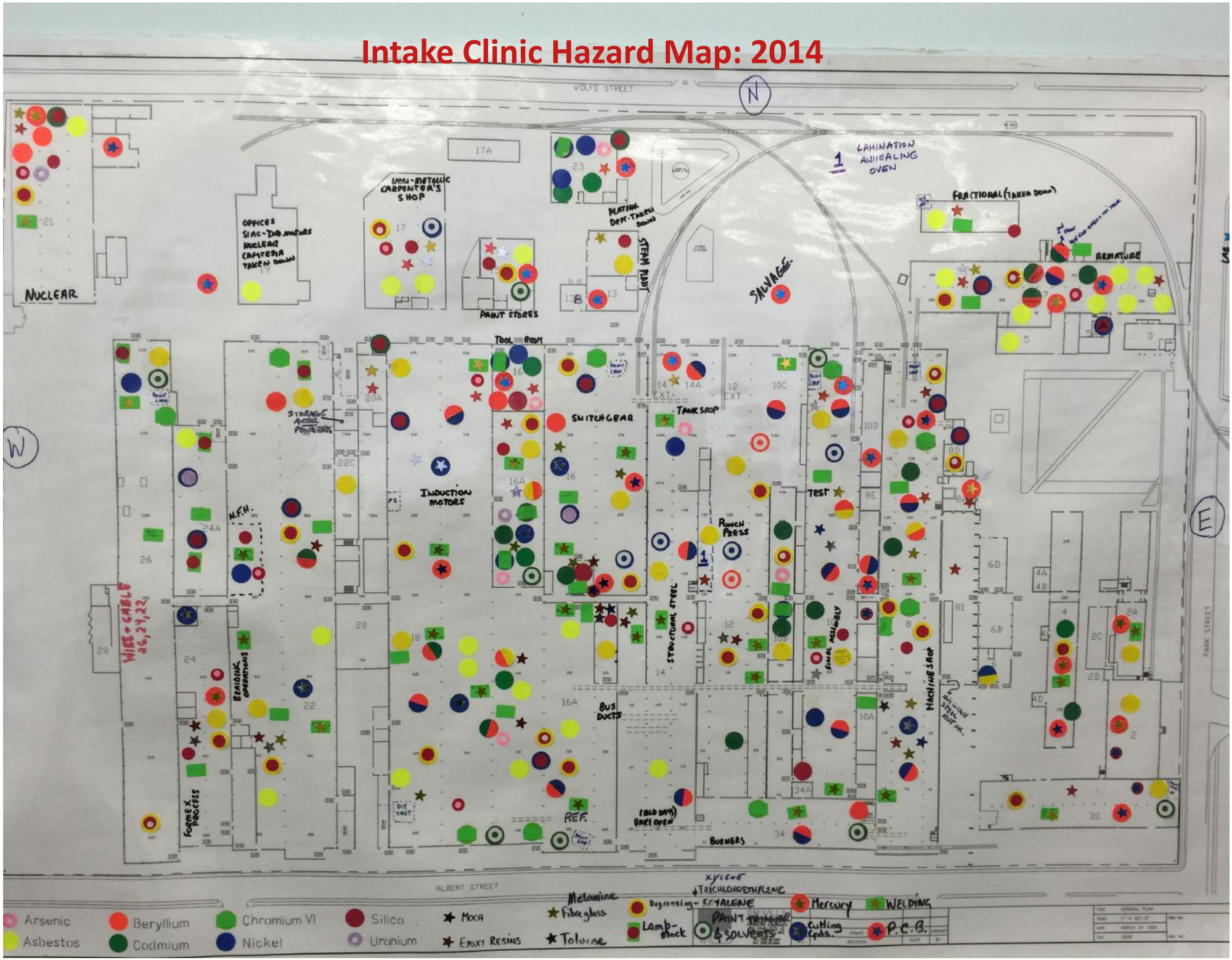
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Intake Clinic Hazard Map: 2014



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Appendix 4: AECOM Canada ULC, “2024 Groundwater Extraction and Treatment System Monitoring Report GEPR Energy Canada Inc. (excerpts)

AECOM

2024 Groundwater Extraction and Treatment System Monitoring Report

GEPR Energy Canada Inc. (Peterborough)

GEPR Energy Canada Inc.

Project Number: 60702823

February 2025

Delivering a better world

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February 27, 2025

Project #
60720641

Subject: 2024 Groundwater Extraction and Treatment System Monitoring Report – GEPR Energy Canada Inc. (Peterborough)

Dear Ms. Bush:

We are pleased to submit to you the GE Power Conversion – Motors (Peterborough) Groundwater Extraction and Treatment System (GETS) 2024 Monitoring Report. This report includes details of:

- Groundwater monitoring related to the Remedial Action Plan to remediate trichloroethylene concentrations in groundwater that have historically migrated from the Facility (note that the groundwater monitoring program was reconfirmed in, and is consistent with, Director's Order Number: 1-228916698, dated March 6, 2024);
- GETS monitoring and maintenance including daily volumes discharge to the sanitary sewer and the results of the effluent sampling; and,
- Additional groundwater monitoring activities.

During this period the GETS operated as designed. There were no compliance issues related to the Permit to Take Water, groundwater Environmental Compliance Approval or the Slug Discharge Permit in 2024.

If you have any comments or questions related to this report or require clarification, please contact the undersigned.

Sincerely,
AECOM Canada ULC

Marc Mitchell, B.Eng.
Senior Project Manager
Marc.Mitchell@aecom.com

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Executive Summary

The results of 2024 groundwater monitoring, extraction and treatment activities associated with the GEPR Energy Canada Inc. Facility in Peterborough, Ontario are summarized below. This Report was prepared by AECOM Canada ULC (AECOM) for GE Canada.

The Site includes the Facility at 107 Park Street North (herein referred to as the "Facility" or "Site 1") and the adjacent Monaghan Road Parking Lot (herein referred to as the "Monaghan Road Property" or "Site 2") located west of the Facility. Groundwater monitoring locations are located both on-site and off-site to the south of the Facility.

Purpose and Objectives

This Report summarizes and presents the results of the environmental and remedial programs carried out at, and in the vicinity of, the Site during 2024 in accordance with the Remedial Action Plan (RAP) to remediate trichloroethylene (TCE) concentrations in groundwater that have historically migrated from the Facility. Note that the groundwater monitoring program was reconfirmed in, and is consistent with, Director's Order Number: 1-228916698, dated March 6, 2024. The results of other related groundwater monitoring activities completed in 2024 are also presented herein.

The Groundwater Extraction and Treatment System (GETS) monitoring and maintenance are conducted in accordance with permit requirements. The GETS operates under the following permits:

i) Permit To Take Water (PTTW), Ministry of the Environment, Conservation and Parks (MECP or Ministry) No. 6551-BCWQSV – Expiry date 7 June 2029;
ii) Environmental Compliance Approval (ECA) 7836-9HDRYN, MECP - Dated 24 March 2014 for treatment of groundwater via air stripping; and,
iii) Slug Discharge Permit, City of Peterborough (City) - Dated 12 May 2004 for discharge of treated groundwater to the City's sanitary sewer.

Findings

The following provides a summary of the main findings derived from the 2024 monitoring programs:

i) Groundwater monitoring was completed as outlined in the RAP and the Director's Order Number: 1-228916698, dated March 6, 2024.
ii) The GETS continues to provide a hydraulic barrier inhibiting the flow of groundwater along the central and eastern portions of the southern property boundary of the Facility.
iii) The backfill of the sanitary sewer along Park Street North appears to depress the water table in this area and appears to act as a drain that conveys groundwater towards the GETS.
iv) The GETS water taking was in compliance with the PTTW.
v) The GETS air stripper operated in accordance with the ECA requirements.
vi) The GETS was operated in compliance with the City of Peterborough Slug Discharge Permit.
vii) If present, the RAP requires the removal of non-aqueous phase liquid (NAPL) at MW58. No NAPL was detected in MW58.

viii) TCE concentrations at groundwater monitoring wells and extraction wells in the southern on-site zone (located along the southern boundary of the Facility) were below the site-specific risk assessment (SSRA) calculated site-specific groundwater Remedial Objective. These results are consistent with historical sampling results.

ix) TCE concentrations at groundwater monitoring wells in the eastern on-site zone (generally located along the eastern boundary of the Facility, adjacent to Park Street North) were below the SSRA Remedial Objective, with the exception of MW05R and MW33. The groundwater at MW05R and MW33 is located within the hydraulic depression along the eastern property boundary that appears to be contained on-site and captured by the GETS. This depression coincides with the backfill of the sanitary sewer along Park Street North that appears to act as a drain conveying groundwater towards the GETS. MW11R2, located east of MW05R on the Park Street Property, showed a low TCE concentration of 29 µg/L in 2024.

x) Groundwater monitoring wells in the eastern downgradient MNA zone are located east of the Facility. Three new monitoring wells were installed in the eastern downgradient zone on Park Street North (MW11R2), Rink Street (MW59R) and Perry Street (MW60R). They were installed to replace four monitoring wells which were removed from the groundwater sampling program: MW11R, MW12R, MW59 and MW60. VOC concentrations at the new monitoring wells were below the SSRA Remedial Objectives in 2024 with the exception of VC at MW59R. MW59R was 2.6 µg/L, slightly above the 1.5 µg/L SSRA Remedial Objective for VC and assumed to be as a result of natural degradation of TCE and dichloroethylene (DCE) isomers *c*12DCE and *t*12DCE.

xi) No LNAPL was detected at MW25 in 2024

Recommendations

Based on the results of the 2024 groundwater monitoring, extraction and treatment programs, the following recommendations are provided:

i) Continue monitoring in accordance with the amended RAP monitoring schedule, Director's Order Number: 1-228916698, dated March 6, 2024.

ii) Continue monitoring for the presence of NAPL in monitoring well MW58 (and voluntarily at nearby MW69 and MW70).

iii) Continue to operate the GETS in accordance with the PTTW, ECA and Slug Discharge permit requirements.

iv) Continue optimizing GETS processes and implement redundancies to facilitate maintenance and reduce potential downtimes.

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Appendix I. Hydrographs

List of Acronyms

11DCE ..... 1,1-dichloroethene or 1,1-dichloroethylene
*c*12DCE..... *cis*-1,2-dichloroethene or *cis*-1,2-dichloroethlyene
CRA..... formerly Conestoga Rovers & Associates, now GHD
DNAPL ..... Dense Non-Aqueous Phase Liquid
ECA..... Environmental Compliance Approval
EW ..... Extraction Well
GAC ..... Granular Activated Carbon
GETS ..... Groundwater Extraction and Treatment System
L/min ..... Litre per minute
mASL ..... metres above sea level
mbgs ..... metres below ground surface
MNA ..... Monitored natural attenuation
MECP..... Ministry of the Environment, Conservation and Parks (Formerly MOECC)
MOE..... Ministry of the Environment (name changed June 24, 2014)
MOECC..... Ministry of the Environment and Climate Change (formerly MOE; name changed on June 29, 2018)
MW..... Monitoring well
PCB..... Polychlorinated biphenyl
PCE..... Tetrachloroethene, tetrachloroethylene or perchloroethylene
PTTW..... Permit to Take Water
QC..... Quality control
RAP..... Remedial Action Plan
SSRA ..... Site-Specific Risk Assessment
*t*12DCE..... *trans*-1,2-dichloroethene or *trans*-1,2-dichloroethlyene
Table 3 SCS..... Ontario Regulation 153/04, Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Groundwater Condition
TCE..... Trichloroethene or trichloroethylene
µg/L ..... microgram per Litre
VC ..... Vinyl chloride
VOC ..... Volatile Organic Compound

1. Introduction

The results of 2024 groundwater monitoring, extraction and treatment activities associated with the GEPR Energy Canada Inc. (GEPR) Facility in Peterborough, Ontario are presented in this Report. This Report was prepared by AECOM Canada ULC (AECOM) for GEPR.

The Site includes the GEPR Facility at 107 Park Street North (herein referred to as the "Facility" or as "Site 1" in the 2024 Director's Order 1-228916698) and the adjacent Monaghan Road Parking Lot (herein referred to as the "Monaghan Road Property" or "Site 2" in the 2024 Director's Order 1-228916698) located west of the Facility. The two sections of the Site are described in more detail in ***Appendix B1***. Groundwater monitoring locations are located both on-site and off-site to the south of the Facility. The Site Plan is presented on ***Figure 1***.

The primary purpose of this Report is to summarize and discuss the results of the environmental and remedial programs carried out at, and in the vicinity of, the Site during 2024 in accordance with the Remedial Action Plan (RAP) for remediating trichloroethylene (TCE) concentrations in groundwater that have historically migrated from the Facility (CRA, 2001). The RAP monitoring program was reconfirmed in, and is consistent with, the Director's Order 1-228916698, dated March 6, 2024, issued by the Ministry (***Appendix D1***). A summary of the RAP is provided in ***Appendix B1***.

The secondary purpose of this report is to present the results of other groundwater monitoring activities completed in 2024 at, or near, the Site including, but not limited to:

i) annual sampling program for total PCBs and Aroclors as per Director's Order Number 1-228916698 focused on the area of northern portion of the former Building 4 at Site 1, where the former PCB waste storage facility was located; and,

ii) annual sampling program for total PCBs and Aroclors as per Director's Order Number 1-228916698 focused on the defined area of PCB-impacted soils at Site 2.

As part of the RAP, the Groundwater Extraction and Treatment System (GETS) provides hydraulic containment to mitigate historical off-site migration of TCE in groundwater. Monitoring and maintenance are conducted to ensure compliance with the permit requirements. This Report outlines the monitoring and maintenance that were carried out and meets the reporting requirements of the permits. The GETS operates under the following permits (***Appendix A***):

i) Permit To Take Water (PTTW), Ministry of the Environment, Conservation and Parks (MECP or Ministry) No. 6551-BCWQSV – Expiry date 7 June 2029;

ii) Environmental Compliance Approval (ECA) 7836-9HDRYN, Ministry - Dated 24 March 2014 for treatment of groundwater via air stripping; and,

iii) Slug Discharge Permit, City of Peterborough (City) - Dated 12 May 2004 for discharge of treated groundwater to the City's sanitary sewer.

Background information for the Site is provided in ***Appendix B1***. In addition to annual summary reports, a brief timeline of activities and other historical submissions since completion of the RAP is included in ***Appendix C***.

The stratigraphic and hydrostratigraphic conditions at and in the vicinity of the Site are provided in ***Appendix B2***.

This report fulfils the annual Groundwater Monitoring & Sampling Program and Groundwater Extraction and Treatment System reporting requirements under the RAP and Director's Order Number 1-228916698 dated March 6, 2024.

2. Monitoring Programs and Methodologies

Appendix E and ***Figure 2*** detail the water level and groundwater quality monitoring programs under Director's Order Number 1-228916698 and the voluntary water level program. Methodologies are described in ***Appendix E***. The groundwater monitoring programs shown on ***Figure 2*** fulfills the groundwater monitoring requirements associated with the Site-Specific Risk Assessment/RAP (SSRA) and included in the Director's Order Number 1-228916698 (***Appendix D1***). Groundwater monitoring is conducted annually in the spring. The monitoring program is evaluated annually based on the findings. Sampling for monitored natural attenuation (MNA) parameters is conducted once every five years. Sampling for MNA parameters was last conducted in 2023, and therefore, sampling for these parameters will be conducted again in 2028.

Soil vapour monitoring program methodology and results conducted off-site for the current year are discussed under separate cover (AECOM, 2025b). The polychlorinated biphenyl (PCB) groundwater monitoring program conducted to monitor for PCBs in groundwater for the current year is also discussed under separate cover (AECOM, 2025a), as these results are part of the Site stormwater discharge monitoring program.

2.1 Deviations from the Programs

2.1.1 Deviations from the Water Level Monitoring Program

The only deviations were related to the voluntary monitoring for due diligence purposes as follows:

- MW18 and MW23 were not accessible because they are within a fenced or closed area. These deviations do not affect the interpretation of data and decision making was not affected.
- The level logger at MW61 malfunctioned in May 2023 and was sent to the manufacturer for assessment. Data following reinstallation in June 2023 were considered unreliable and the logger was removed again and sent to the manufacturer for re-assessment. Battery replaced and logger recalibrated by manufacturer. The logger was replaced in June 2024.
- The level logger from MW32 malfunctioned in 2024 and was sent to the manufacturer for assessment. For 2024, data are available from January to June 2024.
- The level logger from MW71 malfunctioned in 2024 and was sent to the manufacturer for assessment. For 2024, data are available from January to March 2024.

2.1.2 Deviations from the DNAPL Monitoring Program

There were no deviations from the dense non-aqueous phase liquid (DNAPL) monitoring program.

2.1.3 Deviations from the TCE and Degradation Product Sampling Program

No flow at pumping well EW3 during the annual event. EW3 was sampled in September 2024. There were no other deviations from the TCE monitoring program.

2.1.4 Deviations from the PCB Monitoring Programs

There were no deviations from the two PCB monitoring programs.

2.1.5 Deviations from the GETS Operation and Performance Monitoring Program

There were no deviations from the GETS monitoring program.

2.2 Quality Assurance and Quality Control

The project sampling plan minimizes errors by applying consistent and scientifically proven quality control (QC) measures in the field (i.e., Standard Operating Procedures), checks that might identify problems early (i.e., QC samples), and sample-handling procedures that minimize the possibilities of sample tampering (i.e., chain of custody forms) and shipping problems (i.e., by using the laboratory's shipping service).

Certain field QC samples such as blind field duplicates and volatile organic compound (VOC) trip blanks are routine to document the data quality and to identify whether data quality problems exist. They are designed to measure most sources of error that affect environmental samples. Other basic groundwater QC samples include VOC trip spikes and field blanks, as required by the program data quality objectives (DQO). For the Slug Discharge Permit Monitoring Program, field blanks are collected instead of trip blanks. The results of the field and laboratory QC samples are compared against specific performance standards to determine if DQOs are met within known probability limits.

The review of QC program as it relates to annual groundwater quality monitoring program are provided in ***Appendix F***, along with the certificates of analysis. None of the flags affect the validity of the results and decision-making was not affected.

The QC program as it relates to the analytical results from the GETS operations and performance monitoring are discussed in ***Appendix G2***. Overall, the QC programs showed the analytical results to be acceptable and that decision-making was not affected.

3. Results and Discussion

This section provides the results and discussion of the monitoring programs.

3.1 Groundwater Elevations and Flow Gradients

3.1.1 Flow Gradients

In June 2024, water levels were collected in accordance with the 2024 Groundwater Level Monitoring Program (***Appendix E1***). The groundwater elevations are presented in ***Appendix F***. One measurement was not used to contour groundwater elevations, as the screened interval elevation for MW53 is deeper than its shallower nested monitoring well.

The hydrogeological conceptual model for the Site is described in ***Appendix B2.*** The hydrostratigraphy consists of silty sand and gravel underlain by a silty clay glaciolacustrine aquitard, which separates the unconfined groundwater flow system from deeper groundwater flow systems. Groundwater in the silty sand and gravel alluvium deposit at the Facility flows is in a southeasterly direction towards the GETS and the eastern property boundary under unconfined conditions (***Figure 3***).

In June 2024, groundwater levels were collected where possible at the monitoring wells in the annual program (***Appendix E1***), including three shallow monitoring wells, MW11R2, MW59R and MW60R, installed in June 2024 on City of Peterborough property, in the off-site eastern MNA zone. MW11R2, MW59R and MW60R were installed as replacement wells for MW11R, MW12R, MW59 and MW60 which were previously removed from the program (additional information is provided in ***Section 4.1***).

Groundwater elevation contours have been prepared using the groundwater levels gauged in June 2024 to illustrate groundwater elevations at the Site and are presented on ***Figure 3***. The highest topographical location at the Site is near MW76, at the northwest corner of the Monaghan Road Property near High Street. Groundwater in the silty sand and gravel alluvium deposit flows in a southeasterly direction under unconfined conditions. The depth of the water table changes from 10.22 mbgs at MW76, at the top of the hill, to 0.13 mbgs at the bottom of the hill at MW74, as the ground surface drops 20 m. The depth of the water table gradually deepens away from the hill. In June 2024, the water table at MW62 near Park St N was approximately 2.6 mbgs.

Within the orange box on ***Figure 3***, groundwater contours are drawn at 0.2 m intervals to provide more detail in the area influenced by the GETS. For comparison, groundwater contours from 2002, before the GETS was installed, are provided in ***Appendix B2***. The groundwater extraction system continues to depress the water table along the southeastern Facility boundary. During the monitoring event in June 2024, groundwater elevations at MW51, MW67, MW52 and MW61 (along Albert Street) were lower than at MW68 and MW60R (along Lafayette Avenue and Perry Street).

East of the Facility along Park Street North, groundwater elevations appear to be influenced by a sanitary sewer that has invert elevations below the water table (see 2002 groundwater contours and the north-south cross-section provided in ***Appendix B2***). The sanitary sewer backfill (expected to be composed of coarser materials of higher hydraulic conductivity compared to the surrounding natural deposits) appears to depress the water table and act as a drain that captures and conveys groundwater southward along the eastern boundary of the Facility. The lower groundwater elevations and lower TCE concentrations in groundwater at off-site MW11R2 and MW59R compared to on-site monitoring wells in June 2024 (see ***Sections 3.3.1.3*** and ***3.3.2.2***) is consistent with this understanding.

3.1.2 Hydrographs

On October 4, 2014, level loggers were installed at MW61 and MW71 in support of the soil vapour sampling program. Other loggers are deployed across the Site to provide information as needed. In 2024, the level loggers were deployed as follows:

i) at MW61 and MW71 to the south of the Facility in support of the soil vapour sampling program;
ii) at MW70 beneath the Plant Building;
iii) at MW74 at the Monaghan Road Property; and,
iv) at MW32 on-site, adjacent to Parks Avenue North.

Groundwater elevation hydrographs for the 5-year period of October 2019 to October 2024 are presented in ***Appendix I***. The hydrographs show some seasonal fluctuations that follow similar trends with each other. Based on the logger in MW74 at the Monaghan Road Property, the groundwater elevation varies by about 1.2 m throughout the year and is the lowest during the summer and fall. At the Facility and off-site south of the Facility, the water table varies by about 0.2 m throughout the year. Overall, other than seasonal variations, the water table at the Facility remained relatively constant throughout the year.

The hydrographs for MW32, MW61 and MW71 are consistent with previous years. MW70 was installed near the historical TCE DNAPL source zone in which MW58 is screened. The water level record at MW70 is consistent with historical data.

The 2024 data in the hydrograph for MW32 are consistent with previous years.

3.2 DNAPL Investigations

As part of the ongoing investigations and assessment of the MW58 source area, the monitoring of DNAPL (i.e., dense non-aqueous phase liquid or separate phase liquid that is denser than water) is conducted at MW58 and at nearby MW69 and MW70 in conjunction with groundwater level monitoring.

A separate phase signal was not detected at MW58, MW69 or MW70 during the annual monitoring event in 2024, indicating that measurable DNAPL was not present at these monitoring wells.

3.3 Trichloroethylene and Degradation Products Groundwater Concentrations

Groundwater quality sampling results for TCE and TCE degradation products (11DCE, *c*12DCE, *t*12DCE and VC) since 2012 are included in ***Appendix F***. For other VOC historical data, where available, see Appendix E in the 2014 Groundwater Extraction and Treatment System Monitoring Report (CRA, 2015b). The analytical laboratory reports for the annual programs in 2024 are included in ***Appendix F***.

The on-site and off-site groundwater analytical data are compared to two sets of values, where applicable. The first set of values are the SSRA (2002) derived site-specific groundwater criteria titled Minimum Concentration Applied as a Remedial Objective for off-Site MNA Remedy (herein referred to as "SSRA Remedial Objectives"). The second set of values are the standards in Ontario Regulation 153/04 Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Groundwater Condition for Coarse-Textured Soils (MOE, 2011a) (herein referred to as "Table 3 SCS").

3.3.1 Summary and Analysis of On-Site Groundwater Analytical Data

Since the GETS at the Facility is providing ongoing hydraulic containment, the discussion of on-site groundwater analytical results in this section is limited to observed TCE concentrations in 2024 as compared to the SSRA Remedial Objective and trends. Concentrations of TCE degradation products (11DCE, *c*12DCE, *t*12DCE and VC) since 2012 are included in ***Appendix F***.

3.3.1.1 TCE Source Area

Separate phase TCE (i.e., DNAPL) has historically been detected and recovered at MW58 (CRA, 2002). As a result, MW58 functions as both a monitoring well and a recovery well if required. It was constructed with a 152 mm diameter pipe and a 1.5 m tailpiece sump below the base of the well screen. If sufficient quantities of DNAPL accumulate in the sump at the base of the MW58 (1.5-m long, 0.15-m diameter tailpiece sump), DNAPL (if present) and groundwater are removed using low-flow pumping. Between 2015 and 2024, MW58 did not show a separate phase signal with the oil-water interface probe (as discussed in ***Section 3.2***). Similar to recent years, DNAPL removal was not necessary in 2024.

Table 1 summarizes the TCE concentration detected in a groundwater sample collected from the screened zone of MW58 in 2024.

Table 1: On-site SSRA Monitoring, TCE Source Area

		Parameter	TCE
		Table 3 SCS	1.6
		SSRA Remedial Objective	1,098
Monitoring Well	Date	Sample Type	(µg/L)
MW58	27 Jun 2024	N	**28,000**

Notes: Bold – above Table 3 SCS
Lime shading – above the SSRA Remedial Objective

3.3.1.2 Southern On-Site Zone

Groundwater monitoring wells in the southern on-site zone are generally located along the southern boundary of the Facility along Albert Street, and generally align with the extraction wells. ***Table 2*** summarizes the TCE concentrations and notes the figure number for the associated time-series graph. TCE concentrations at these monitoring wells were below the SSRA Remedial Objective in 2024. Trends in TCE concentrations in the groundwater wells in the southern on-site zone are discussed below.

Table 2: On-site SSRA Monitoring, Southern Zone

		Parameter	TCE	
		Table 3 SCS	1.6	
		SSRA Remedial Objective	1,098	
Monitoring Well	Date	Figure	(µg/L)	Discussion
MW49	19 Jun 2024	***Figure 4***	0.59 / 0.66	MW49 is located west of the extraction well network and serves as a sentry well for the GETS. TCE concentrations continue to be low.
MW50	19 Jun 2024	***Figure 5***	<0.20	MW50 is located at the western end of the extraction well network (adjacent to EW7). Historically, TCE has been below the SSRA Remedial Objective
MW51	24 Jun 2024	***Figure 6***	**290**	TCE concentrations have fluctuated since monitoring began, with values ranging from 79 µg/L to 5,500 µg/L since 2005. A generally decreasing trend has been evident since 2013.
MW52	24 Jun 2024	***Figure 7***	**4.8**	TCE concentrations show an overall decreasing trend since 2000.
MW67	24 Jun 2024	***Figure 8***	0.22	TCE concentrations have remained low since sampling began in 2002.

Notes: Bold – above the Table 3 SCS

The extraction wells are located along the southern boundary of the Facility along Albert Street. ***Table 3*** summarizes the TCE concentrations. TCE concentrations at the extraction wells were below the SSRA Remedial Objective in 2024 at all locations. These results are consistent with historical sampling results (***Appendix F***).

Table 3: On-site GETS Monitoring, Extraction Wells

Parameter		TCE
Table 3 SCS		1.6
SSRA Remedial Objective		1,098
Monitoring Well	Date	(µg/L)
EW-1	20 Jun 2024	**48**
EW-2	20 Jun 2024	**120 / 120**
EW-3	04 Sep 2024	**470**
EW-4	20 Jun 2024	**240**
EW-5	20 Jun 2024	**790**
EW-6	20 Jun 2024	**750**
EW-7	20 Jun 2024	**48**

Notes: Bold – above the Table 3 SCS
Lime shading – above the SSRA Remedial Objective
120 / 120 – field duplicate results

Since the water in the extraction wells enter the treatment system immediately after the sampling ports, the extraction well results are not discussed further.

3.3.1.3 Eastern On-Site Zone

Groundwater monitoring wells in the eastern on-site zone are generally located along the eastern boundary of the Facility, along the grassed portion of the Facility adjacent to Park Street North. ***Table 4*** summarizes the TCE concentrations and notes the figure number for the associated time-series graph. TCE concentrations were below the SSRA Remedial Objective in 2024 with the exception of MW33 and MW05R. Trends in TCE concentrations in the groundwater wells in the eastern on-site zone are discussed below.

Table 4: On-site SSRA Monitoring, Eastern Zone

Parameter			TCE
Table 3 SCS			1.6
SSRA Remedial Objective			1,098
Monitoring Well	Date	Figure	(µg/L)
MW32	**26 Jun 2024**	***Figure 9***	**170**
MW33	**26 Jun 2024**	***Figure 10***	**1200**
MW05R	**26 Jun 2024**	***Figure 11***	**2300 / 2300**
MW53	**25 Jun 2024**	***Figure 12***	**6.9**
MW62	**25 Jun 2024**	***Figure 13***	**95**

Notes: Bold – above the Table 3 SCS
Lime shading – above the SSRA Remedial Objective
960 / 1000 – field duplicate results

MW32

TCE concentrations prior to 2008 and after 2014 are below SSRA Remedial Objective. Between March 2008 and March 2014, TCE was generally above the SSRA Remedial Objective, with a high of 20,000 µg/L in March 2014. Since 2016, TCE concentrations have been below the SSRA Remedial Objectives for TCE of 1,098 µg/L.

MW33

The TCE concentration was just above the SSRA Remedial Objective in 2024. MW33 is located south and generally downgradient of MW32. In 2015 and 2016, the TCE concentrations at MW33 (between 4,100 µg/L and 7,500 µg/L) were above the historical range (2000-2014) and above the SSRA Remedial Objective. Since 2017, TCE has remained below the historical maximum.

MW05R

In December 2018, MW05 was replaced by MW05R. MW05R was installed as a water table monitoring well, placed as close as possible to MW05 (within 1.5 m) and with a similar screen depth.

The TCE concentration was above the SSRA Remedial Objective in 2024 at 2,300 µg/L. TCE concentration in MW05R has been above the SSRA Remedial Objective of 1,600 µg/L since it was first sampled in 2019.

The groundwater at MW05R is located south and generally downgradient of MW33 and appears to be contained on-site and captured by the GETS. The backfill of the sanitary sewer along Park Street North appears to act as a drain conveying groundwater towards the GETS.

MW11R2, located east of MW33 and MW05R on the Park Street Property, showed a low TCE concentration of 29 µg/L in 2024 (see ***Appendix F***).

MW53

TCE concentrations have generally declined since 2005, and have been at, or slightly above reporting limits since 2010. While the 2024 concentration was slightly higher at 6.9 µg/L, it remains well below the below the SSRA Remedial Objective.

MW62

In 2024, TCE was detected at 95 µg/L. Since 2012, TCE concentrations have been below the SSRA Remedial Objective.

3.3.2 Summary and Analysis of Off-Site Groundwater Analytical Data

3.3.2.1 Southern MNA Zone

Groundwater monitoring wells in the southern MNA zone are located off-site south of the Facility. These wells are within, or delineate, the area of dissolved TCE in groundwater. ***Table 5*** summarizes selected VOC (TCE and degradation products) concentrations observed in these wells and notes the figure number for the associated time-series graph. VOC concentrations at these wells were below the SSRA Remedial Objectives in 2024, with the exception of vinyl chloride (VC) at MW61 and MW68. Trends in VOC concentrations in the groundwater wells in the southern MNA zone are discussed below.

Table 5: Off-site SSRA Monitoring, Southern MNA Zone

Parameter			TCE	11DCE	*c*12DCE	*t*12DCE	VC
Table 3 SCS			1.6	1.6	1.6	1.6	0.50
SSRA Remedial Objectives			1,098	3	1,617	no criterion	1.5
Monitoring Well	Date	Figure	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
MW61	24 Jun 2024	***Figure 14***	**83**	<0.20	**57**	1.4	**2.3**
MW63R	24 Jun 2024	***Figure 20***	0.69	<0.20	<0.50	<0.50	<0.20
MW64	25 Jun 2024	***Figure 19***	1.1	<0.20	**3.9**	<0.50	<0.20
MW65	25 Jun 2024	***Figure 17***	0.35	<0.20	<0.50	<0.50	<0.20
MW66	26 Jun 2024	***Figure 18***	<0.20	<0.20	<0.50	<0.50	<0.20
MW68	24 Jun 2024	***Figure 15***	**250**	1.1	**750**	**38**	**1.7**
MW71	24 Jun 2024	***Figure 16***	1.3	<0.20	**3.1**	<0.50	<0.20

Notes: Bold – above the Table 3 SCS
Lime shading – above the SSRA Remedial Objectives
220 / 210 – field duplicate results

MW61

MW61 is located along Albert Street and is within the capture zone of the GETS. Since the start of the GETS in 2004, TCE and degradation product concentrations have declined and have been below SSRA Remedial Objectives with the exception of VC in 2023 and 2024. Vinyl chloride is assumed to be a result of natural degradation of TCE, *c*12DCE and *t*12DCE.

MW68

MW68 is located along Lafayette Avenue, just south of Albert Street and appears to be within the capture zone of the GETS. In 2024, TCE was below the SSRA Remedial Objective. Historically, TCE concentrations decreased following the start of the GETS in 2004 but fluctuated above and below the SSRA Remedial Objective until 2015. Since 2015, TCE has been below the SSRA Remedial Objective.

TCE degradation products have been regularly detected at this location. VC has been detected above SSRA Remedial Objective intermittently, including in 2024. Vinyl chloride is assumed to be a result of natural degradation of TCE, *c*12DCE and *t*12DCE.

MW71

VOCs have been monitored at this location since its installation and inclusion in the off-site monitoring program in December 2012. In 2024, TCE and degradation product concentrations continue to be below the SSRA Remedial Objectives.

MW65

MW65 is the westernmost monitoring location in the Southern MNA Zone. TCE and degradation product concentrations have been below SSRA Remedial Objectives and near or below the reporting limits since monitoring began since 2012.

MW66

MW66 is the easternmost monitoring location in the Southern MNA Zone monitoring program. TCE and degradation products have been below the SSRA Remedial Objective and near or below the reporting limits since 2012.

MW64

TCE results have shown a generally decreasing trend since 2010. TCE and degradation product concentrations have remained below SSRA Remedial Objectives since monitoring began at this location.

MW63R

MW63R is the southernmost monitoring location in the Southern MNA Zone monitoring program. TCE and degradation product concentrations have been below the SSRA Remedial Objectives and near or below the reporting limits at this location and its predecessor location (MW63) since 2012, with the exception of a temporary increase in 2022.

The source of the 2022 TCE detections at MW63R remain unclear and the concentrations have decrease to near previous concentrations in 2023 and 2024.

3.3.2.2 Eastern MNA Zone

Three new monitoring wells were installed in the eastern downgradient zone located east of the Facility on Park Street North (MW11R2), Rink Street (MW59R) and Perry Street (MW60R). They were installed to replace four monitoring wells which were removed from the groundwater sampling program: MW11R, MW12R, MW59 and MW60. ***Table 6*** summarizes the selected VOC (TCE and degradation products) concentrations observed in these wells and notes the figure number for the associated time-series graph. VOC concentrations at these monitoring wells were below the SSRA Remedial Objectives in 2024, with the exception of VC at MW59R. Trends in VOC concentrations in the groundwater wells in the eastern downgradient zone are discussed below.

Table 6: Off-site SSRA Monitoring, Eastern MNA Zone

		Parameter	TCE	11DCE	*c*12DCE	*t*12DCE	VC
		Table 3 SCS	**1.6**	**1.6**	**1.6**	**1.6**	**0.50**
		SSRA Remedial Objectives	**1,098**	**3**	**1,617**	**no criterion**	**1.5**
Monitoring Well	Date	Figure	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
MW11R2	25 Jun 2024	***Figure 21***	**29**	<0.20	**74**	**13**	0.22
MW59R	25 Jun 2024	***Figure 22***	**25**	<0.20	**59**	**12**	**2.6**
MW60R	25 Jun 2024	***Figure 23***	<0.20	<0.20	<0.50	<0.50	<0.20

Notes: Bold – above the Table 3 SCS;
Lime shading – above the SSRA Remedial Objectives

MW11R2

MW11R was installed as a water table monitoring well, first sampled in June 2019. In June 2024, MW11R2 was installed to replace MW11R. TCE and degradation product concentrations have consistently been below the SSRA Remedial Objectives.

MW59R

Concentrations of TCE and degradation product concentrations (except for VC) at this location are well below their SSRA Remedial Objectives.

MW60R

TCE and degradation product concentrations are below SSRA Remedial Objectives and the reporting limit.

3.4 PCB Sampling

The annual groundwater PCB quality programs include three monitoring wells near former Building 4 at Site 1 (MW25, MW26 and MW28) and seven monitoring wells at the Monaghan Road Property (Site 2). The locations are shown on **Figure 2**. They are discussed as part of the 2024 PCB Monitoring Report for Stormwater and Groundwater (AECOM, 2025b).

3.5 GETS Operation and Performance Assessment

Routine operations and maintenance of the GETS were carried out by AECOM technicians. AECOM Operators typically attended the GETS two times each week.

Routine maintenance in 2024 included:

i) Bag filter changes approximately twice per week;
ii) Air stripper scale cleaning in February, April and October 2024;
iii) Granular activated carbon (GAC) full change-out in October 2024;
iv) Replacing selected EW pumps when necessary;
v) Holding tank TK1 cleaning completed in December 2024; and,
vi) Level sensors cleaning completed monthly starting in September 2024.

The routine operations and maintenance requirements were similar to previous years. A summary of non-routine maintenance activities that impacted GETS operation carried out in 2024 is presented below:

Component	Issue
Piping / Valves	• Minor drips/leaks. • Completed inspection of entire system; replaced sections of piping and miscellaneous valves.
Dosing Pump	• Recalibrated / adjusted.
Level Sensor at TK1	• Malfunction of High High Alarm Sensor, resulted in TK1 overflowing. • Repaired sensor and implemented monthly inspection and testing.
Transfer Pump P-3	• Minor drip/leak from seal on pump shaft. • Pump repaired and reinstalled.
Air Stripper	• High Pressure Alarm triggered. • Air Stripper cleaned, blower dilution valve adjusted.
	• Air Stripper level sensor housing broke. • Replaced housing for level sensors.
Power Supply	• Plant power loss; temporary impact to GETS.

3.5.1 PTTW Monitoring & Hydraulic Performance

Total daily water takings were recorded in accordance with the PTTW. The GETS treated an average of approximately 18 Litres per minute (L/min) or 25,975 Litres per day; a total of approximately 9,507 m^3 was treated and discharged to the sanitary sewer in 2024. The PTTW allows a maximum water taking of 273,600 Litres per day for remediation purposes. GEPR reports the daily water taking to the Water Taking Reporting System electronic database on a calendar year basis. A copy of the daily water taking record is provided in ***Appendix H1***. The confirmation of successful online reporting is provided in ***Appendix H2***.

The groundwater elevation contour maps show that the GETS is creating a hydraulic depression along the Facility's central and eastern portions of the southern property boundary (as discussed in ***Section 3.1***). The hydraulic

depression is caused by inward horizontal hydraulic gradient around the extraction wells and inhibits the migration of groundwater from the Site to beyond southern property boundary of the Facility. Historical groundwater elevations are tabulated in ***Appendix F***.

3.5.2 Treatment Performance

3.5.2.1 Slug Discharge Permit Monitoring Program

Sampling of the GETS discharge was carried out in 2024 in accordance with Slug Discharge Permit. Analytical certificates of analyses are provided in ***Appendix G1***. The annual effluent PCB sample was below the laboratory reporting limit of 0.01 µg/L.

The GETS was operated in compliance with the City of Peterborough (City) Slug Discharge Permit in 2024. The monthly concentrations of the contaminant of concern VOCs through the GETS in 2024 (influent, post air stripper, and effluent) are shown on ***Figure 24***.

Historical concentrations of these VOCs at the influent and effluent points are shown on ***Figure 25*** through ***Figure 29***.

3.5.2.2 Environmental Compliance Approval for Air

There were no modifications made to the air stripper in 2024.

There were no environmental complaints received regarding the air stripper in 2024.

4. Additional Work Completed During 2024

4.1 Monitoring Well Network Additions, Inventory and Repairs

In June 2024, AECOM conducted an inventory of the monitoring well network. The majority of monitoring wells were found to be in good condition; however, the inventory identified a few monitoring wells that needed repairs as listed in ***Appendix F***.

Three new observation wells were installed on City of Peterborough property — MW11R2, MW59R and MW60R. Borehole logs are provided in **Appendix F2**. Their addition is reflected in the groundwater monitoring programs on **Figure 2 and** in **Appendix E1**. Observation wells on private property to the east of Park Street North were removed from the programs.

4.2 LNAPL at MW25

In June 2020, LNAPL was measured at MW25 and identified as a heavy distillate petroleum product, such as a motor or lubricating oil (AECOM, 2021). No LNAPL was measured in 2021 and 2022.

On June 6, 2023, a trace of dark LNAPL was seen on the oil-water interface probe tip at MW25; the trace LNAPL was confirmed on June 7, 2023. LNAPL was removed using an oil-absorbent sock. MW25 was monitored monthly for LNAPL from July to November 2023, with no LNAPL observed. As part of the most recent annual program monitoring in June 2024, MW25 was again assessed and no LNAPL was observed. MW25 will be reassessed during the annual program in spring 2025.

5. Summary of Findings and Recommendations

5.1 Findings

The following provides a summary of the main findings derived from the 2024 monitoring programs:

i) Groundwater monitoring was completed as outlined in the RAP and the Director's Order GE-1-228916698, dated March 6, 2024.

ii) The GETS continues to provide a hydraulic barrier inhibiting the flow of groundwater beyond the central and eastern portions of the southern property boundary of the Facility.

iii) The backfill of the sanitary sewer along Park Street North appears to depress the water table in this area and appears to act as a drain that conveys groundwater towards the GETS.

iv) The GETS water taking was in compliance with the PTTW in 2024. A total of approximately 9,507 m^3 was treated and discharged to the sanitary sewer in 2024, equivalent to an average of 25,975 Litres per day and remained below the PTTW allowable maximum water taking of 273,600 Litres per day.

v) The GETS air stripper operated in accordance with the ECA requirements in 2024.

vi) The GETS was operated in compliance with the City of Peterborough Slug Discharge Permit in 2024.

vii) **TCE Source Area:** No DNAPL was detected in MW58 in 2024.

viii) **Southern On-Site Zone:** Groundwater monitoring wells in the southern on-site zone are generally located along the southern boundary of the Site along Albert Street, and generally align with the extraction wells. TCE concentrations at the monitoring wells were below the SSRA Remedial Objective in 2024. TCE concentrations at the extraction wells were below the SSRA Remedial Objective in 2024. These results are consistent with historical sampling results.

ix) **Eastern On-Site Zone:** Groundwater monitoring wells in the eastern on-site zone are generally located along the eastern boundary of the Facility, adjacent to Park Street North. TCE concentrations at these monitoring wells were below the SSRA Remedial Objective in 2024, with the exception of MW05R and MW33. The groundwater at MW05R is located south and generally downgradient of MW33 and both are located along the eastern property boundary that appears to be contained on-site and captured by the GETS. The backfill of the sanitary sewer along Park Street North appears to influence groundwater flow along the eastern property boundary on-site and convey groundwater towards the GETS. MW11R2, located east of MW05R on the Park Street Property, showed a low TCE concentration of 29 µg/L in 2024.

x) **Southern MNA Zone**: Groundwater monitoring wells in the southern MNA zone are located off-site south of the Facility. VOC concentrations at these wells were below the SSRA Remedial Objectives in 2024, with the exception of VC at MW61 (2.3 µg/L) and MW68 (1.7 µg/L) that were slightly above the SSRA remedial objective of 1.5 µg/L.

xi) **Eastern MNA Zone**: Groundwater monitoring wells in the eastern downgradient zone are located east of the Facility. Three new monitoring wells were installed in the eastern downgradient zone on Park Street North (MW11R2), Rink Street (MW59R) and Perry Street (MW60R). They were installed to replace four monitoring wells which were removed from the groundwater sampling program: MW11R,

MW12R, MW59 and MW60. VOC concentrations at the new monitoring wells were below the SSRA Remedial Objectives in 2024 with the exception of VC at MW59R. MW59R was 2.6 µg/L, slightly above the 1.5 µg/L SSRA Remedial Objective for VC and assumed to be as a result of natural degradation of TCE, *c*12DCE and *t*12DCE.

xii) No LNAPL was detected at any annual program monitoring wells in 2024, including MW25.

5.2 Recommendations

Based on the results of the 2024 groundwater monitoring, extraction and treatment programs, the following recommendations are provided:

i) Continue monitoring in accordance with the amended RAP monitoring schedule, Director's Order Number: 1-228916698, dated March 6, 2024.

ii) Continue monitoring for the presence of NAPL in monitoring well MW58 (and voluntarily at nearby MW69 and MW70).

iii) Continue to operate the GETS in accordance with the PTTW, ECA and Slug Discharge permit requirements.

iv) Continue optimizing GETS processes and implement redundancies to facilitate maintenance and reduce potential downtimes.

6. Glossary

Chlorinated Solvent—an organic solvent containing chlorine atoms (e.g., methylene chloride and 1,1,1-trichloromethane). Uses of chlorinated solvents include aerosol spray containers, in highway paint, and dry cleaning fluids. EPA

Extraction Well—a discharge well used to remove groundwater. EPA *(Note: also known as pumping well)*

Groundwater flow—the movement of water in the zone of saturation. ASTM D653

Head—pressure at a point in a liquid, expressed in terms of the vertical distance of the point below the surface of the liquid. ASTM D653

Hydraulic Gradient— hydraulic gradient, i (D), n—*in hydraulics*, the change in total head (head loss, Dh) per unit distance (L) in the direction of fluid flow, in which i = Dh/L. ASTM D653

Monitoring well—a well that is constructed by one of a variety of techniques that may serve a variety of purposes: (1) extracting groundwater for physical, chemical, or biological testing; (2) measuring water levels; (3) measuring formation hydraulic parameters; or (4) measuring formation fluid chemical or physical parameters. ASTM D5521

Parameter—parameter to be tested and is synonymous with other terminology such as "contaminant", "target analyte", or "analyte" which may be used in the regulation or other documents related to O.Reg. 153/04. Analytical Protocol

Polychlorinated Biphenyls—a group of toxic, persistent chemicals used in electrical transformers and capacitors for insulating purposes, and in gas pipeline systems as lubricant. EPA

Quality Assurance (QA)—a system of planned activities intended to provide adequate confidence that quality requirements are being met. QA is one element of the quality system. Analytical Protocol

Quality Control (QC)—a set of operational techniques and activities intended to ensure that quality requirements are actually being met within known probability limits. Quality control is one part of the quality system. Analytical Protocol

Reporting Limit (RL)—also reportable detection limit (RDL); concentration at which a single analysis using the methods and matrices listed in the analytical protocol document will consistently detect target analytes when present. The RL must be equal to or greater than the MDL. Analytical Protocol

Screened Interval—*in well construction*, the interval in a geologic formation where a well is screened, allowing the water to enter the well if a portion of the screened interval is saturated.

Static Water Level—attained by water at equilibrium in a well when no water is being taken from the well O.Reg. 903

Water table (groundwater table)—*in geohydrology/hydro-geology*, the surface of a groundwater body at which the water pressure equals atmospheric pressure. ASTM D653 DISCUSSION—Earth material below the groundwater table that is saturated with water. It is common practice to determine the water table using a monitoring (observation) well or piezometer, or both.

Well screen—perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone O.Reg. 903

—a filtering device that allows groundwater to flow freely into a well from the adjacent formation, while minimizing or eliminating the entrance of fine-grained material into the well. ASTM D5521

References for Glossary

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ASTM D653—Standard Terminology Relating to Soil, Rock, and Contained Fluids Designation: D653–09 (2009-01-01).

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O.Reg. 903—Ontario Regulation 903, Wells made under the Ontario *Water Resources Act*. Ministry of the Environment, 2010.

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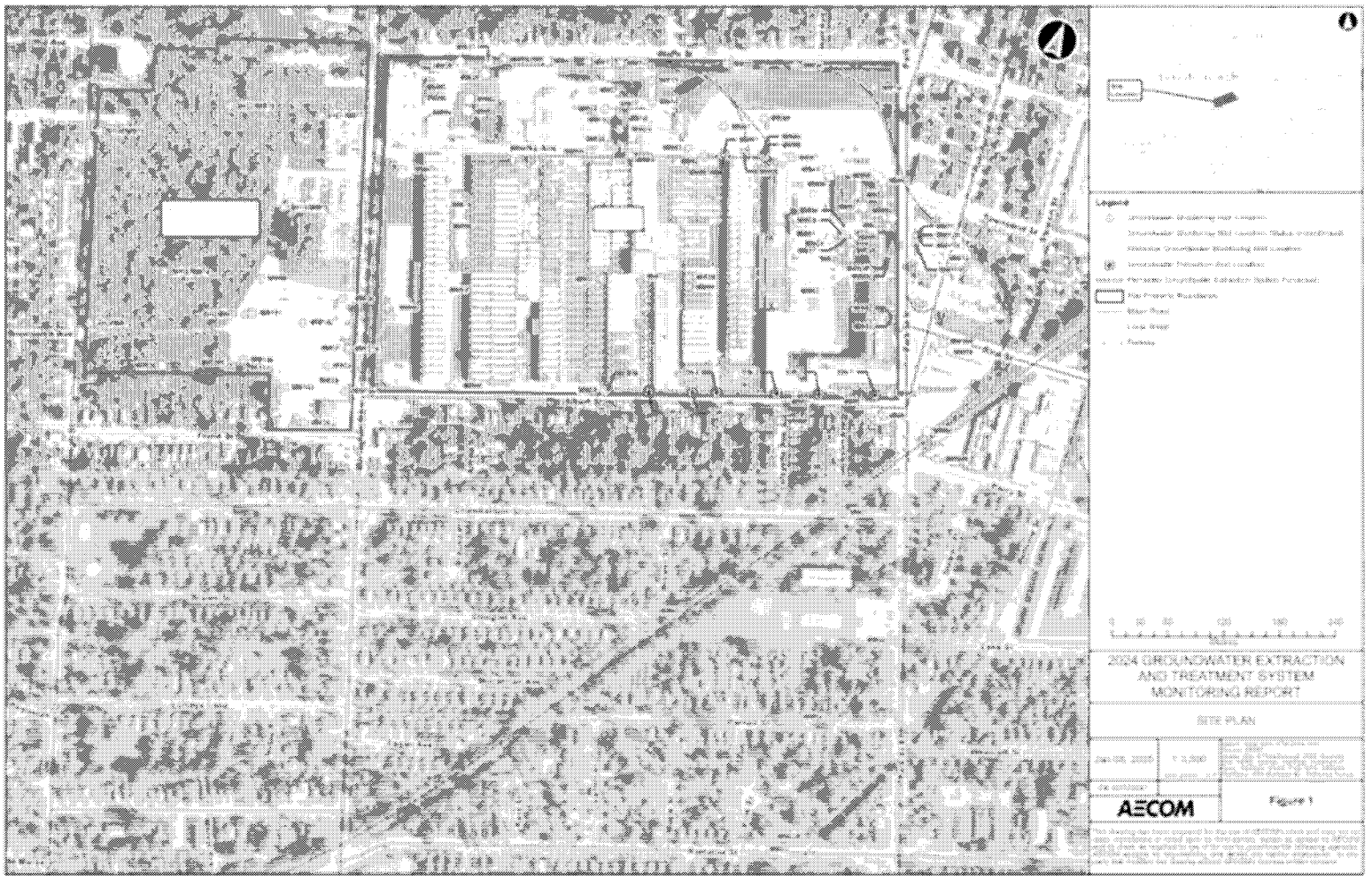
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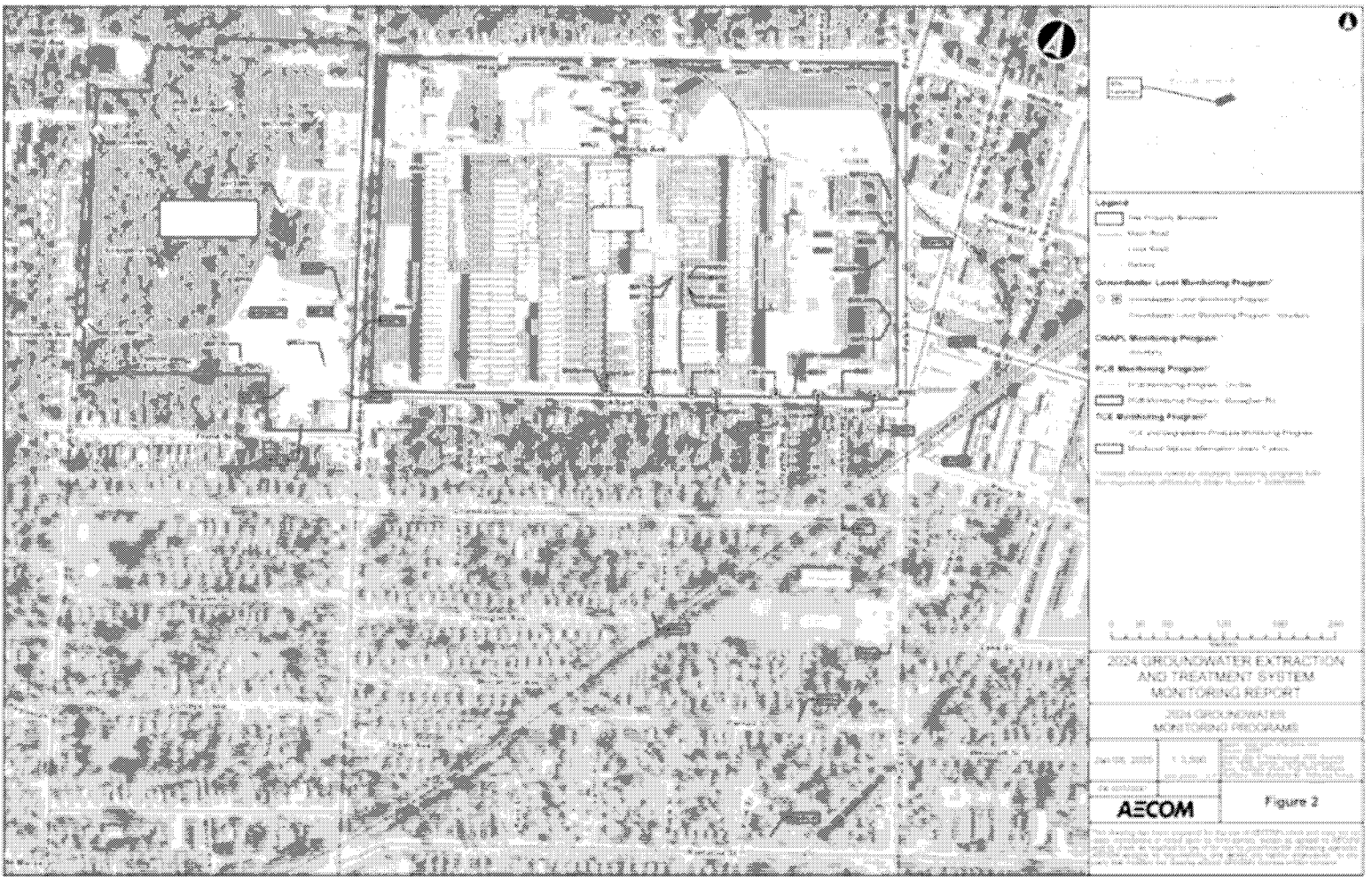
Françoise Campbell, M.Sc., P.Geo.
Hydrogeologist, Environment

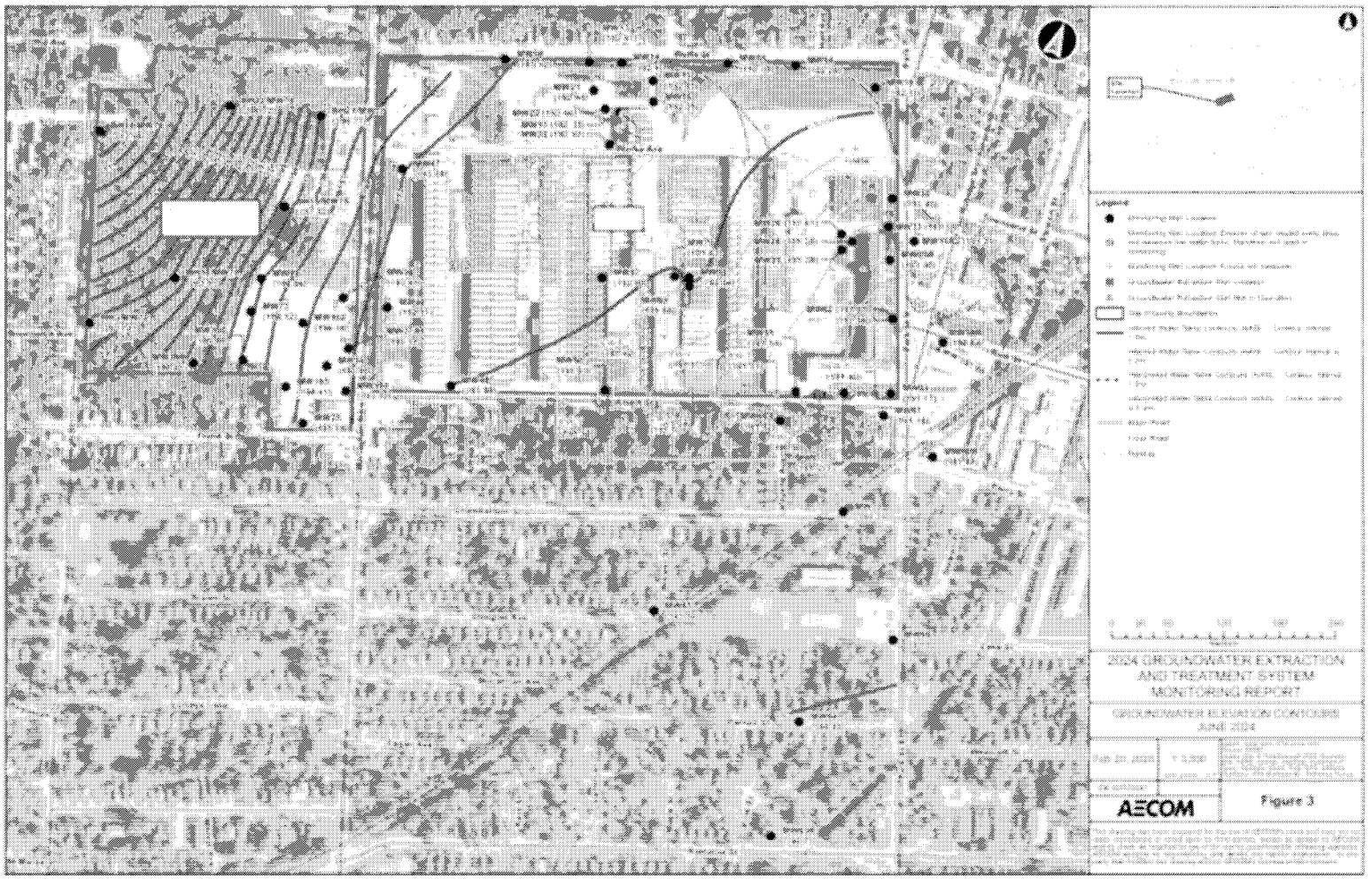
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Figures


2024 GROUNDWATER EXTRACTION AND TREATMENT SYSTEM MONITORING REPORT
SITE PLAN
AECOM

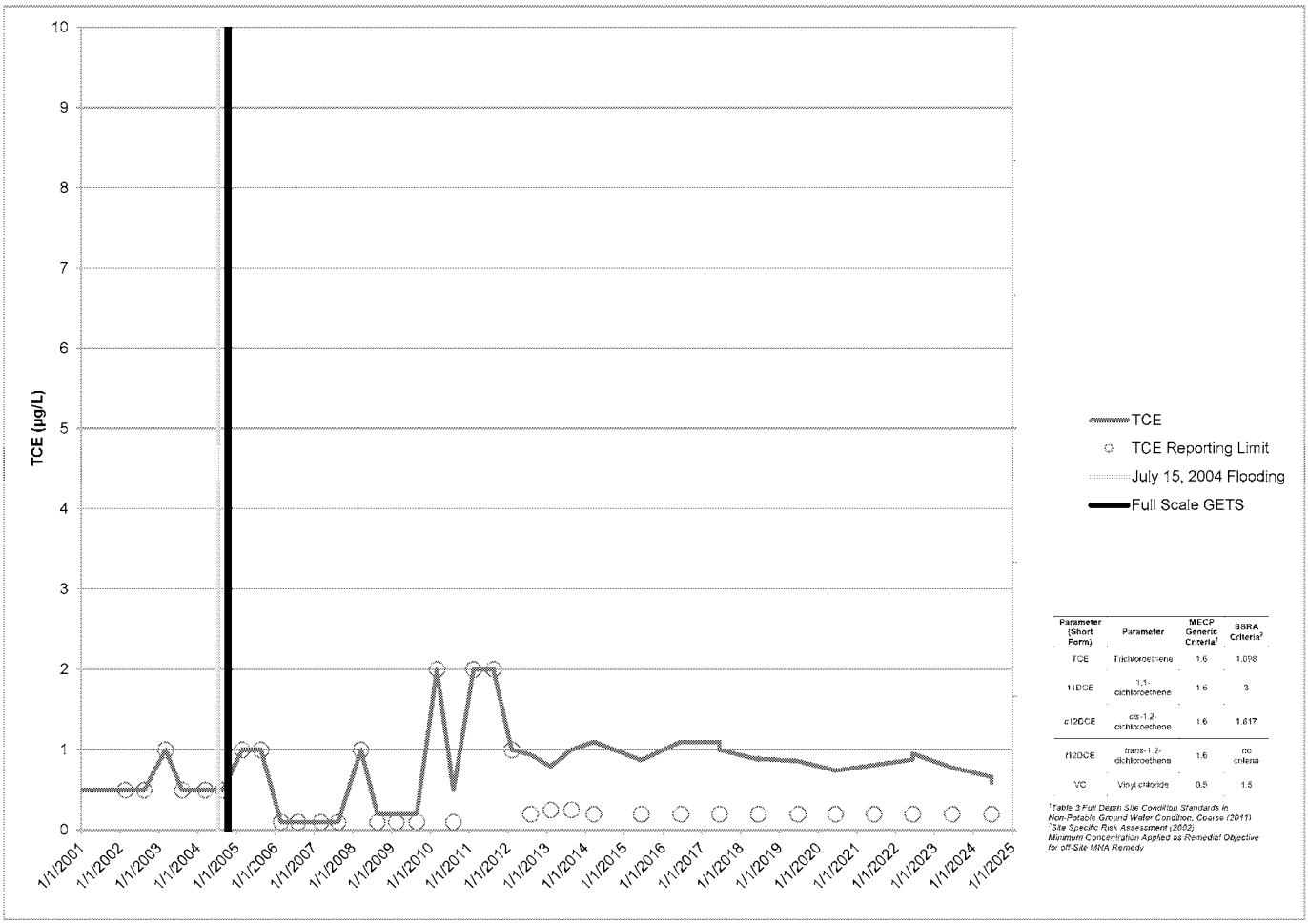

2024 GROUNDWATER EXTRACTION AND TREATMENT SYSTEM MONITORING REPORT
2024 GROUNDWATER MONITORING PROGRAMS
AECOM
Figure 2


2024 GROUNDWATER EXTRACTION AND TREATMENT SYSTEM MONITORING REPORT
GROUNDWATER ELEVATION CONTOURS JUNE 2024
AECOM
Figure 3

AECOM

Figure 4 On-site MW49 Groundwater Concentrations

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60720641



Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.5

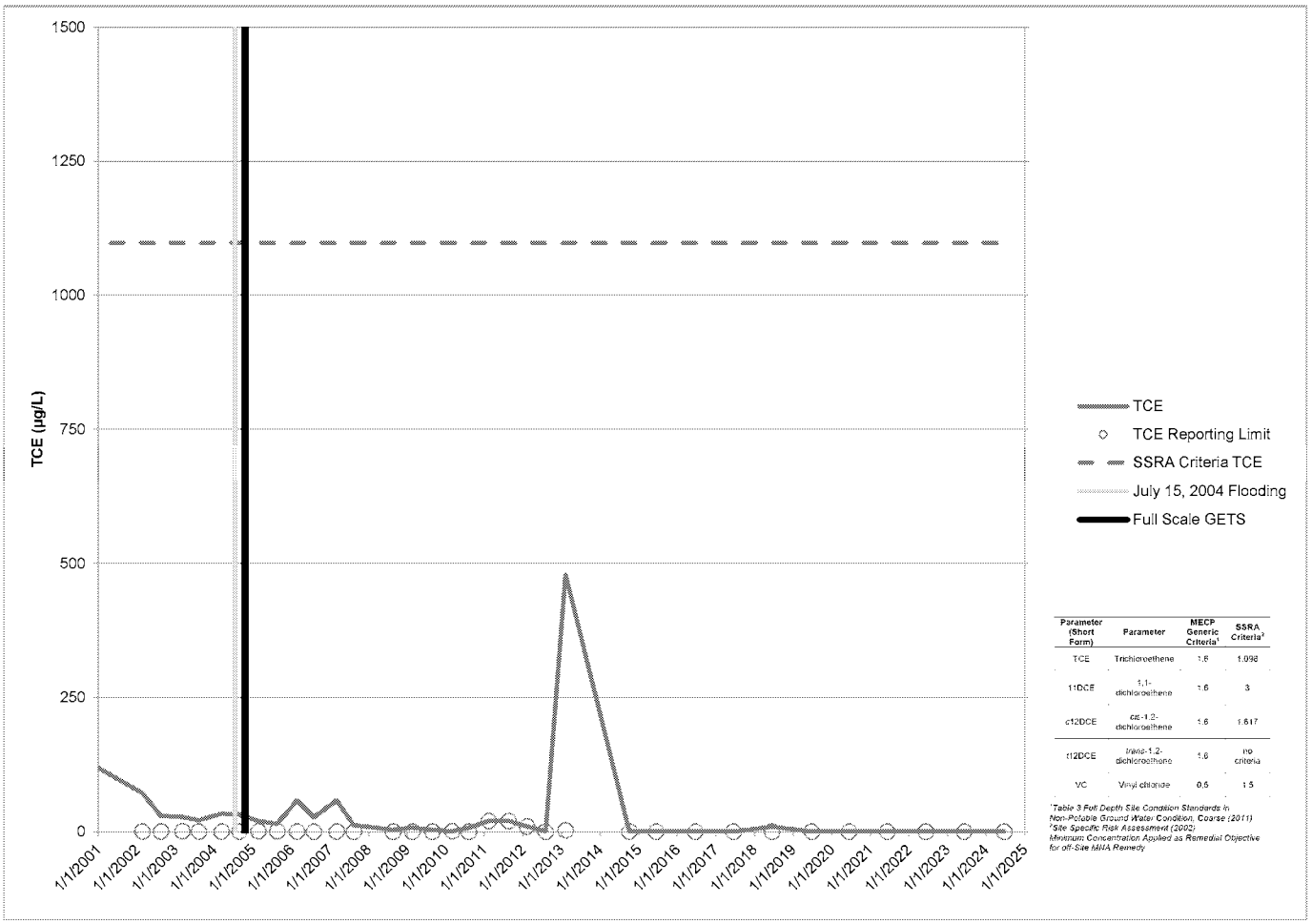
[1] *Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)*
[2] *Site Specific Risk Assessment (2002) Minimum Concentration Applied as Remedial Objective for off-Site MNA Remedy*

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Figure 5 On-site MW50 Groundwater Concentrations

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GE Peterborough
60720641



Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.647
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.5

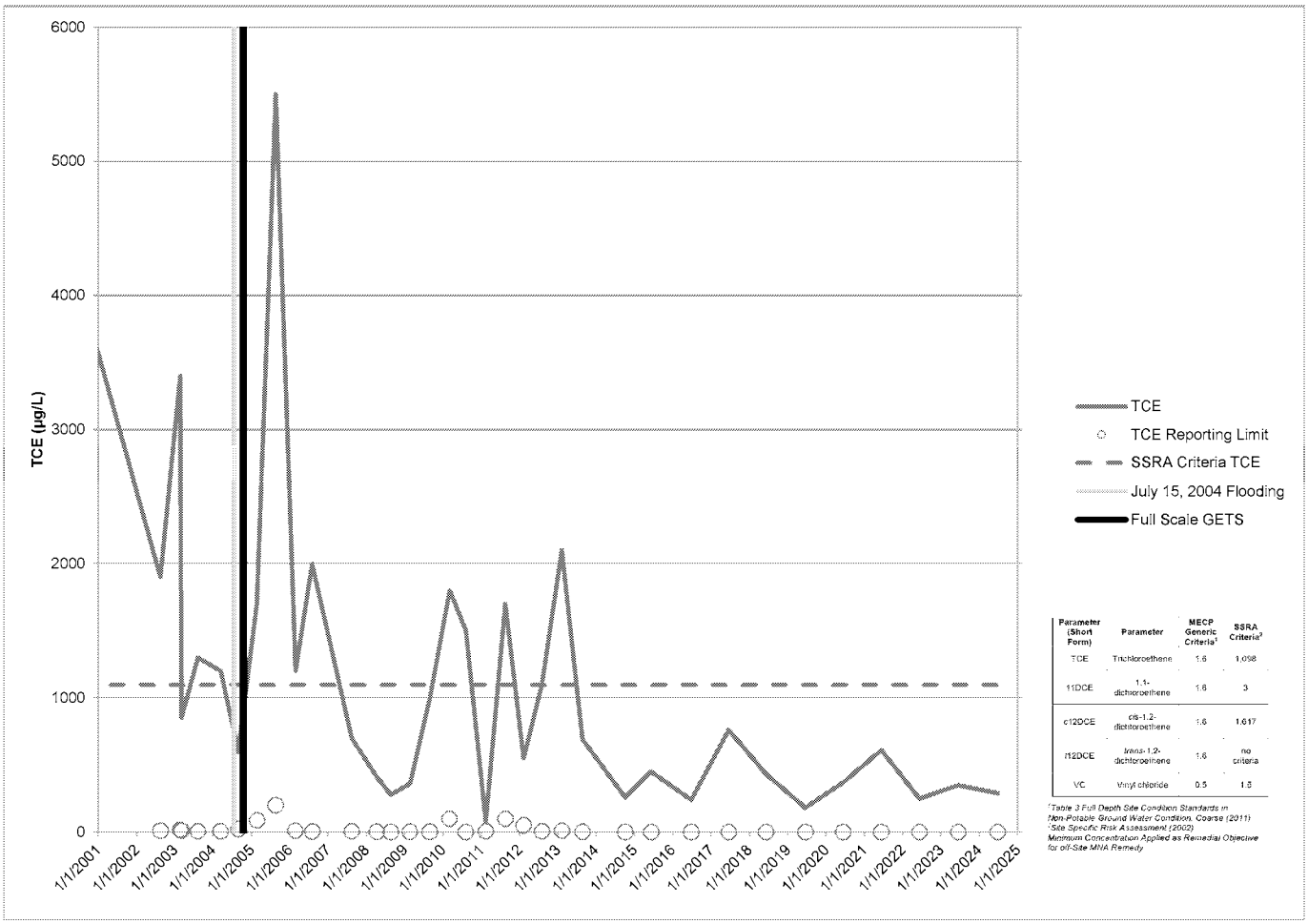
[1]Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2]Site Specific Risk Assessment (2002)
Minimum Concentration Applied as Remedial Objective for off-Site MNA Remedy

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Figure 6 On-site MW51 Groundwater Concentrations

GEPR Energy Canada Inc
GE Peterborough
60720641



Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.8

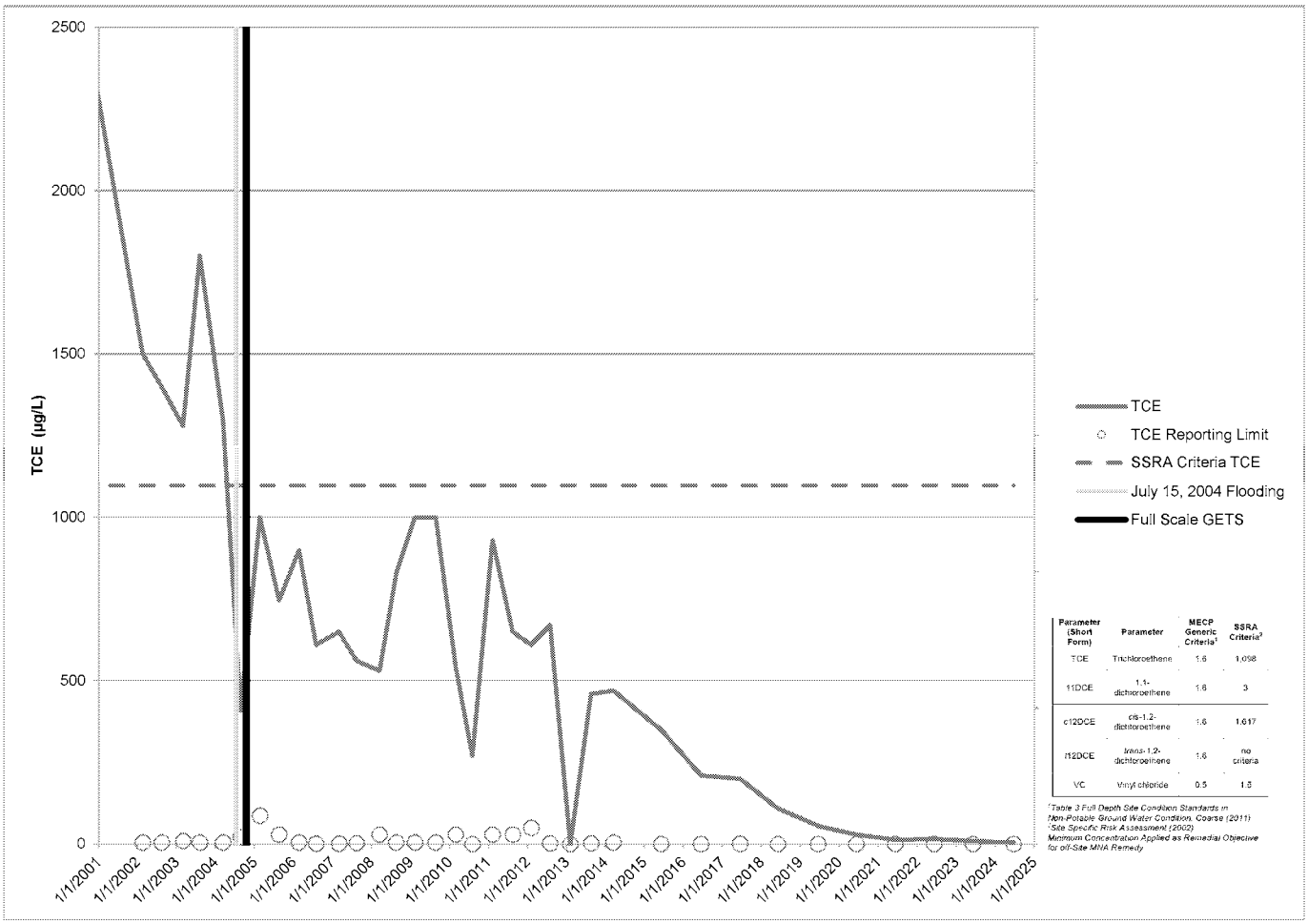
[1] *Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)*
[2] *Site Specific Risk Assessment (2002)*
Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy

GEPET_60720641T_4014_09_02_01.00 Figure 03 to 22 Time-Series Chemistry
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Figure 7 On-site MW52 Groundwater Concentrations

GEPR Energy Canada Inc
GE Peterborough
60720641



Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.8

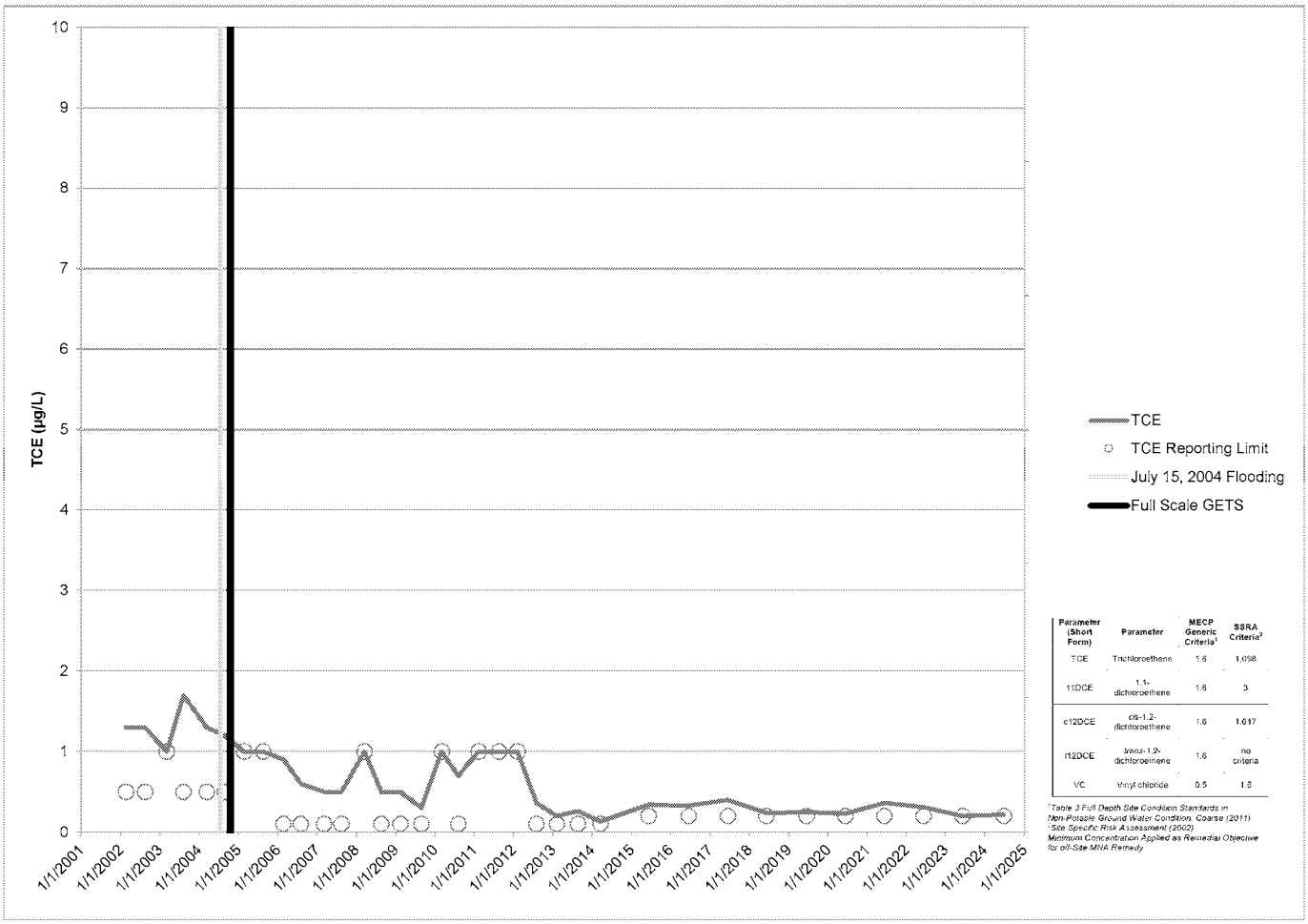
[1] *Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)*
[2] *Site Specific Risk Assessment (2002) Minimum Concentration Applied as Remedial Objective for off-Site MNA Remedy*

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Figure 8 On-site MW67 Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.8

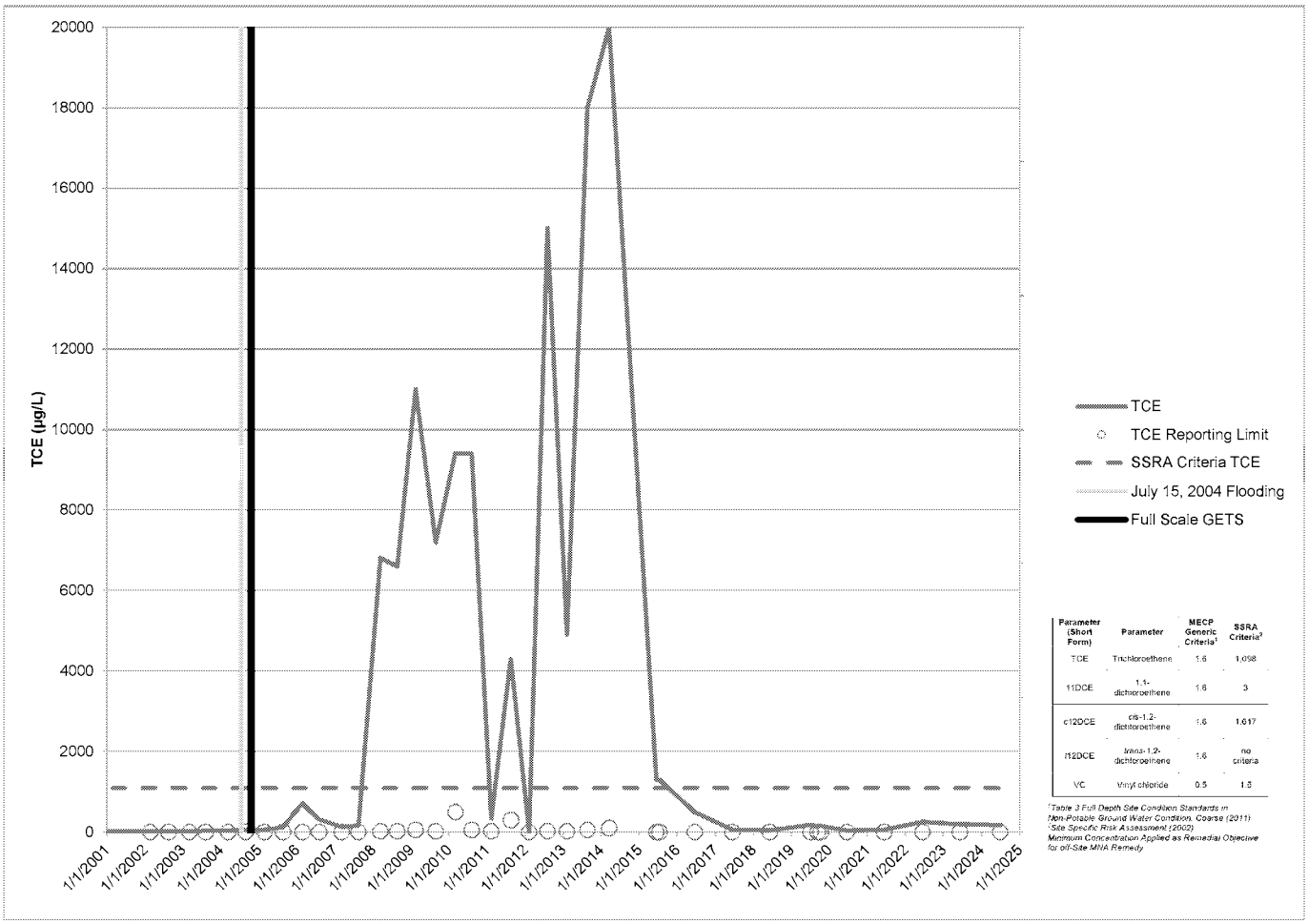
[1] *Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)*
[2] *Site Specific Risk Assessment (2002)*
Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy

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Figure 9 On-site MW32 Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.8

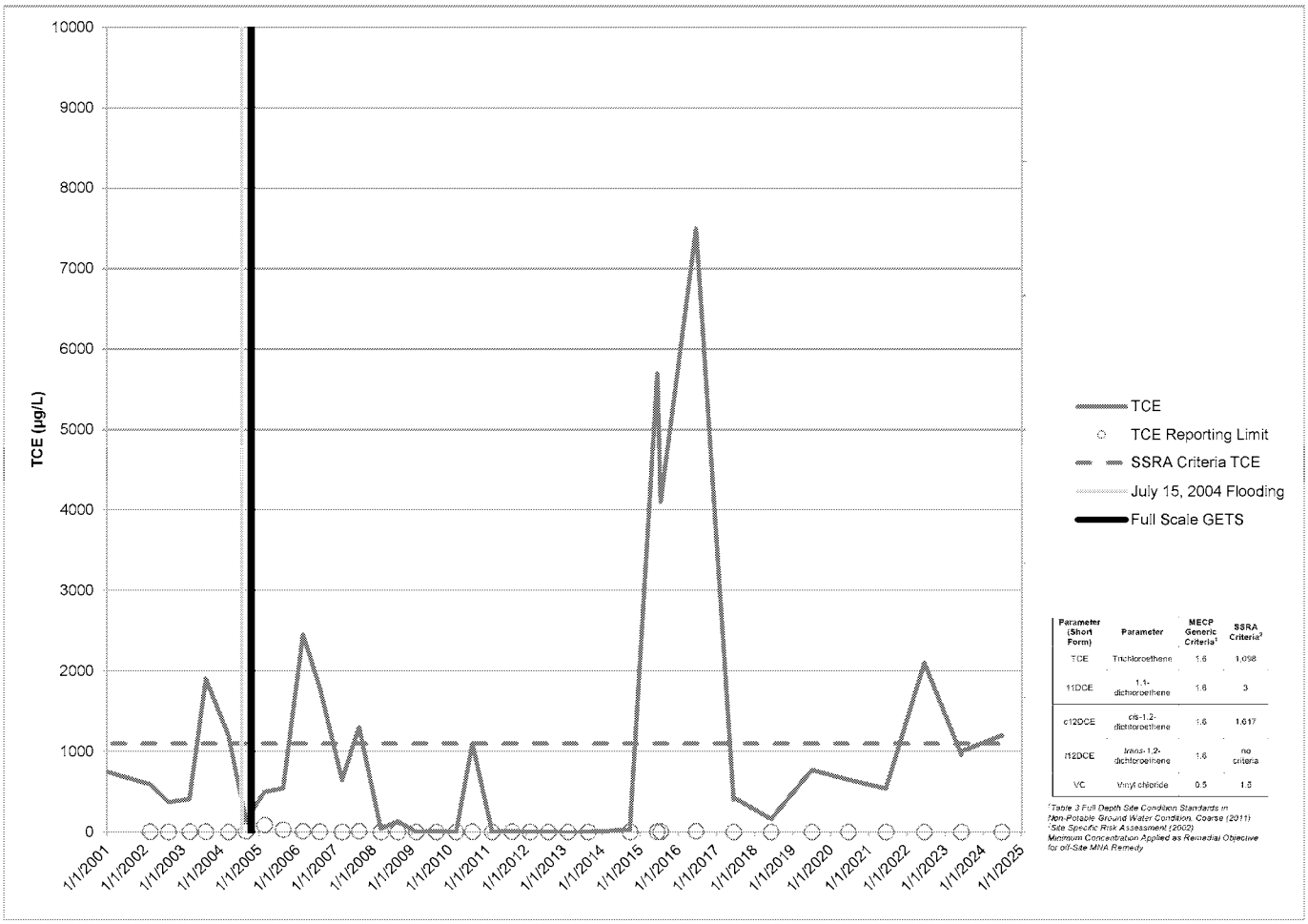
[1] *Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)*
[2] *Site Specific Risk Assessment (2002)*
Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy

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Figure 10 On-site MW33 Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.8

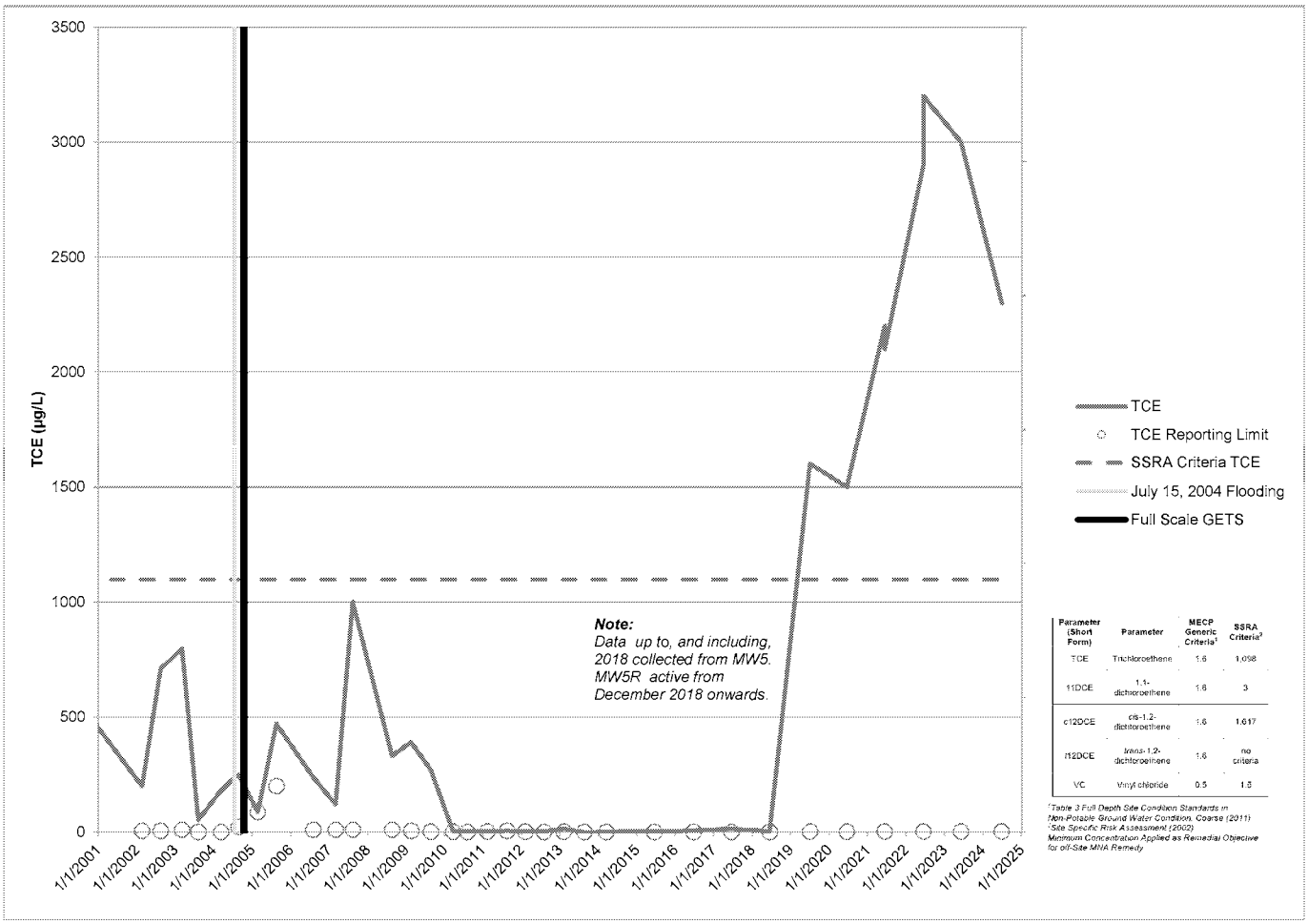
[1] *Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)*
[2] *Site Specific Risk Assessment (2002) Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy*

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Figure 11 On-site MW05R Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.5

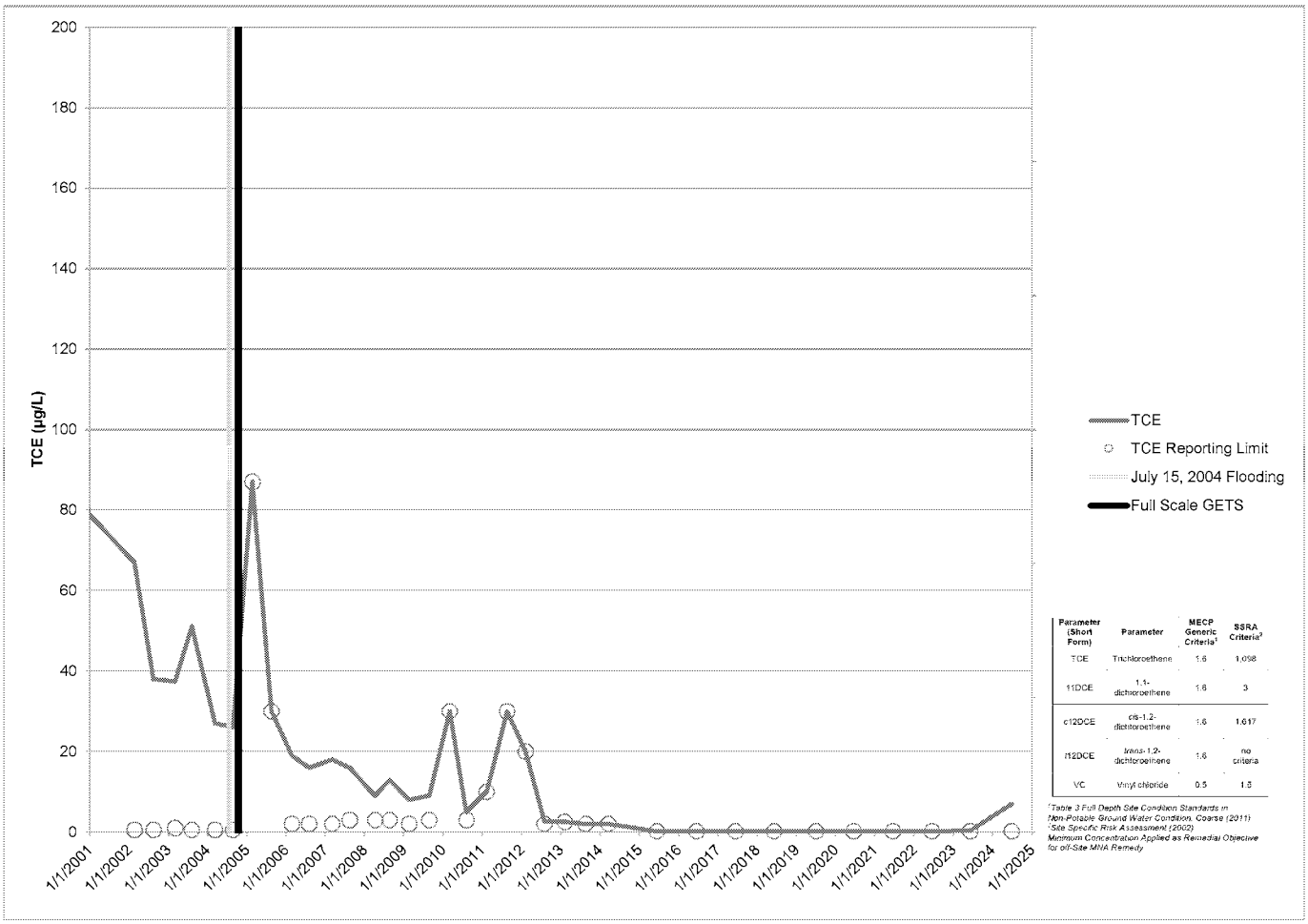
[1] Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2] Site Specific Risk Assessment (2002)
Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy

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Figure 12 On-site MW53 Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.8

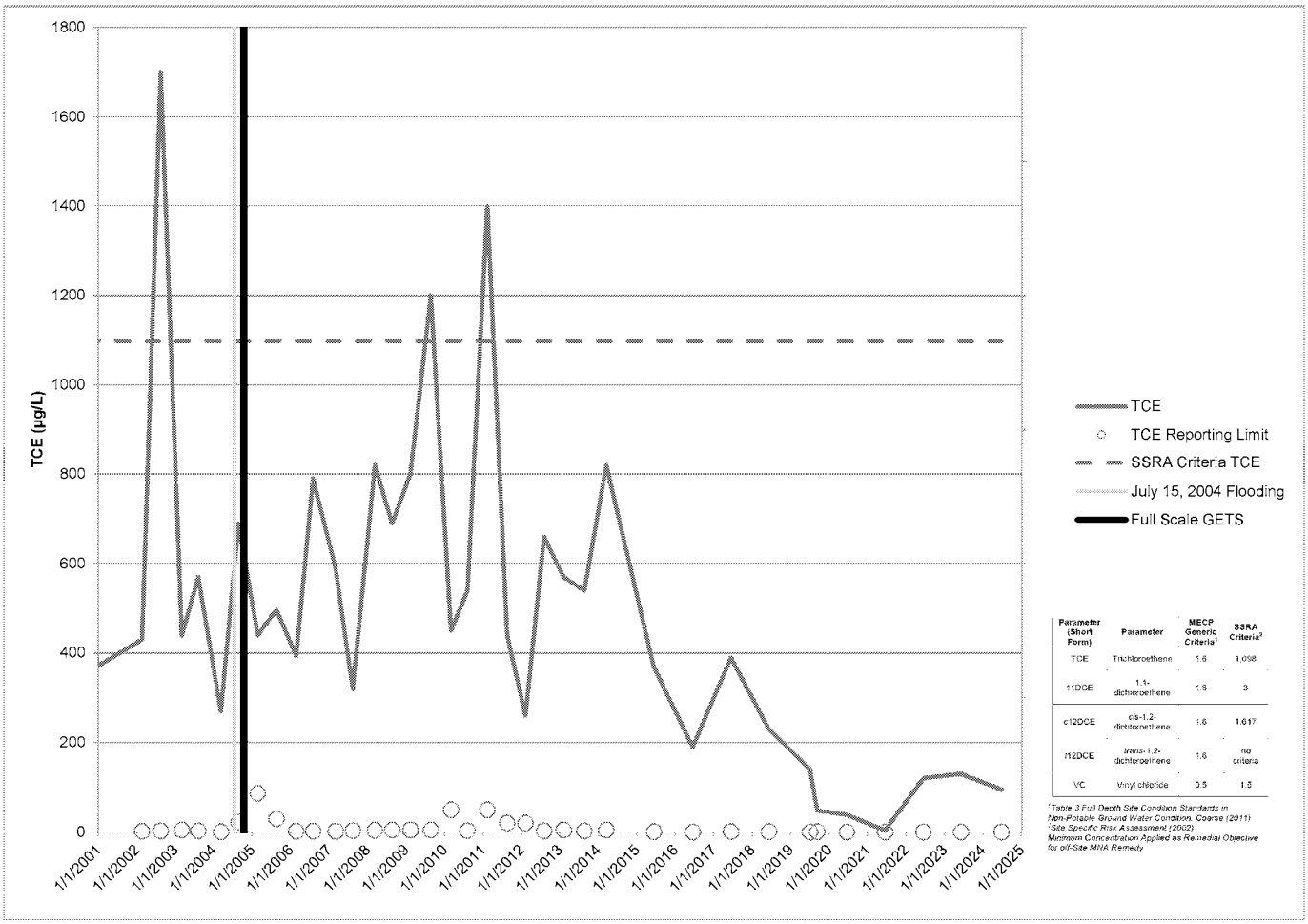
[1] *Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)*
[2] *Site Specific Risk Assessment (2002) Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy*

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Figure 13 On-site MW62 Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.5

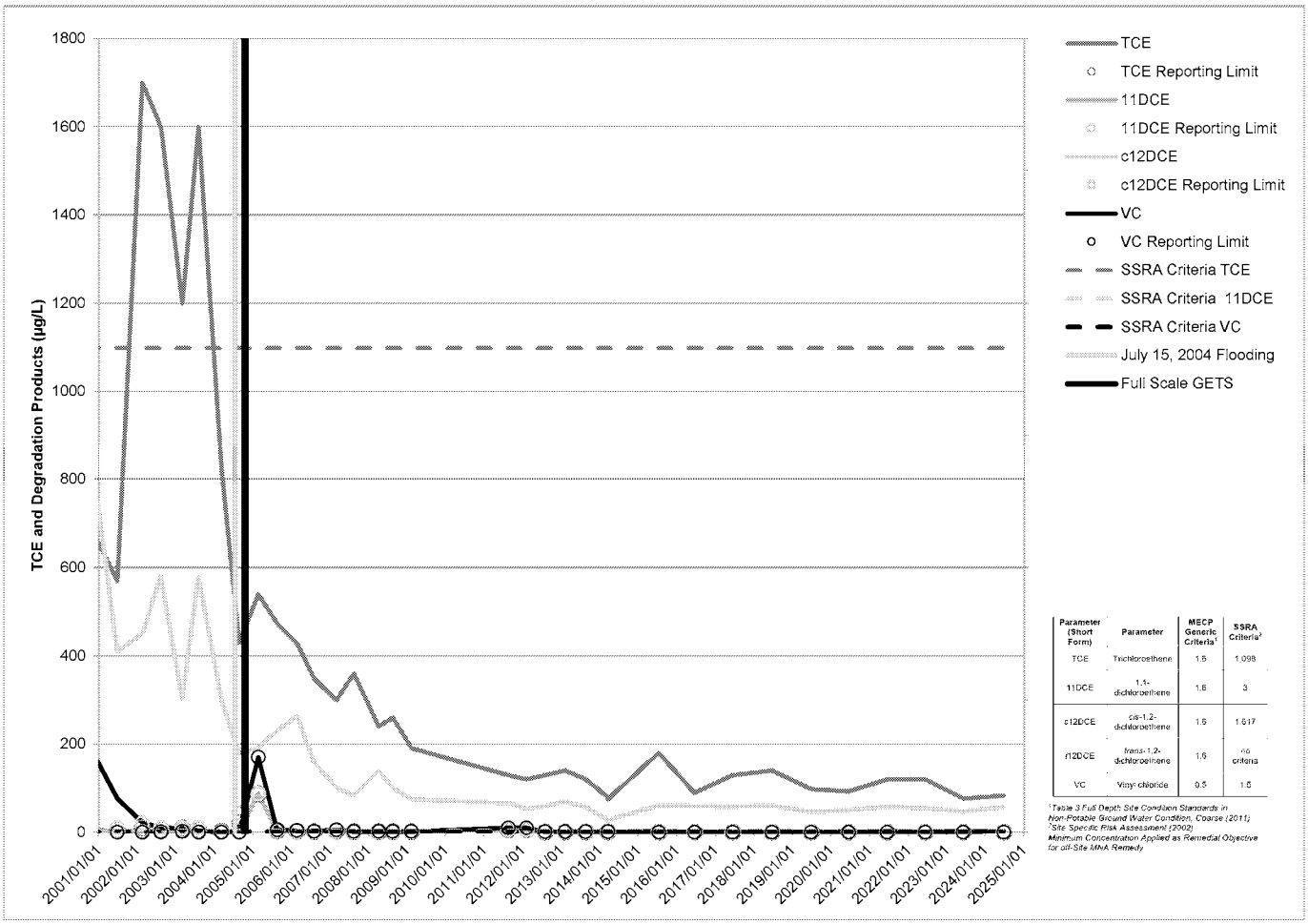
[1] *Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)*
[2] *Site Specific Risk Assessment (2002) Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy*

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Figure 14 MW61 Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.6

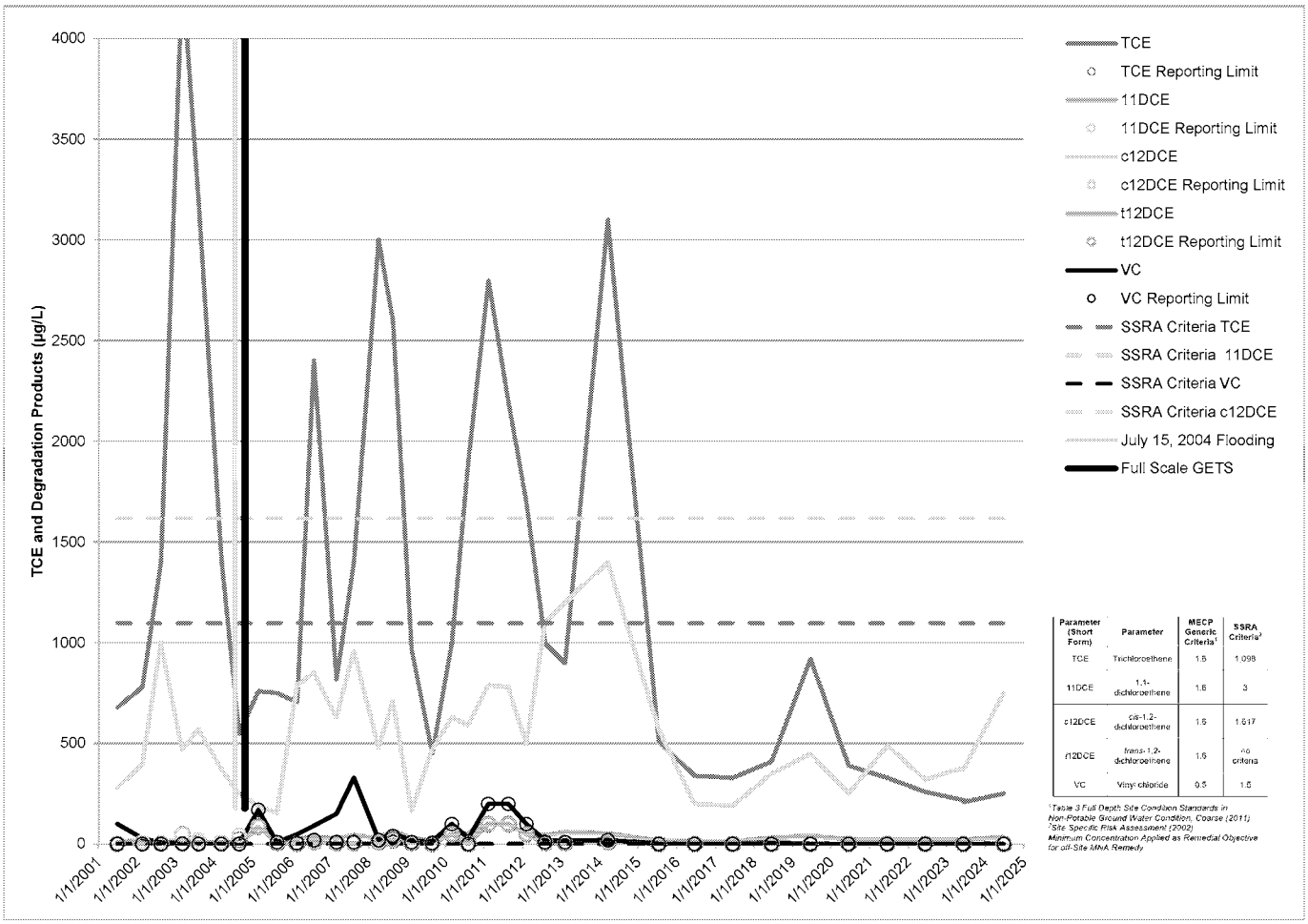
[1]Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2]Site Specific Risk Assessment (2002)
Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy

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Figure 15 MW68 Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.6

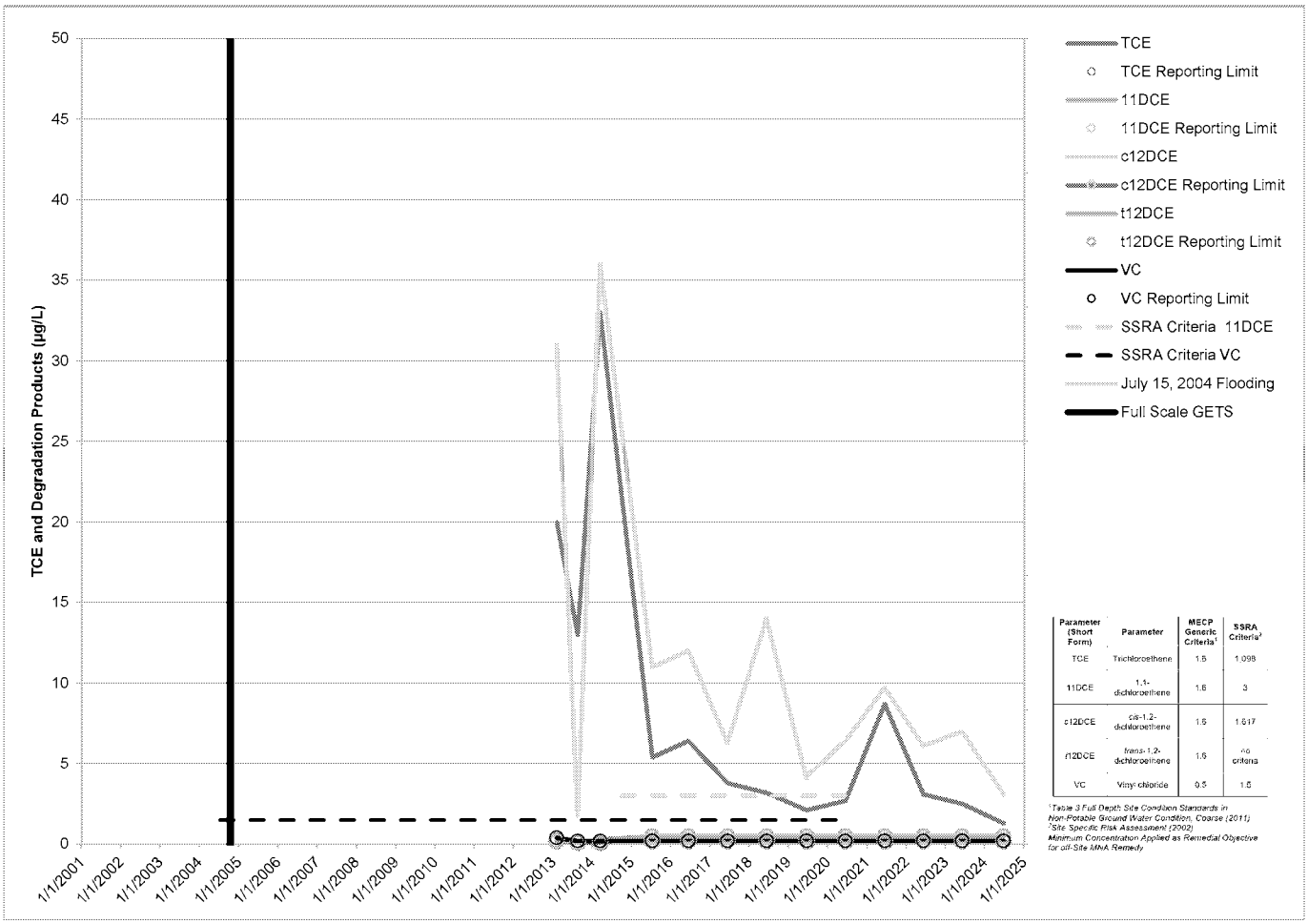
[1]Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2]Site Specific Risk Assessment (2002)
Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy

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Figure 16 MW71 Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.6

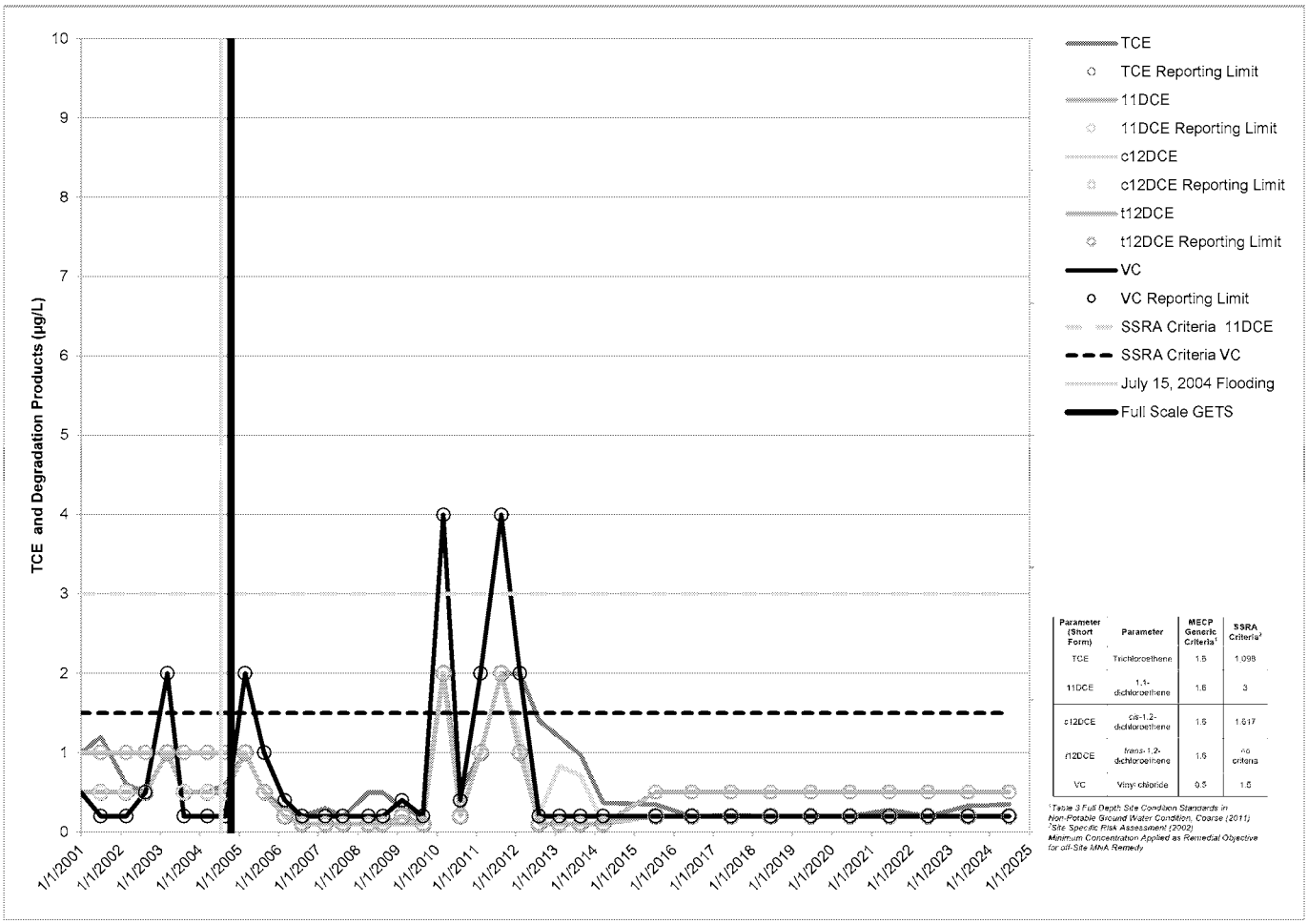
[1]Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2]Site Specific Risk Assessment (2002)
Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy

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Figure 17 MW65 Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.6

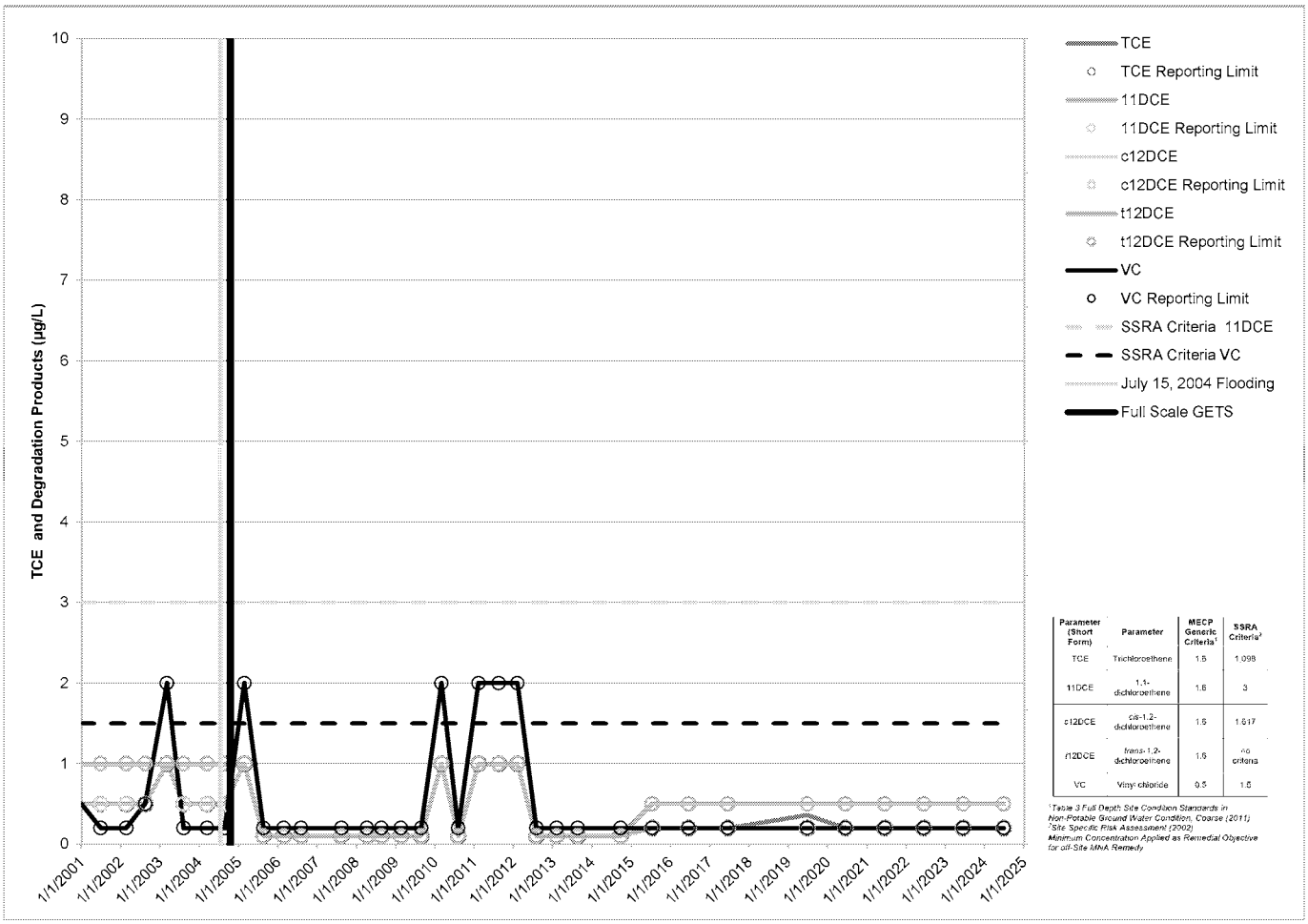
[1]Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2]Site Specific Risk Assessment (2002)
Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy

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Figure 18 MW66 Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.6

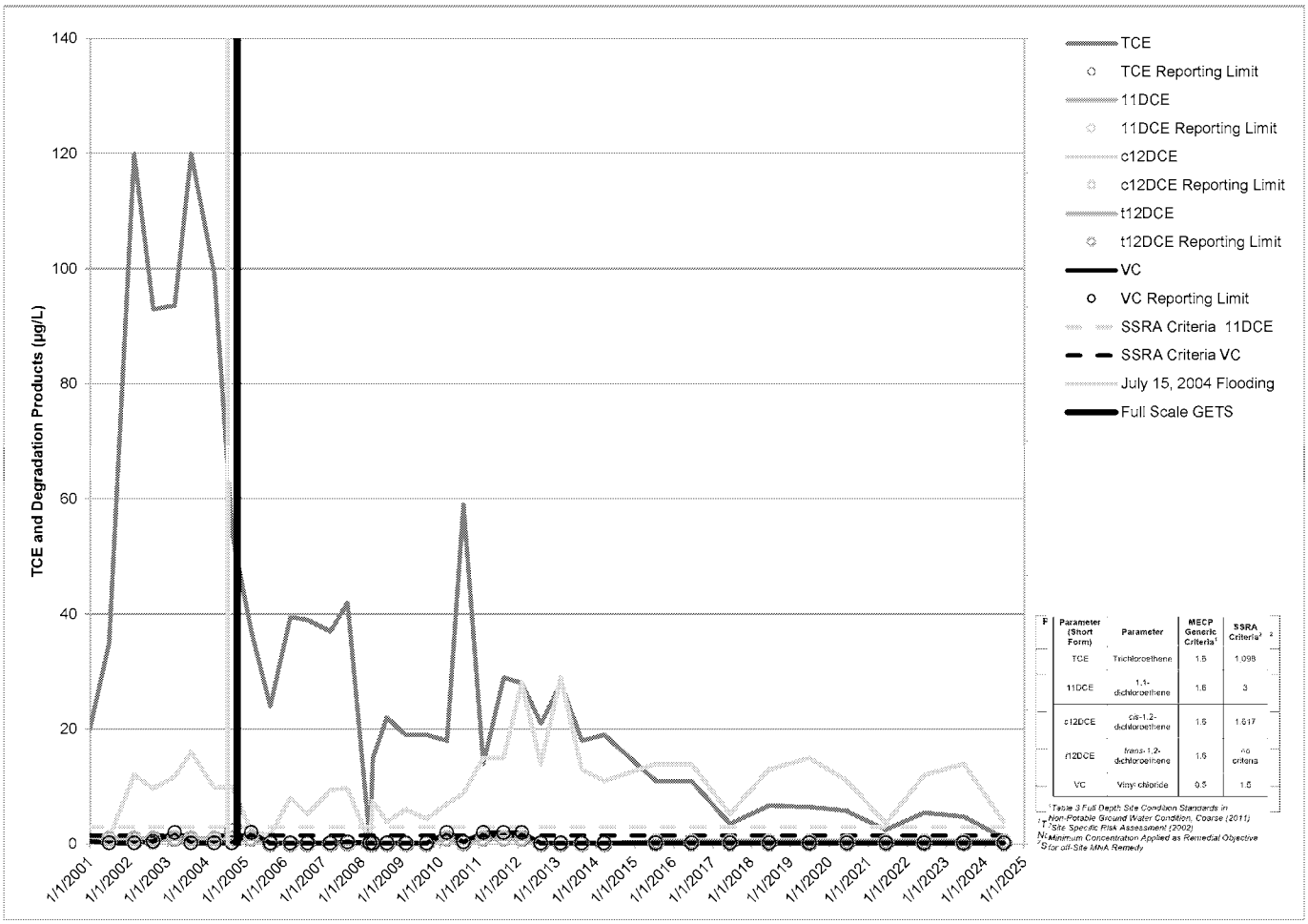
[1]Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2]Site Specific Risk Assessment (2002)
Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy

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Figure 19 MW64 Groundwater Concentrations

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P	Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2] [3]
	TCE	Trichloroethene	1.6	1.098
	11DCE	1,1-dichloroethene	1.6	3
	c12DCE	cis-1,2-dichloroethene	1.6	1.617
	t12DCE	trans-1,2-dichloroethene	1.6	no criteria
	VC	Vinyl chloride	0.5	1.6

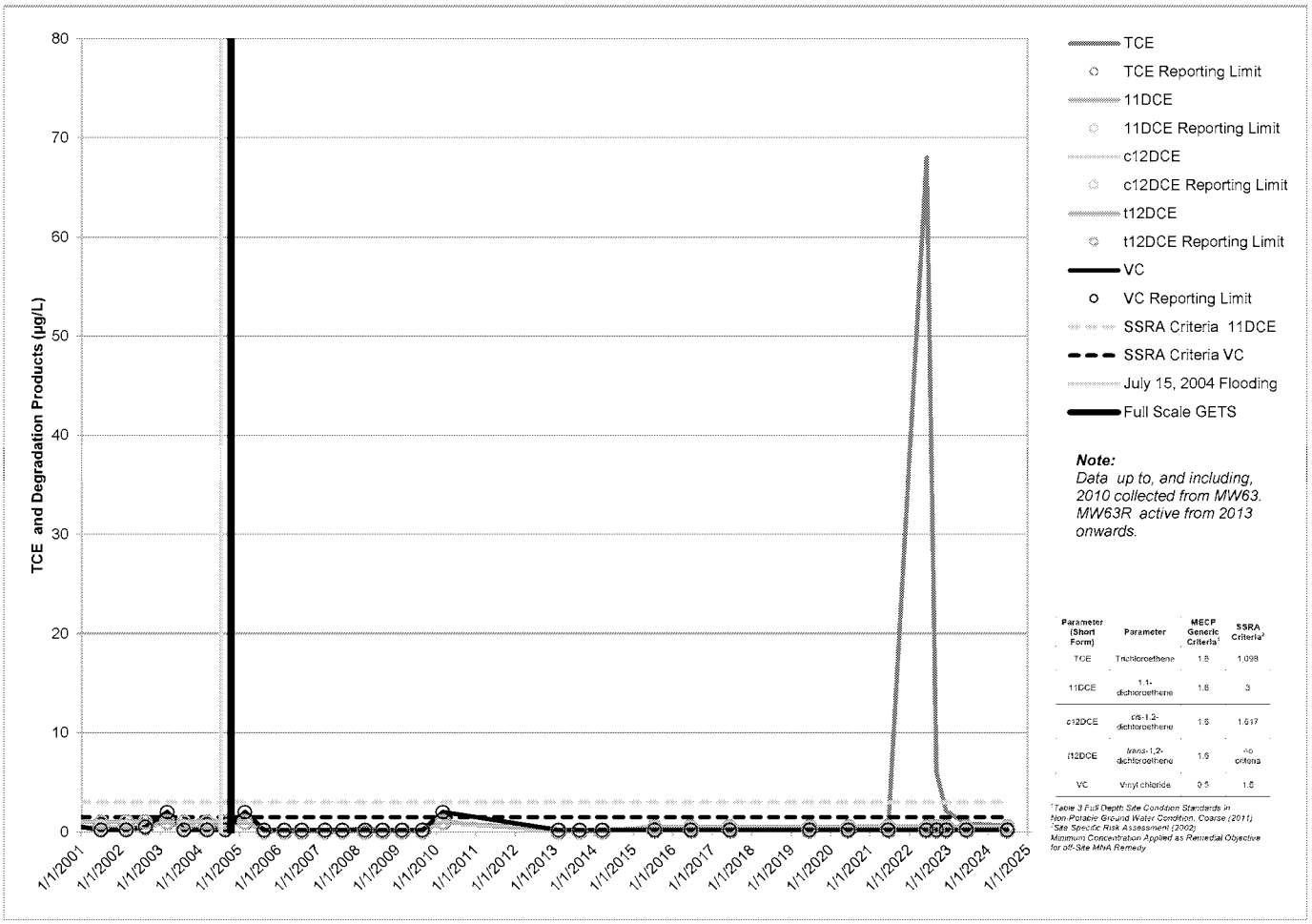
[1]Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2]Site Specific Risk Assessment (2002)
[3]Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy

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Figure 20 MW63R Groundwater Concentrations

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Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.647
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.6

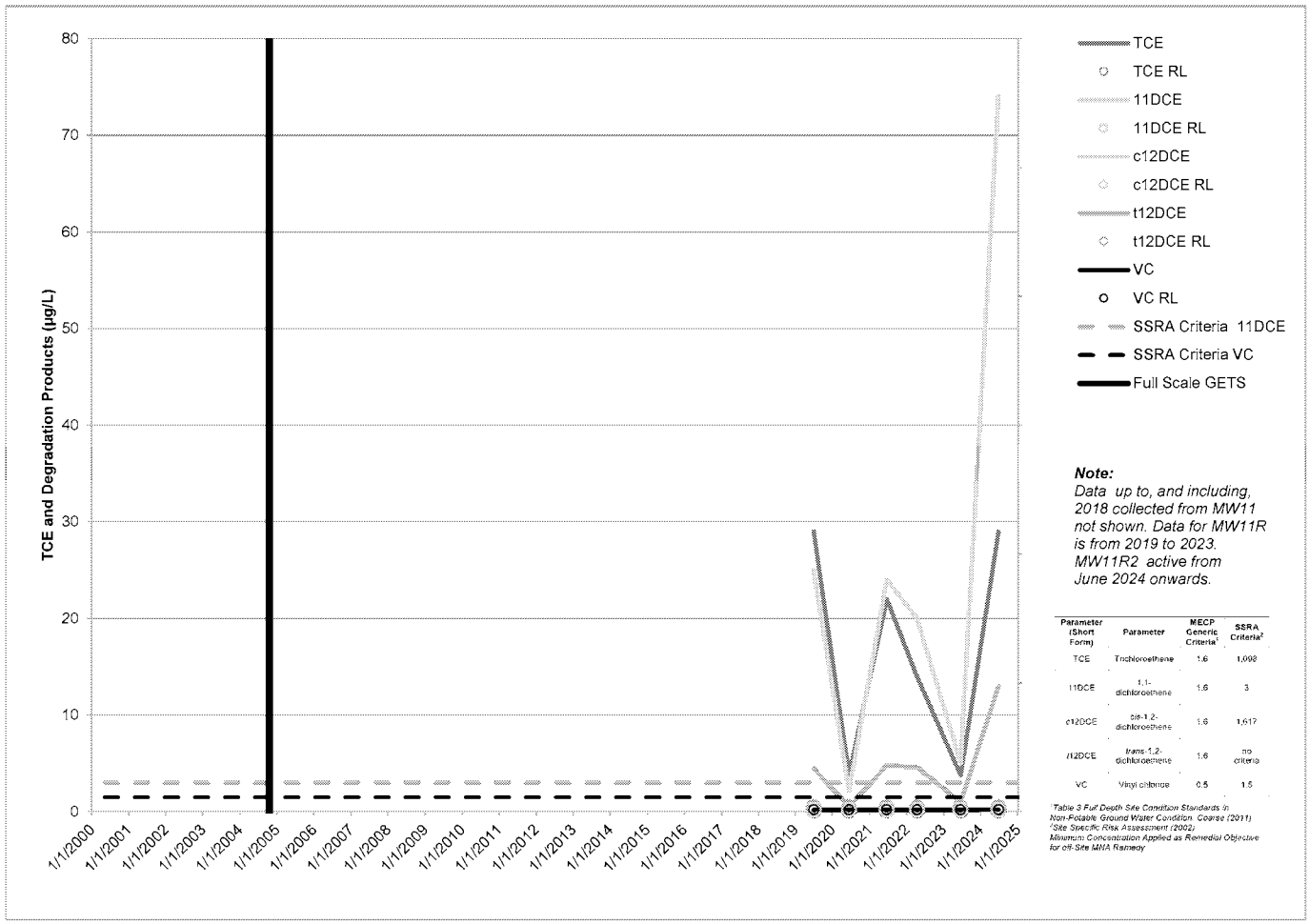
[1]Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2]Site Specific Risk Assessment (2002)
Minimum Concentration Applied as Remedial Objective for off-Site MNA Remedy

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Figure 21 MW11R2 Groundwater Concentrations

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Note:
Data up to, and including, 2018 collected from MW11 not shown. Data for MW11R is from 2019 to 2023. MW11R2 active from June 2024 onwards.

Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1,098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1,617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.5

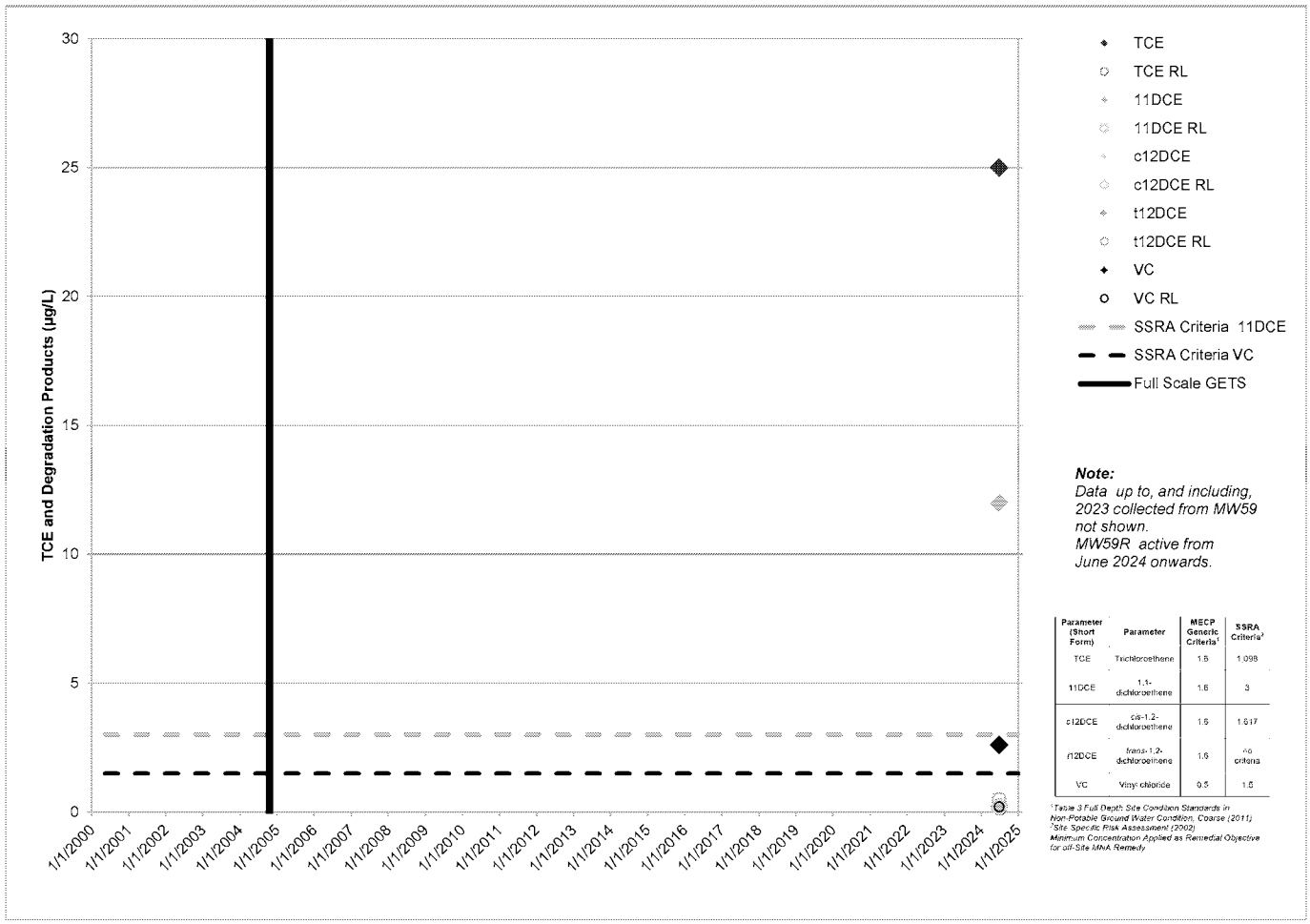
[1]Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2]Site Specific Risk Assessment (2002) Minimum Concentration Applied as Remedial Objective for off-Site MNA Remedy

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Figure 22 MW59R Groundwater Concentrations

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Note:
Data up to, and including, 2023 collected from MW59 not shown.
MW59R active from June 2024 onwards.

Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.617
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.6

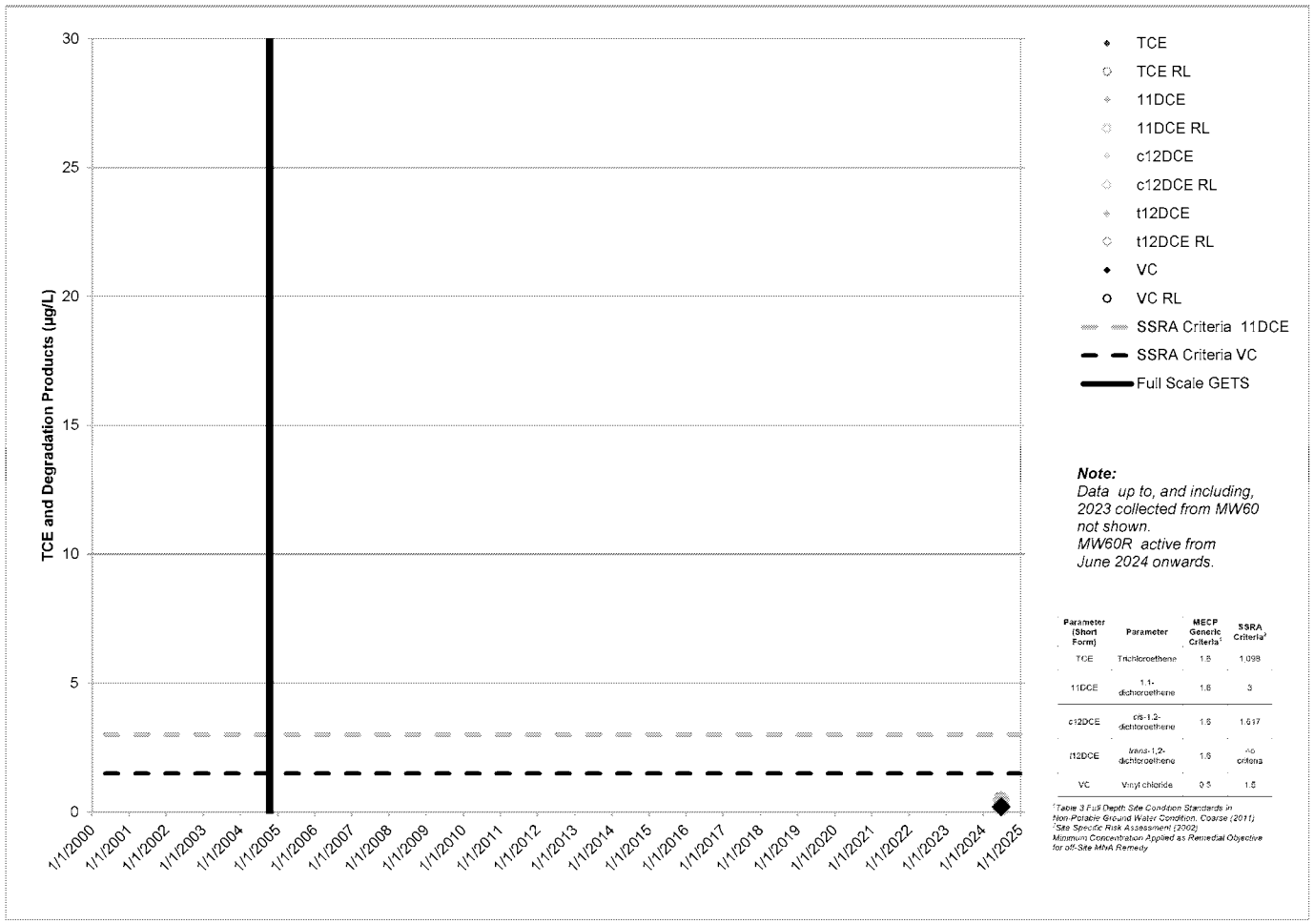
[1]Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2]Site Specific Risk Assessment (2002)
Minimum Concentration Applied as Remedial Objective for all-Site MNA Remedy

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Figure 23 MW60R Groundwater Concentrations

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60720641



Parameter (Short Form)	Parameter	MECP Generic Criteria[1]	SSRA Criteria[2]
TCE	Trichloroethene	1.6	1.098
11DCE	1,1-dichloroethene	1.6	3
c12DCE	cis-1,2-dichloroethene	1.6	1.647
t12DCE	trans-1,2-dichloroethene	1.6	no criteria
VC	Vinyl chloride	0.5	1.6

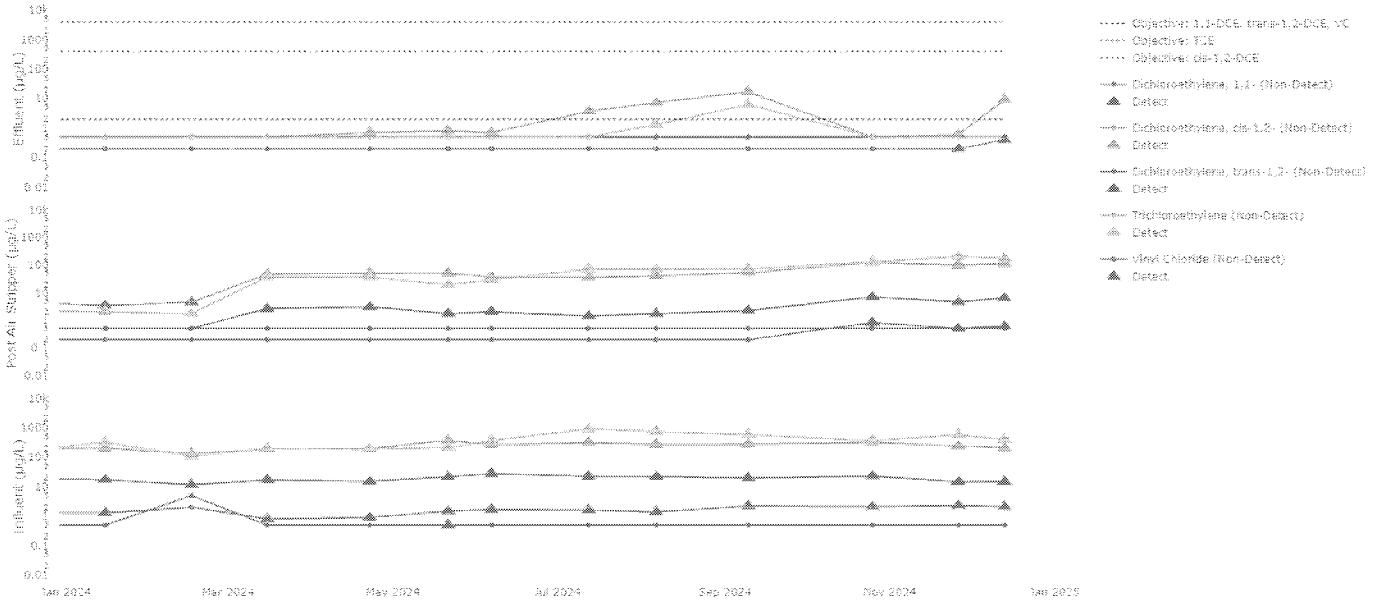
[1]Table 3 Full Depth Site Condition Standards in Non-Potable Ground Water Condition, Coarse (2011)
[2]Site Specific Risk Assessment (2002)
Minimum Concentration Applied as Remedial Objective for off-Site MNA Remedy

GEPET_60720641T_4014_09_02_01.00 Figure 03 to 22 Time-Series Chemistry
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Figure 24

VOCs Through GETS in 2024

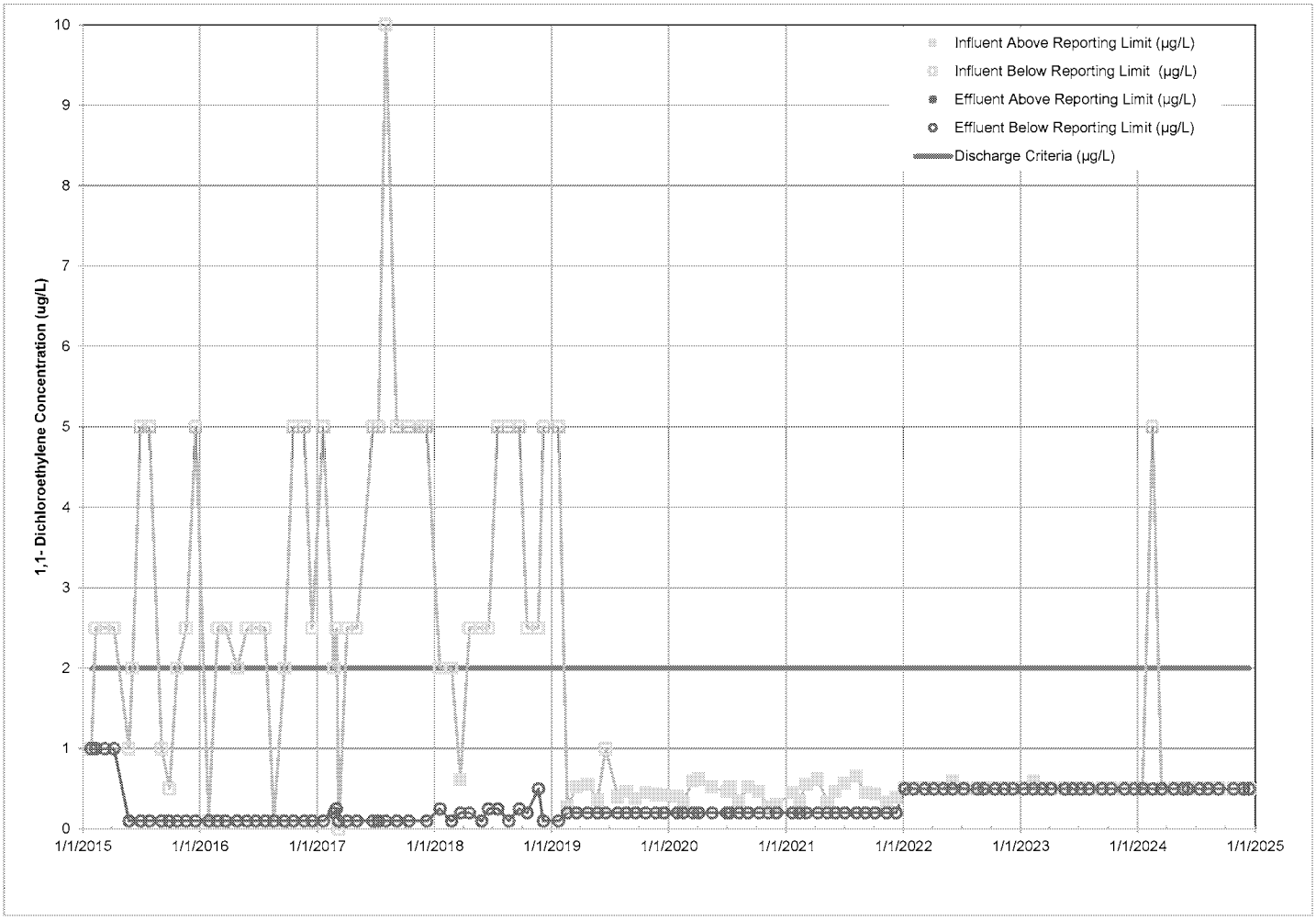
2024 GETS Monitoring Report
GEPR Energy Canada Inc
GEPR Peterborough Site



GEPET_60720641T_4014_09_02_02.00 Figure 24 GETS Chemistry

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Figure 25

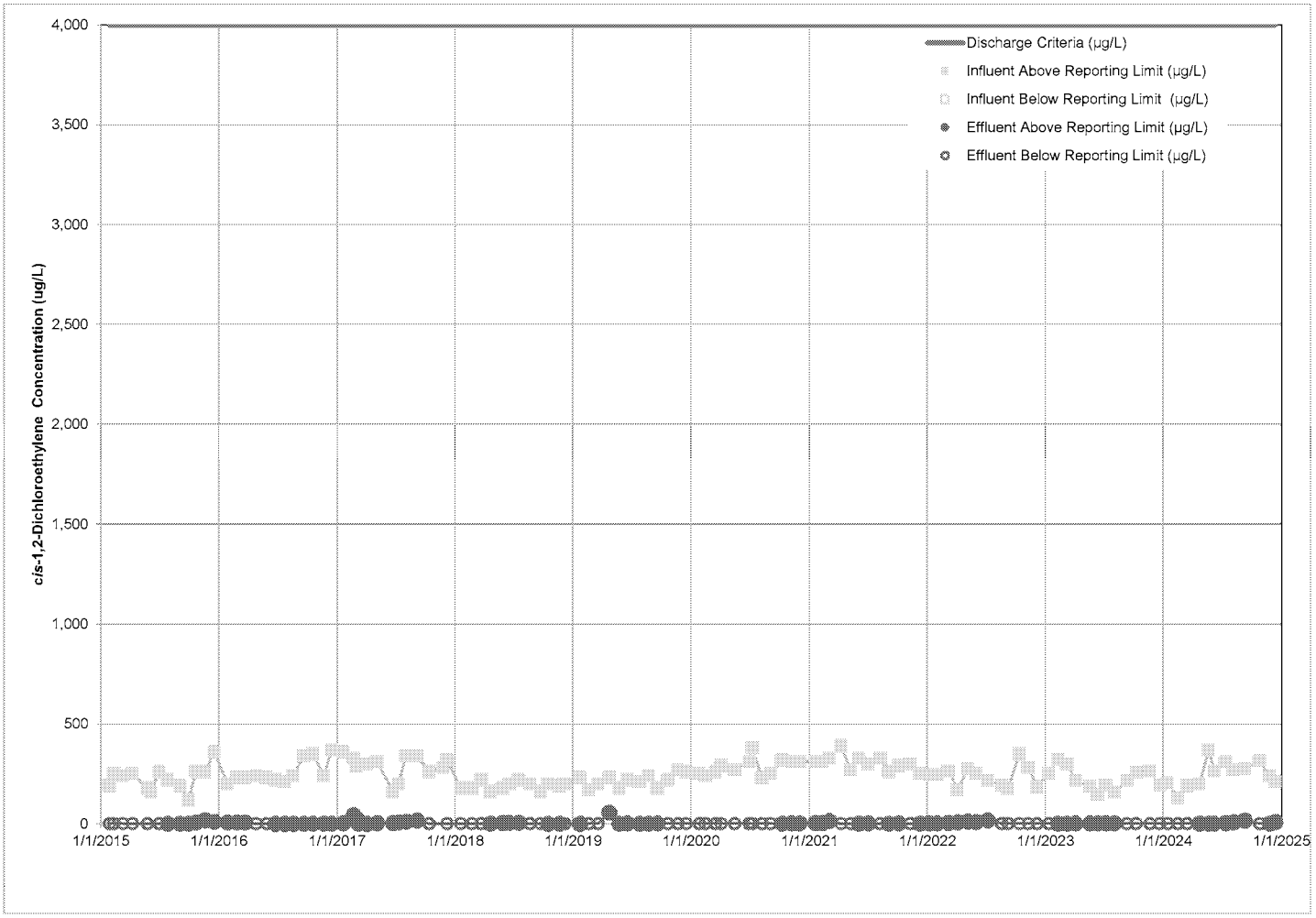
Historical Concentration of 1,1-Dichloroethylene, GETS Influent and Effluent



GEPET_60720641T_4014_09_02_03.00 Figure 25 to 29 GETS Chemistry

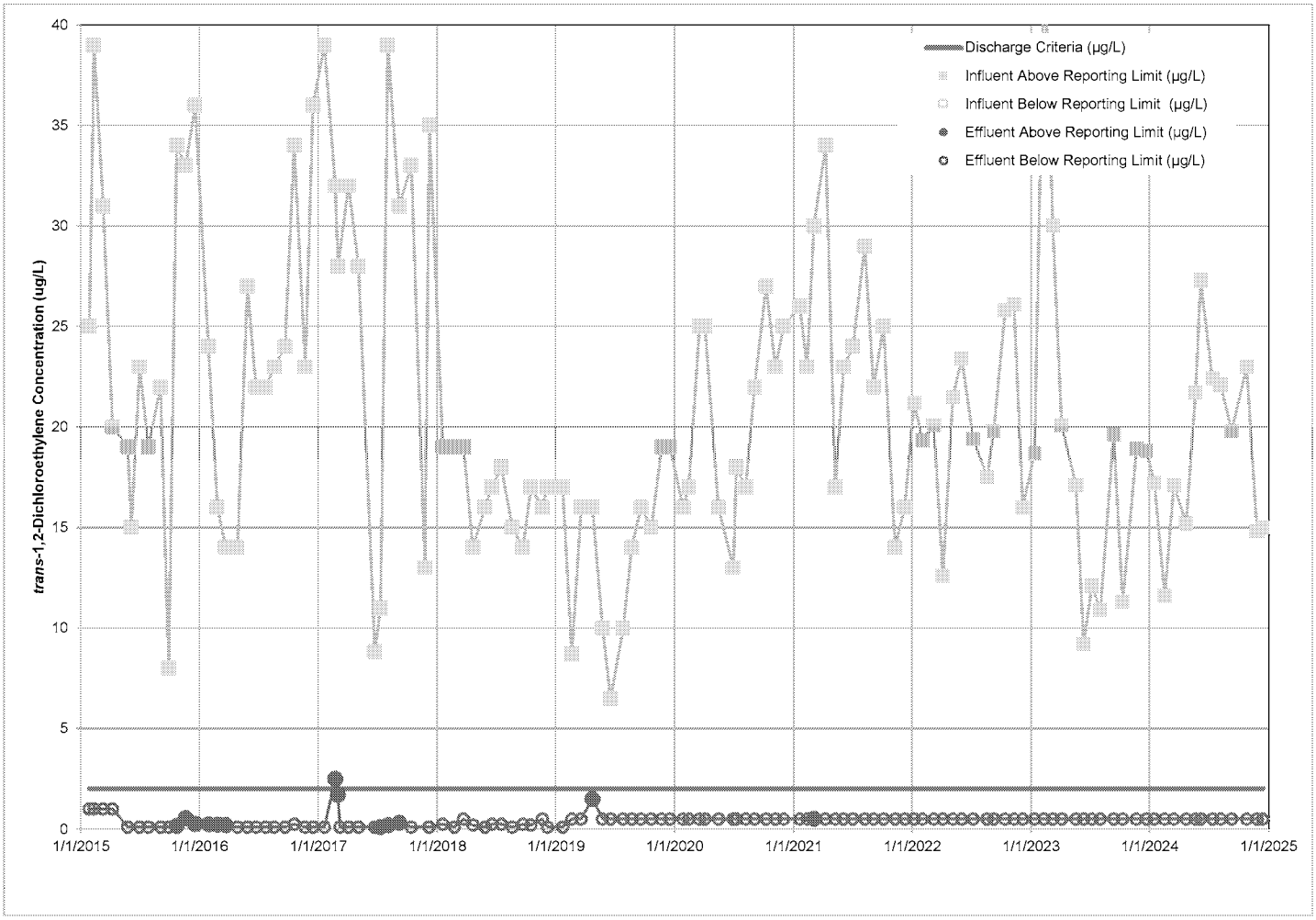
AECOM
Figure 25

Historical Concentration of cis-1,2-Dichloroethylene, GETS Influent and Effluent



GEPET_60720641T_4014_09_02_03.00 Figure 25 to 29 GETS Chemistry

Historical Concentration of trans-1,2-Dichloroethylene, GETS Influent and Effluent

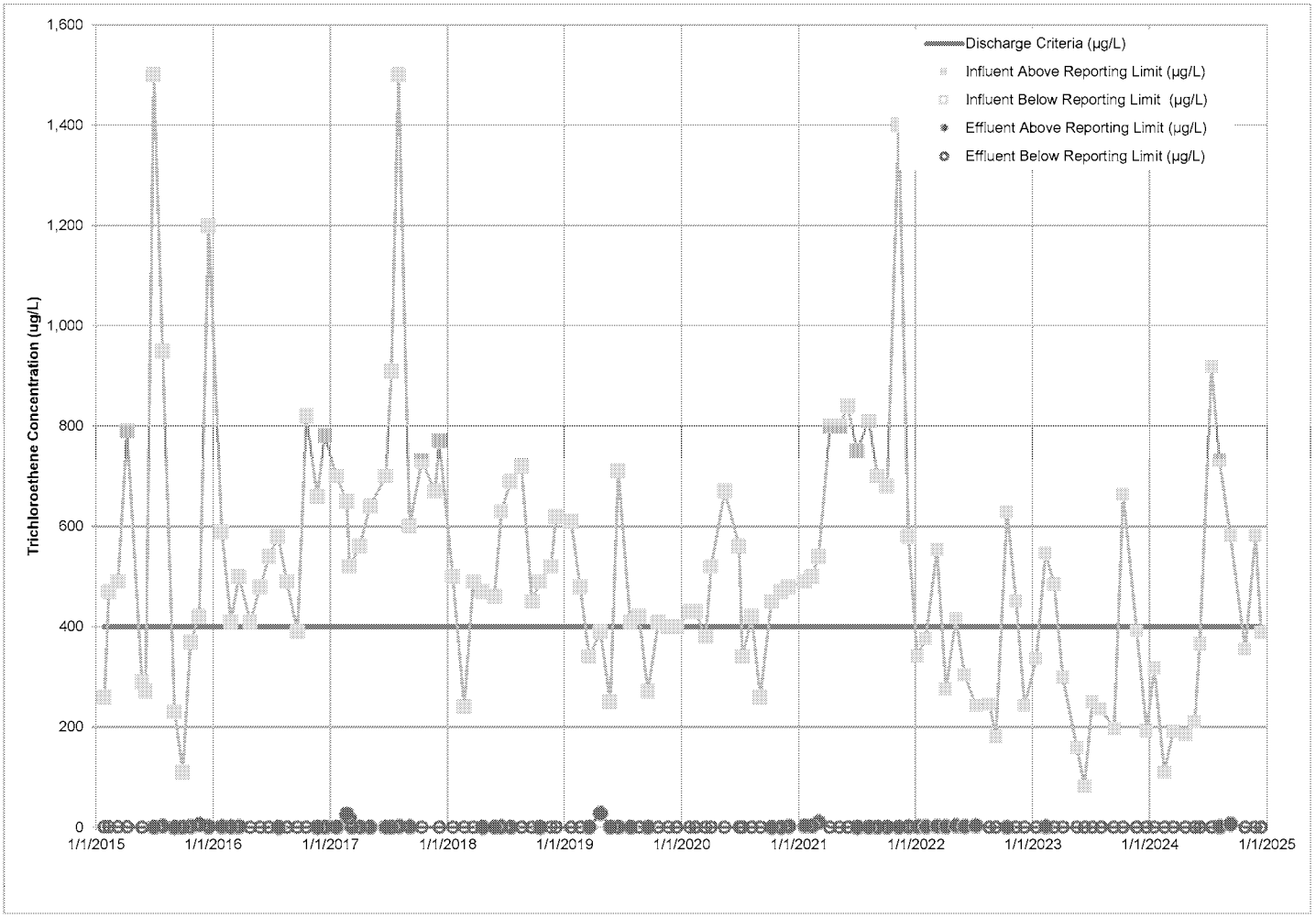


GEPET_60720641T_4014_09_02_03.00 Figure 25 to 29 GETS Chemistry

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Figure 28

Historical Concentration of Trichloroethylene, GETS Influent and Effluent

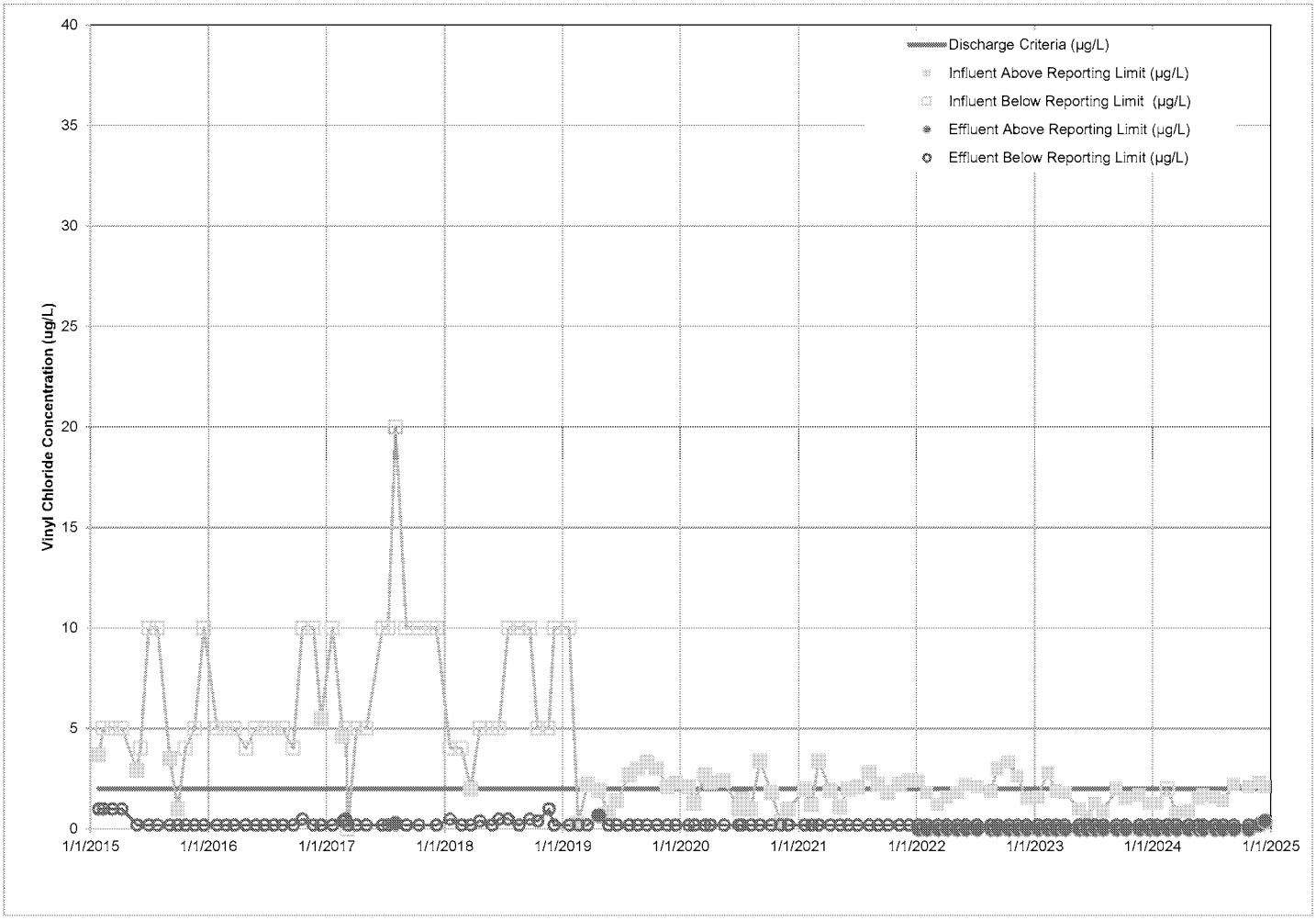
2024 GETS Monitoring Report
GEPR Energy Canada Inc
(Peterborough)



GEPET_60720641T_4014_09_02_03.00 Figure 25 to 29 GETS Chemistry

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Figure 29

Historical Concentration of Vinyl Chloride, GETS Influent and Effluent



GEPET_60720641T_4014_09_02_03.00 Figure 25 to 29 GETS Chemistry

Appendix 5: GEPR Energy Canada Inc., “Emission Summary and Dispersion Modelling Report 107 Park Street North, Peterborough, Ontario”

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Emission Summary and Dispersion Modelling Report

107 Park Street North, Peterborough, Ontario

GEPR Energy Canada Inc.

Project number: 60746233

January 2026

Delivering a better world

Statement of Qualifications and Limitations

The attached Report (the “Report”) has been prepared by AECOM Canada ULC (“AECOM”) for the benefit of the Client (“Client”) in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the “Agreement”).

The information, data, recommendations and conclusions contained in the Report (collectively, the “Information”):

- Is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the “Limitations”);
- represents AECOM’s professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
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Executive Summary

AECOM Canada ULC. (AECOM) was retained by GEPR Energy Canada Inc. (GEPR) to update the current Emission Summary and Dispersion Modelling (ESDM) Report as part of the renewal application for the Limited Operational Flexibility (LOF) in the current Environmental Compliance Approval (ECA). GEPR currently operates under Amended ECA No. 7836-9HDRYN issued by the Ontario Ministry of Environment, Conservation and Parks (MECP) on March 24, 2014, for the facility located at 107 Park Street North, in Peterborough, Ontario (the Facility).

The ESDM Report was prepared in accordance with s.26 of O. Reg. 419/05 to support the ECA Application. In addition, guidance in the Ministry publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" (ESDM Procedure Document) was followed as appropriate.

GEPR and BWXT Nuclear Energy Canada Inc. (BWXT) both operate facilities that were formerly deemed to be located on one property with a shared property line with two separate addresses: GEPR located at 107 Park Street North and BWXT located 1160 Monaghan Road in Peterborough, Ontario.

For the current Amended ECA No. 7836-9HDRYN, compliance was previously assessed at a combined property boundary shared between GEPR and BWXT Nuclear Energy Canada Inc. (previously GE-Hitachi Nuclear Energy Canada). The GEPR operations occur at 107 Park Street North and the BWXT operations occur at 1160 Monaghan Road in Peterborough, Ontario. Since GEPR and BWXT are separate entities, GEPR requests for the current application, that a separate property boundary is used in the compliance assessment; thus, GEPR will only assess their own operations and equipment emissions on the extent of the 107 Park Street North property controlled and occupied by GEPR.

In addition, GEPR plans to demolish most of the buildings on the part of the property controlled and occupied by GEPR and to remove the existing comfort heating systems associated with these buildings. Buildings 2, 2A 8A and 30 shall remain and the Groundwater Extraction and Treatment System (GETS) currently located within Building 14 and will be replaced by a new GETS unit located on the south side of the property. An exhaust stack serving the new GETS will be extended vertically from the north side of the unit.

The ESDM has assessed the following two operation scenarios:

1. Existing Operation: All current and relevant operations with the inclusion of the new GETS unit will be assessed; and,
2. Future Operation: Most of the GEPR buildings are assumed to be demolished leaving only Buildings 2, 2A, 8A and 30 and the GETS unit in operation. The unit is modelled in the same location as Scenario 1. This represents a conservative assessment since any relocation of the GETS will be equidistant to or farther from the property line than the current GETS location.

BWXT is expected to separately prepare and submit its own ESDM report to solely consider its own air emissions on the extent of the 1160 Monaghan Road property, which is controlled and occupied by BWXT.

The Site is in an area zoned for industrial use, as per the City of Peterborough zoning maps.

As of 2019, the GEPR manufacturing operations at the site ceased. GEPR continues to operate the GETS and natural gas-fired comfort heating equipment. The GETS and comfort heating equipment are expected to operate 24 hours per day, 7 days per week, 52 weeks per year.

The significant contaminants of concern at the Facility include Nitrogen Oxides and Trichloroethylene. The Source Summary Table containing a list of all on-site air emission sources is presented in Table B.1, Appendix B.

The most relevant NAICS code that is applicable to GE's current operations at the Facility is 541330 - Engineering services; the secondary applicable NAICS code is 562910 – Remediation services. Prior to 2019, when the Facility's manufacturing lines were operational, the NAICS code was 335312 - Motor and generator manufacturing.

The AERMOD advanced air dispersion model was used to assess compliance with the air quality standards and guidelines listed in Schedule 3 of Ontario Regulation 419/05. AERMOD version 22112 and AERMET version 22112 were used to determine the maximum point of impingement concentrations of the significant contaminants of concern. Regional pre-processed meteorological data was used in the advanced air dispersion model. The predicted POI concentrations were compared to the respective POI limit(s) set out in Schedule 3 under O. Reg. 419/05, guidelines or applicable screening levels.

The Emission Summary Tables (Table E-1 and E-2) demonstrates that for both the Existing and Future Operation, the Facility is in compliance with the Schedule 3 POI limits or applicable screening levels for the identified significant contaminants.

Table E-1: Existing Operation - Emission Summary Table

Contaminant Name	Contaminant CAS Number	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum Ground Level POI Concentration (µg/m³)	Averaging Period (hours)	MECP POI Limit (µg/m³)	Benchmark and Category	Limiting Effect	Percentage of MECP POI Limit (%)
Nitrogen Oxides	10102-44-0	9.93E-01	AERMOD V. 22112	77.4	24	200	Schedule 3 Standard, B1	Health	39%
Nitrogen Oxides	10102-44-0	9.93E-01	AERMOD V. 22112	164.4	1	400	Schedule 3, Standard, B1	Health	41%
Trichloroethylene	79-01-6	1.14E-02	AERMOD V. 22112	3.4	24	12	Schedule 3, Standard, B1	Health	28%
Nitrogen Oxides	10102-44-0	1.30E-02	ASHRAE (2015)[1]	39.7	24	200	Schedule 3, Standard, B1	Health	20%
Nitrogen Oxides	10102-44-0	1.30E-02	ASHRAE (2015)[1]	96.7	1	400	Schedule 3, Standard, B1	Health	24%

Notes: Standard – Standard under Ontario Regulation 419/05 – Air Pollution – Local Air Quality.
B1 - Benchmark 1
[1] For the ASHRAE assessment, total emission rate for nitrogen oxides consists of the sum of emissions from the five comfort heating sources located closest to the BWXT bay door. The BWXT bay door is located adjacent to the northwest corner of Building 22 of GE. Refer to Section 6.4, and Appendix B.7.

Table E-2: Future Operation - Emission Summary Table

Contaminant Name	Contaminant CAS Number	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum Ground Level POI Concentration (µg/m³)	Averaging Period (hours)	MECP POI Limit (µg/m³)	Benchmark and Category	Limiting Effect	Percentage of MECP POI Limit (%)
Nitrogen Oxides	10102-44-0	9.87E-02	AERMOD V. 22112	26.8	24	200	Schedule 3 Standard, B1	Health	13%
Nitrogen Oxides	10102-44-0	9.87E-02	AERMOD V. 22112	45.4	1	400	Schedule 3, Standard, B1	Health	11%
Trichloroethylene	79-01-6	3.00E-03	AERMOD V. 22112	6.2	24	12	Schedule 3, Standard, B1	Health	52%

Notes: Standard – Standard under Ontario Regulation 419/05 – Air Pollution – Local Air Quality.
B1 - Benchmark 1

1. Introduction and Facility Description

AECOM was retained by GEPR Energy Canada Inc. (GEPR) to update the current ESDM Report as part of the ECA renewal application for the Limited Operational Flexibility (LOF) in the current ECA. GEPR currently operates under Amended ECA No. 7836-9HDRYN issued by the Ontario MECP on March 24, 2014, for the facility located at 107 Park Street North, in Peterborough, Ontario (the Facility).

This Emission Summary and Dispersion Modelling Report (ESDM Report) was prepared in accordance with s. 26 of O. Reg. 419/05 to provide the required information supporting the ECA application. The air dispersion modelling in this report was performed using AERMOD, version 22112. In addition, the Ministry of the Environment, Conservation and Parks (MECP) Publication "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2018 (ESDM Procedure Document) was followed as appropriate.

For ease of review and to promote clarity, this ESDM Report is structured to correspond to the recommended Table of Contents, tables and ESDM Checklist provided in the MECP ESDM Procedure Document.

1.1 Purpose and Scope of ESDM Report

This ESDM Report has been prepared to support the ECA renewal application for the Limited Operational Flexibility (LOF). GEPR currently operates under Amended ECA No. 7836-9HDRYN, which was issued by the Ontario Ministry of Environment, Conservation and Parks (MECP) on March 24, 2014. A copy of the existing ECA is included in Appendix A.

The Facility is proposing the remove most of the Buildings on-site and their associated comfort heating equipment. This ESDM evaluates two operation scenarios where:

- Existing Operation: All current and relevant operations will be assessed: and
- Future Operation: Most of the GEPR buildings are assumed to be demolished leaving only Buildings 2, 2A, 8A and 30 and the GETS unit in operation. The unit is modelled in the same location as Scenario 1. This represents a conservative assessment since any relocation of the GETS will be equidistant to or farther from the property line than the current GETS location.

The scope of the Future Operation will include the following equipment in the remaining buildings:

- One groundwater treatment system equipped with an air stripper, exhausting [redacted] above ground through [redacted].
- [redacted] Boilers with a natural gas heat rating of [redacted].
- Comfort heating equipment, consisting of unit heaters, infrared heaters, HVAC units, and tube heaters with a combined natural gas heat rating of [redacted]

A maximum design flow rate of [redacted] for the air stripper in the ground water treatment system is proposed for the production limit under the Limited Operational Flexibility.

For the current Amended ECA No. 7836-9HDRYN, compliance was previously assessed at a combined property boundary shared between GEPR and BWXT Nuclear Energy Canada Inc. (previously GE-Hitachi Nuclear Energy Canada). The GEPR operations occur at 107 Park Street North and the BWXT operations occur at 1160 Monaghan Road in Peterborough, Ontario. Since GEPR and BWXT are separate entities, GEPR requests for the current application, that a separate property boundary is used in the compliance assessment; thus, GEPR will only assess their own operations and equipment emissions on the extent of the 107 Park Street North property controlled and occupied by GEPR.

An overview of the site, containing the GEPR operations is shown in Figure 1-1. The site plan is provided in Appendix C.1. The zoning map of the site and surrounding area is also provided in Appendix C.

1.2 Description of Processes and NAICS Code(s)

As of 2019, the GEPR manufacturing operations at the site ceased. [redacted] groundwater extraction and treatment system with an air stripper. The comfort heating equipment and groundwater treatment system are expected to operate 24 hours per day, 7 days per week, and 52 weeks per year.

The most relevant NAICS code that is applicable to GE's current operations at the Facility is 541330 - Engineering services; the secondary applicable NAICS code is 562910 – Remediation services. Prior to 2019, when the Facility's manufacturing lines were operational, the NAICS code was 335312 - Motor and generator manufacturing. The Facility's compliance was compared to the Schedule 3 standards in O. Reg. 419/05.

1.3 Description of Products and Raw Materials

The comfort heating is located within or on the following buildings: [redacted] Figures C.2.1 and C.2.2 in Appendix C.2 identify building numbers for the Existing and Future Operations.

For the Existing Operation, the groundwater treatment system is currently located [redacted], on [redacted]. Ground water contaminated with Volatile Organic Compounds (VOC) is sprayed into an aerator tank from above, where it is met with a counter-current of air. The VOCs present in the water are released into the air and are exhausted with the air into the atmosphere. The groundwater treatment system has a design flow rate of [redacted] with a maximum air exhaust of [redacted]

For the Future Operation, the same groundwater treatment system is proposed for relocation, following the removal of [redacted]

1.4 Process Flow Diagram

The process flow diagram representing the activities at the Facility is provided in Figure 1-2.

1.5 Operating Schedule

The Facility operations occur 24 hours per day, seven days a week, 52 weeks per year.

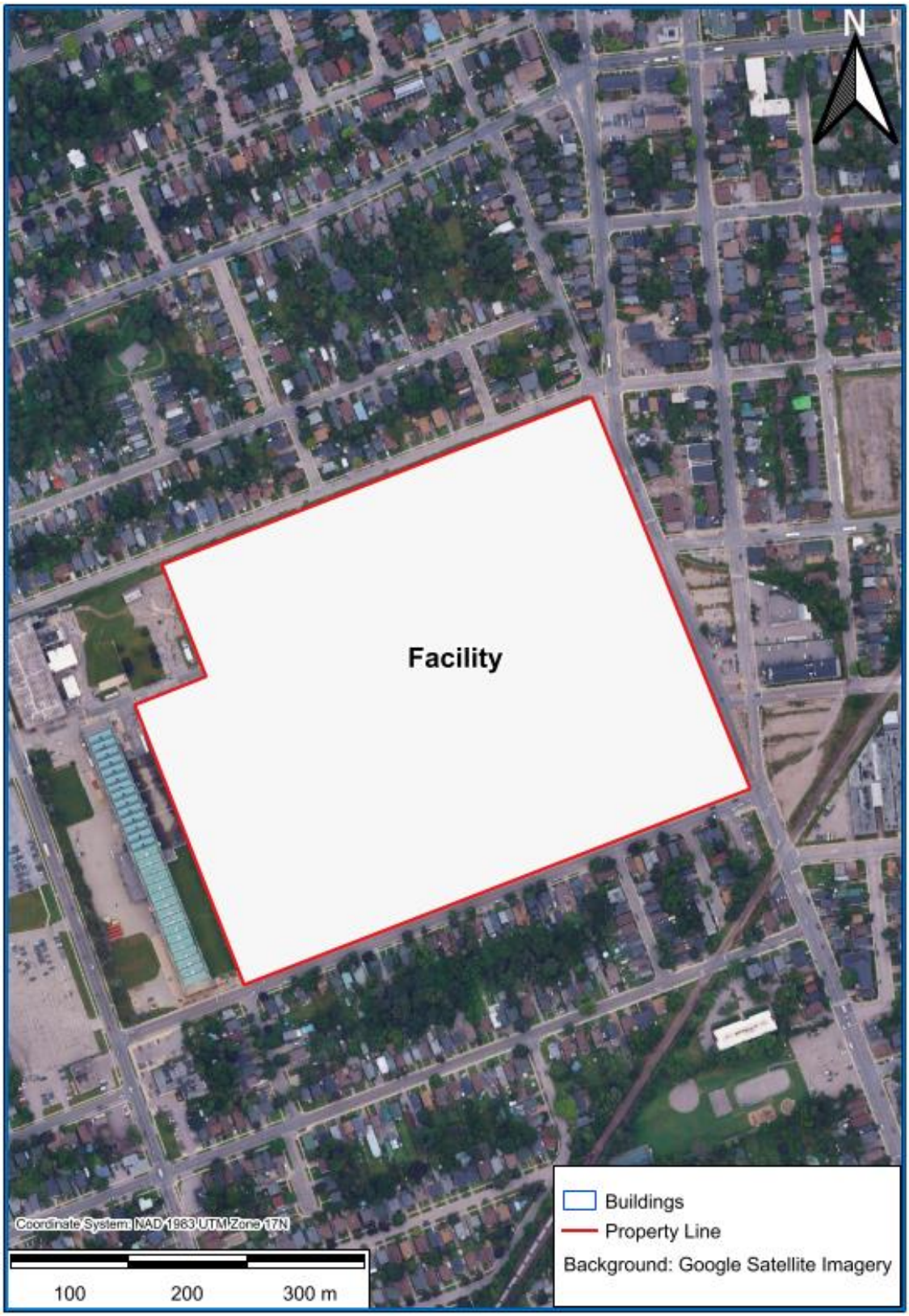


Figure 1-1: Current Site Boundary

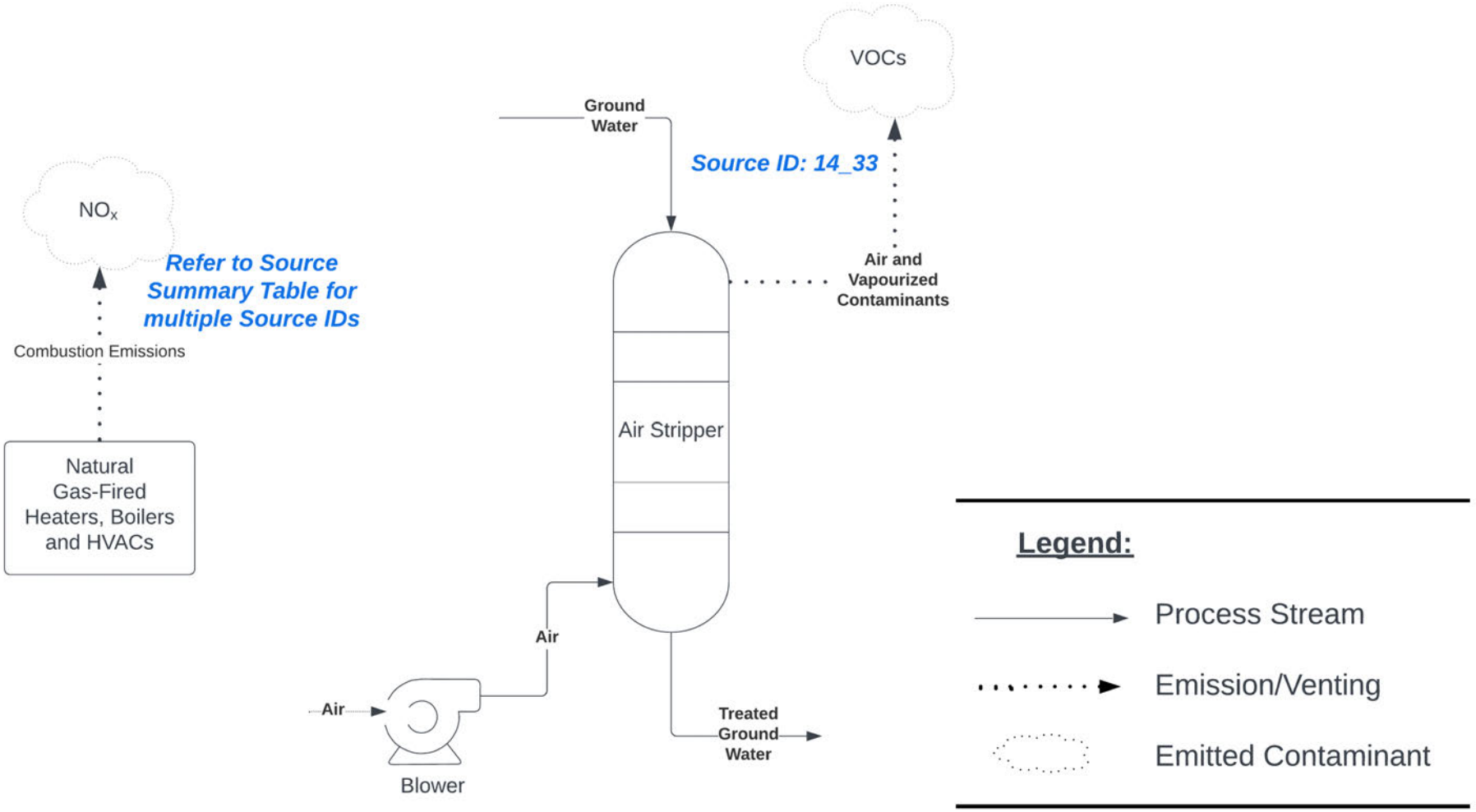


Figure 1-2: Process Flow Diagram

2. Initial Identification of Sources and Contaminants

The expected contaminants released from the existing Facility and the associated processes/equipment are identified below in Table 2-1. The future expected contaminants released from the Facility are identified in Table 2-2. See Section 3 of this ESDM Report for the rationale of assessment for the identification of insignificant sources and contaminants.

Table 2-1: Existing Operation Sources and Contaminants Identification Table

Source Information			Expected Contaminants	Significant (Yes or No)
Building Number	Equipment ID	Description		
[redacted]			Nitrogen Oxides[1]	Yes
[redacted]			Nitrogen Oxides[1]	Yes
[redacted]			Nitrogen Oxides[1]	Yes

Source Information			Expected Contaminants	Significant (Yes or No)
Building Number	Equipment ID	Description		
[redacted]	[redacted]	[redacted]	Nitrogen Oxides[1]	Yes

Table 2-2: Future Operation Sources and Contaminants Identification Table

Source Information			Expected Contaminants	Significant (Yes or No)
Building Number	Equipment ID	Description		
[redacted]	[redacted]	[redacted]	Nitrogen Oxides[1]	Yes
[redacted]	[redacted]	[redacted]	Nitrogen Oxides[1]	Yes
[redacted]	[redacted]	[redacted]	Nitrogen Oxides[1]	Yes
[redacted]	[redacted]	[redacted]	Trichloroethylene, Vinyl Chloride, cis-1,2-Dichloroethylene, trans-1,2-Dichloroethylene	Yes No [2] No [2] No [2]

Note: [1] According to Section 7.1.1 of the MECP ESDM Procedure Document, Nitrogen Oxides are usually the significant contaminant from natural gas burning, when compared to the remaining contaminants emitted.
[2] Screened out as insignificant using Emission Threshold Screening.

3. Assessment of Significance of Contaminants and Sources

3.1 Identification of Negligible Contaminants and Sources

The following sections provide the rationale for assessment for the identification of which sources were screened out as insignificant or if the contaminants were screened out as insignificant and not requiring further assessment (i.e., dispersion modelling).

3.2 Rationale for Assessment

3.2.1 Combustion of Natural Gas

As per Section 7.1.1 of the MECP ESDM Procedure Document, the significant contaminant from the combustion of natural gas is typically nitrogen oxides. Other contaminants, for this type of source are generally emitted in negligible amounts.

3.2.2 Screening-Out Sources that May Emit Contaminants in Negligible Amounts

Table B.5 of Appendix B of the ESDM Procedure Document cites specific examples of sources that emit contaminants in negligible amounts. None of the sources were screened out for this reason at the Facility.

3.2.3 Sources that are Insignificant Relative to Total Emissions

Sources with contaminant emissions that were less than 5% of the total site-wide emissions can be considered negligible as per Section 7.2.2 in the MECP ESDM Procedure Document. For both Current and Future Operation, none of the sources were screened out as insignificant relative to total emissions.

3.2.4 Emission Threshold Screening

Following the guidance in Section 7.1.2 of the ESDM Procedure Document, contaminant significance was assessed based on emission thresholds. Emission thresholds for each contaminant were calculated based on the following formula:

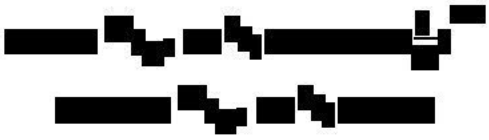
$$Emission\ Threshold\ (g/s) = \frac{0.5\ x\ Ministry\ POI\ Limit\ (^{\mu g}/_{m^3})}{Dispersion\ Factor\ (^{\mu g}/_{m^3}\ per\ ^{g}/_{s}\ emission)}$$

Ministry POI limits were obtained from the Air Contaminants Benchmarks List. Depending on the contaminant, an rural dispersion factor was selected based on the closest distance to the property line. The nearest source of Vinyl Chloride is present within 6.5 m from the property boundary.

The rural dispersion factor (based on a 1 hr averaging time) was adjusted to the appropriate averaging period (e.g. 24-hour averaging period) using the averaging period conversion factor equation outlined in Table 7-1 of the ESDM Procedure Document.

A sample calculation for the 24-hour emission threshold for Vinyl Chloride from the Groundwater Treatment System [redacted] is provided below:

$$Dispersion\ Factor_{\ (24-hour\ averaging)} = dispersion\ factor_{1-hour\ averaging} \times \left(\frac{1\ hour}{24\ hours}\right)^{0.28}$$



$$Emission\ Threshold_{(24-hour\ averaging\ [redacted])} = \frac{[redacted]\ \mu g/m^3}{\mu g/m^3\ per\ g/s\ emission} = [redacted]\ g/s$$

The facility wide emission rate for Vinyl Chloride (24-hr averaging period) is [redacted] g/s.

Since the Facility wide emission rate is less than the emission threshold, the contaminant Vinyl Chloride (24-hr averaging period) is considered as negligible.

This emission threshold method was used to assess of significance of each contaminant. Table 3-1 provides a list of all contaminants emitted from the Facility. Three (3) of the five (5) contaminants were screened out as being emitted in negligible amounts.

The Facility was assumed to operate 24 hours a day, when assessed on a 24-hour averaging period.
All contaminants were assessed using POI limits, guidelines or applicable screening levels provided in the current Air Contaminants Benchmark List. A copy of the emission threshold calculations is provided in Table B.5, Appendix B.

Table 3-1: Results of Emission Threshold Screening

Contaminant Name	CAS Number	Total Facility Emission Rate (g/s)	Site-Specific Emission Threshold (g/s)	Contaminant Emitted in Negligible Amount?	Averaging Period (hours)	MECP POI Limit/ Guideline (µg/m³)
Nitrogen Oxides	10102-44-0	[redacted]	[redacted]	**No**	24	200
			[redacted]	**No**	1	400
Trichloroethylene	79-01-6	[redacted]	[redacted]	**No**	24	12
Vinyl Chloride	75-01-4	[redacted]	[redacted]	Yes	24	1
cis-1,2-Dichloroethylene	156-59-2	[redacted]	[redacted]	Yes	24	105
trans-1,2-Dichloroethylene	156-60-5	[redacted]	[redacted]	Yes	24	105

3.2.5 Identification of Insignificant Contaminants without MECP Limits

All contaminants emitted from the Facility have a corresponding MECP limit, guideline or screening level.

4. Operating Conditions, Emission Rate Estimating and Data Quality

This section provides a description of the operating conditions used in the calculation of the emission estimates and an assessment of the data quality of the emission estimates for each significant contaminant from the Facility, as required by sub paragraphs 6 and 7 of s.26(1) of O. Reg. 419/05.

4.1 Description of Operating Conditions

The maximum emissions scenario will occur when all the significant sources listed in the Source Summary Tables in Appendix B, for both Current and Future Operation are operating simultaneously at the maximum operating capacity. The modelling assessment was established based on this maximum emissions scenario.

The emission inventory was developed based on the worst-case scenario resulting in the maximum emission operating conditions, as presented in Table B.2.

4.2 Explanation of the Methods Used for Emission Estimates and Data Quality

The maximum emission rates for each significant contaminant emitted from the significant sources were calculated in accordance with the requirements of the ESDM Procedure Document. Emission estimate methodology for each process type is shown in the following sections. Detailed calculations are presented in Appendix B.

4.2.1 Natural Gas Combustion Sources

(Source IDs: HTR, BLR multiple IDs. Refer to Appendix B, Table B.1.)

Nitrogen oxides (NOx) emissions from natural gas-fired comfort heating equipment have been calculated using the natural gas heat rating for each equipment along with the AP-42 emission factors for small boilers (<100 MMBtu/hour of heat input) from Table 1.4-1.

A sample calculation for the emission rate of Nitrogen Oxides from Commercial Unit Heater [redacted] is provided below. A Natural Gas higher heating value of [redacted] is used.

$$Natural\ Gas\ heat\ rating\ for\ [redacted] = [redacted]\ \frac{Btu}{Hour}$$

$$Natural\ gas\ consumption\ rate = \frac{Natural\ Gas\ heat\ rating\ for\ [redacted]}{\text{Natural Gas higher heating value}}$$

$$Natural\ gas\ consumption\ rate = \frac{[redacted]}{[redacted]}$$

$$Natural\ gas\ consumption\ rate = [redacted]$$

$$Natural\ gas\ consumption\ rate = \frac{[redacted]}{[redacted]} = [redacted]$$

$$AP-42\ NOx\ Emission\ Factor\ for\ Small\ Boilers\ \left(< 100\ \frac{MMBtu}{hour}\ heat\ input\right) = [redacted]\ \frac{[redacted]}{[redacted]}$$

$$NOx\ emission\ rate\ for\ [redacted] = Natural\ consumption\ rate \times AP-42\ NOx\ emission\ factor$$

$$NOx\ emission\ rate\ for\ [redacted] = [redacted]\ \frac{m^3}{hour} \times [redacted]\ \frac{kg}{10^6\ m^3} = [redacted]\ \frac{kg}{hour}$$

$NOx\ emission\ rate\ for$ [redacted] $\frac{g}{s}$

The rating for the AP-42 emission factor is "B", thus data quality is considered "Above – Average Data Quality", as per section 9.2.2 of the ESDM Procedure Document.

4.2.2 Air Stripper – Groundwater Treatment

(Source ID: [redacted] *)*

Emissions of Volatile Organic Compounds (VOCs) from the air stripper have been estimated based on maximum concentrations of detected compounds in the groundwater, along with the design flow rate of the air stripper (Table B.4). It is conservatively assumed that 100% of the measured VOCs are emitted to the atmosphere. The VOC concentrations in groundwater were based on four years of AECOM measurements, with the maximum concentration selected for each contaminant and some additional buffer added for conservatism.

A sample calculation for the emission rate of Trichloroethylene from Air Stripper [redacted] is provided below.

$Air\ Stripper\ Design\ Flow\ Rate\ =$ [redacted]

$Maximum\ Concentration\ Measured\ in\ water\ =$ [redacted] $\frac{\mu g}{L}$ ([redacted] $\frac{\mu g}{L}$ $assumed\ for\ conservativism$)

$Emission\ Rate\ =$ [redacted] $\frac{\mu g}{L} \times$ [redacted] $\frac{L}{min} \times \frac{1}{60} \frac{min}{s} \times 10^{-6} \frac{g}{\mu g} =$ [redacted] $\frac{g}{s}$

The data quality for this technique of emission estimation is considered "Above-Average Data Quality", as per section 9.2.2 of the ESDM Procedure Document.

5. Source Summary Table and Site Plan

5.1 Source Summary Table and Site Plan

For both the Existing and Future Operation, the sources at the Facility are documented in Table B.1, Appendix B – Source Summary Table in accordance with requirements of s. 26 of O. Reg. 419/05. This Table follows the format provided in the MECP ESDM Procedure Document.

The Facility is in an industrial area with an adjacent facility immediately to the west, which is leased by BWXT. For this application, a separate property boundary has been proposed and only the emissions from GEPR have been considered.

5.2 Site Plan

The building locations along with its name and heights for the Existing and Future Operations are presented in Appendix C.2 and Appendix C.3 respectively.

6. Dispersion Modelling

The dispersion modelling for the Facility was completed using AERMOD dispersion model (version 22112) and has been assessed on 1-hour and 24-hour averaging periods to compare to the Schedule 3 POI limits or other applicable screening levels.

The various parameters of the model as required by O. Reg. 419/05 are described in Table 6-1 below.

6.1 Dispersion Modelling Input Summary Table

The Dispersion Modelling Input Summary Table is presented for completeness of the ESDM Report, as shown below in Table 6-1.

Table 6-1: Dispersion Modelling Input Summary Table

Relevant Section of the Regulation	Section Title	Description of How the Dispersion Model was Used
Section 8	Negligible Sources	Sources and contaminants that were considered negligible were identified and were not modelled. Refer to Section 3 of this ESDM Report.
Section 9	Same Structure Contamination	The Facility does not have a childcare, health care, senior's residence, long term care or an education facility located on site. **Existing Operation:** Applicable, since GE and BWXT occupy buildings that are adjacent to each other and share a common wall. ASHRAE assessment was completed for the Nitrogen Oxides (refer to Section 6.4). **Future Operation:** Not applicable.
Section 10	Operating Conditions	All processes and equipment at the Facility were assumed to operate at maximum production rates. Refer to Section 4 of this ESDM Report.
Section 11	Source of Contaminant Emission Rates	The maximum emission rates for each averaging period that the equipment/process is capable of for each significant contaminant were estimated and used in the modelling. The emission estimation methodology for each source is documented in Section 4, and Table B.1 – Source Summary Table (Existing Operation) and Table B.1 – Source Summary Table (Future Operation).
Section 12	Combined Effect of Assumptions for Operating Conditions and Emission Rates	The operating conditions were estimated in accordance with s.10(1) 1 and s.11(1) 1 of O. Reg. 419/05. These conditions are expected to result in the highest POI concentrations for the contaminants emitted. See Section 0 of this ESDM Report.
Section 13	Meteorological Conditions	MECP's Ontario meteorological data covering the modelling domain – Ottawa suburban (Version 22112) for years 1996 to 2000 was used.
Section 14	Area for Modelling Conditions	The modelled area extends approximately 5 km from the Facility in all directions. Receptors were setup in accordance with the guidance provided in the Air Dispersion Modelling Guideline for Ontario, Guideline A-11, Version 3.0. Receptors along the property boundary were set to 10 m apart. Receptor spacing increases further from the Facility: • up to 200 m from all Facility emission sources - receptor spacing is set at 20 m, • between 200 m and 300 m – receptor spacing is set at 50 m, • between 300 m and 800 m – receptor spacing is set at 100 m,

Relevant Section of the Regulation	Section Title	Description of How the Dispersion Model was Used
		• Between 800 m and 1800 m – receptor spacing is set at 200 m, • between 1800 m and 4800 m – receptor spacing is set at 500 m.
Section 15	Stack Height for Certain New Sources of Contaminant	Sources were modelled for both the Existing and Future Operation, using the stack parameters provided in the Source Summary Table, Table B.1, Appendix B.
Section 16	Terrain Data	MECP's Ontario data files covering the modelling domain (cdem_dem_031B.tif) were used in the modelling.
Section 17	Averaging Periods	The appropriate averaging periods as defined in the Schedule 3 standards and Guidelines of the O. Reg. 419/05 were modelled for each contaminant.

6.2 Land Use Zoning Designation Plan

The Facility is located on land zoned as Special District 59 (SP.59), which is designated as an industrial district, as per the City of Peterborough Zoning By-laws. It is surrounded by land zoned as residential to the north, south and east; some commercial lands are located to the south-east, and industry is located to the west. The land zoning maps are provided in Appendix C.2.

6.3 Dispersion Modelling Input and Output Files

The location of the modelled property line is presented in Figure 6-1 and the coordinates are summarized in Table 6-2 below. The source parameters are provided in the Source Summary Table, Table B.1, Appendix B.

Table 6-2: Property Line Coordinates

Point on Property Line	UTM Coordinates (m)	
	Northing	Easting
1	712888.19	4907934.49
2	712795.21	4908172.69
3	712855.86	4908196.84
4	712818.23	4908292.04
5	713184.05	4908434.57
6	713319.22	4908101.24

The modelled source locations are shown in Figure 6-2 to Figure 6-6.



Figure 6-1: Modelled Facility Property Line

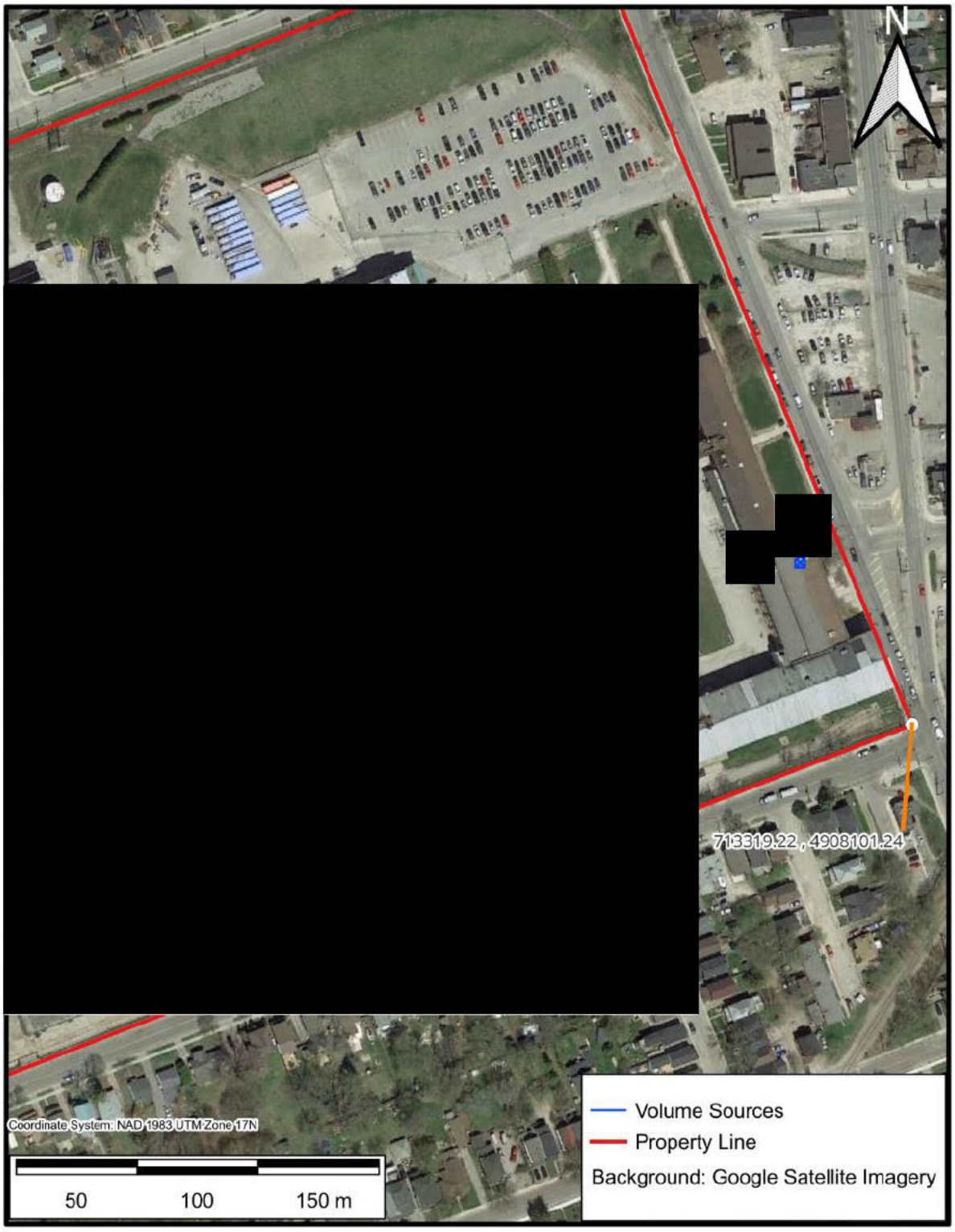


Figure 6-2: Existing Operation: Location of Volume Sources – East Side of Facility

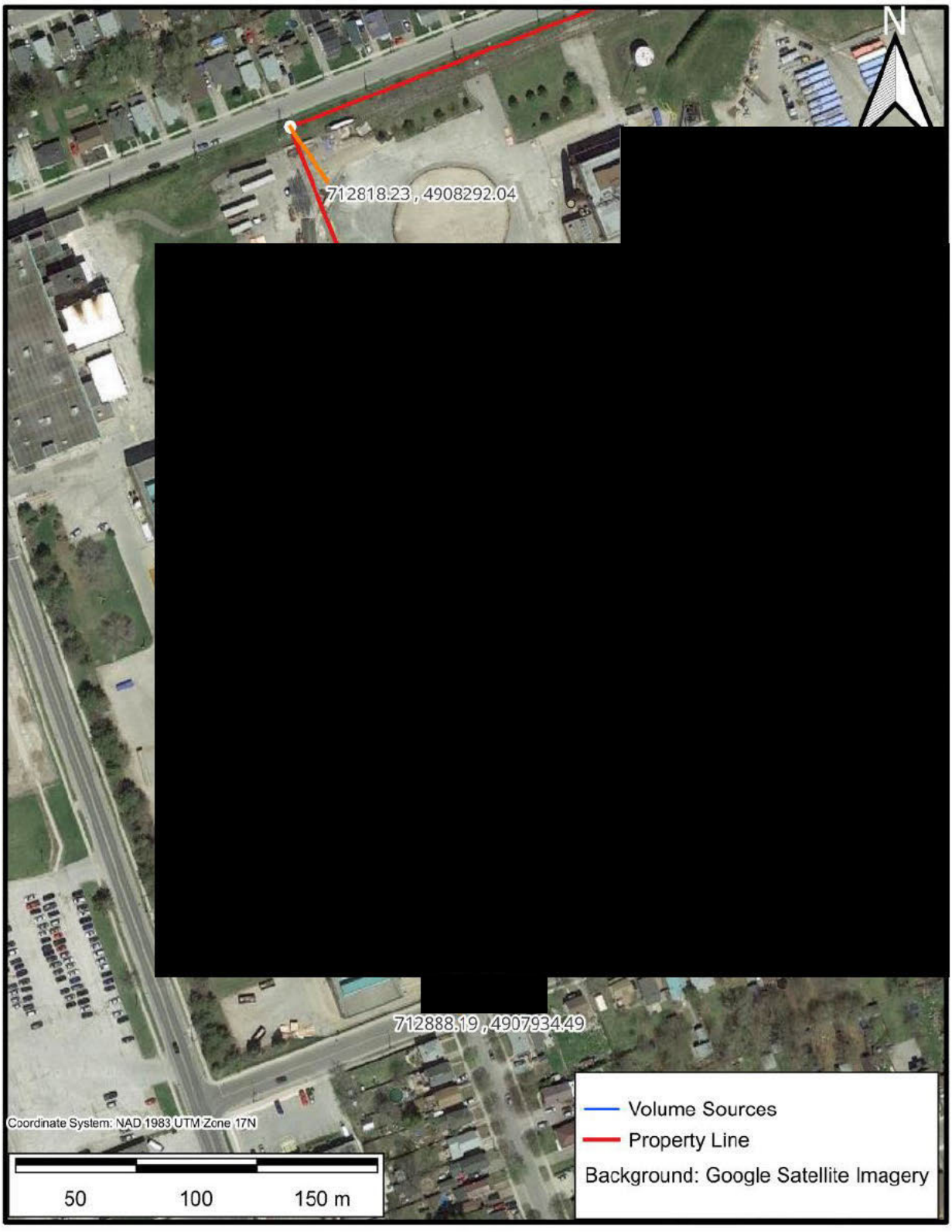


Figure 6-3: Existing Operation: Location of Volume Sources – West Side of Facility



Figure 6-4: Future Operation: Location of Volume Sources – East Side of Facility

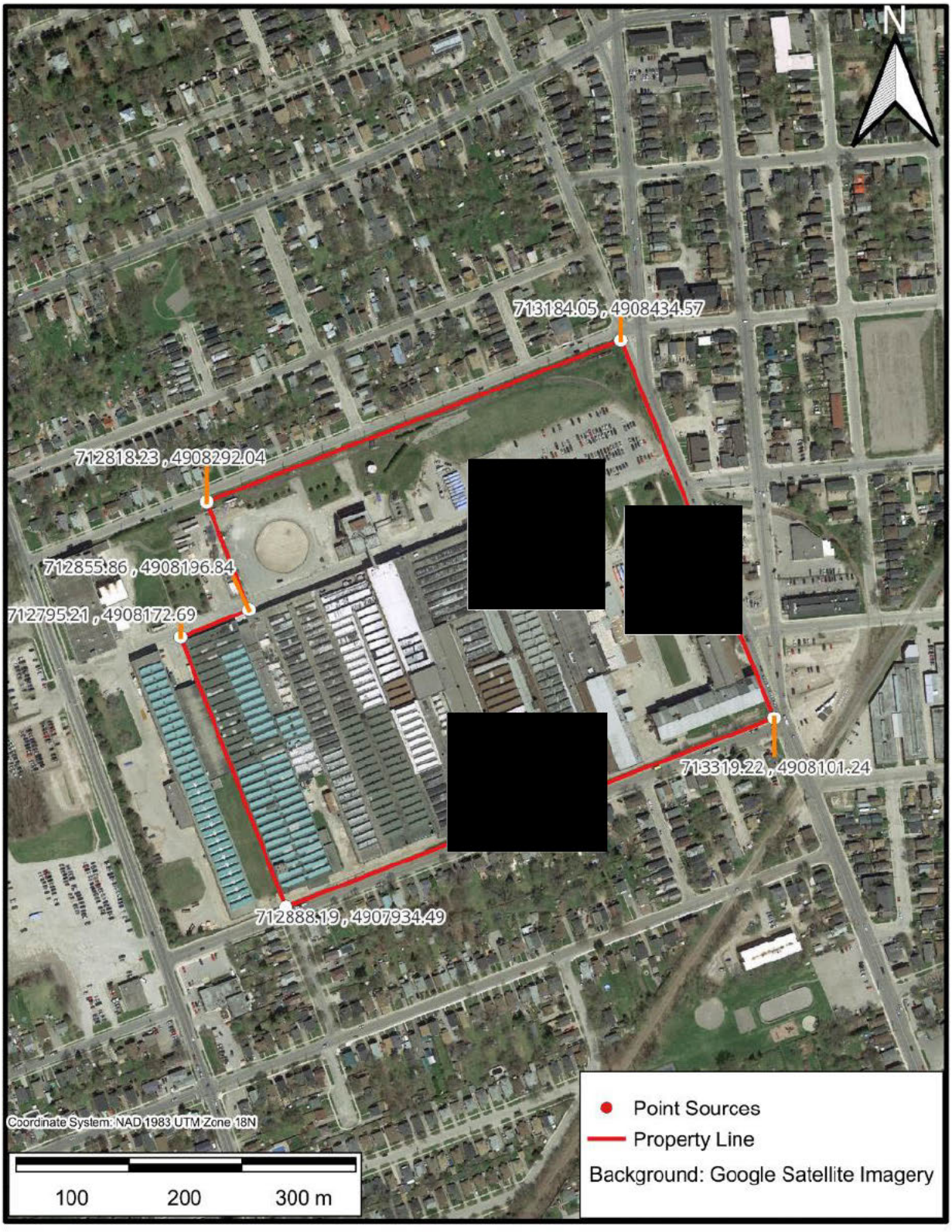


Figure 6-5: Existing Operation: Location of Point Sources at Facility



Figure 6-6: Future Operation: Location of Point Sources at Facility

6.4 ASHRAE Assessment

For the Existing Operation, the comfort heating exhaust vents are located on the [redacted] To assess the potential impact of Nitrogen Oxides emissions [redacted], an ASHRAE assessment was conducted using the ASHRAE 2015 methodology.

A total of [redacted] were assessed, assuming simultaneous operation at full capacity.

Cumulatively, the impact of these sources (each unit operating with maximum emissions) was below the MECP POI Nitrogen Oxides limits for both the 1 hour and 24 hour averaging periods. Details of the assessment are provided in Appendix B.7.

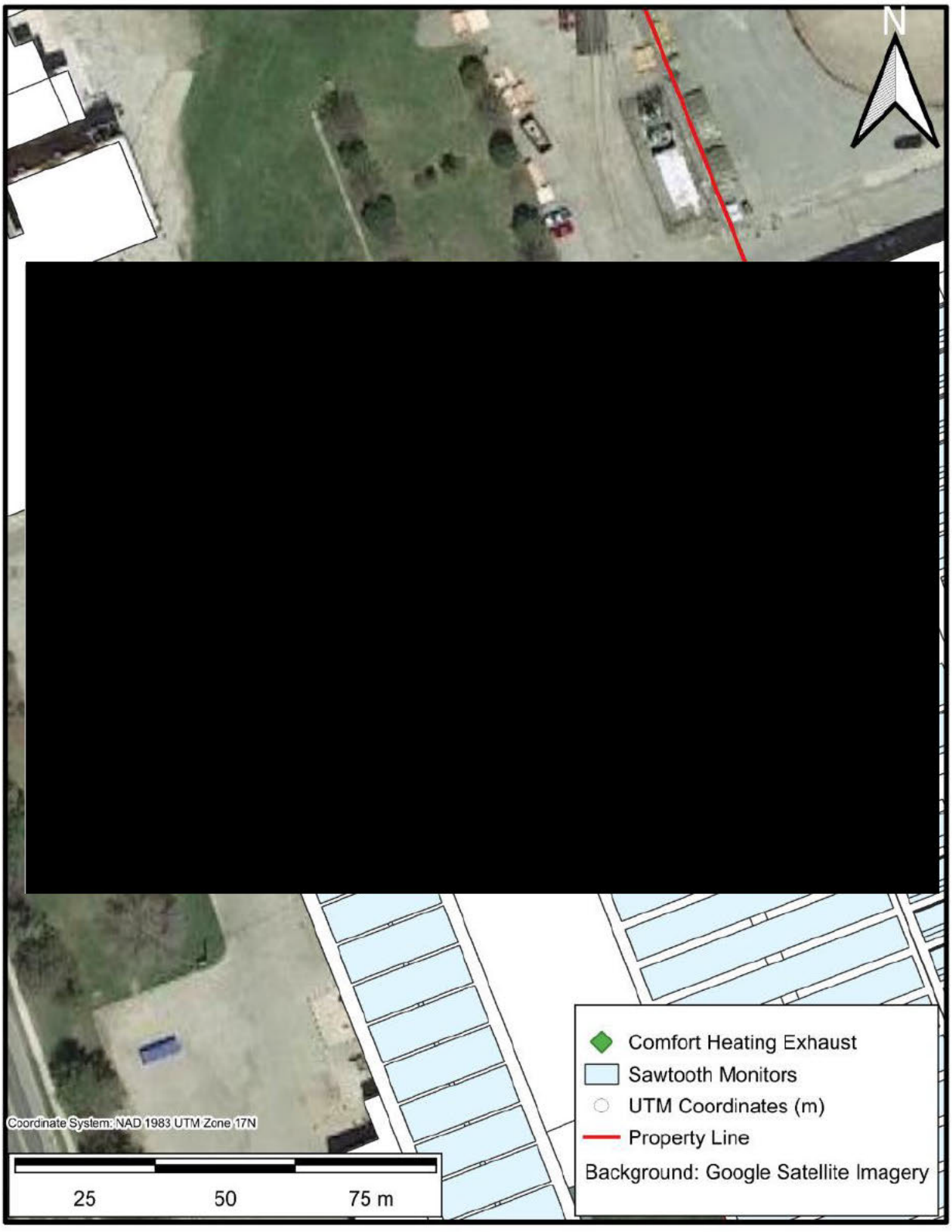


Figure 6-7: Location of Comfort Heating Exhausts, [redacted] – ASHRAE Assessment

7. Emission Summary Table and Conclusions

The maximum POI concentrations resulting from the Facility's sources are presented in the Emission Summary Tables, Table 7-1 and Table 7-2, for the Existing and Future Operation scenarios respectively. The results indicate that the impacts are predicted to be below the relevant POI limits set out in Schedule 3 of O. Reg. 419/05 or applicable screening levels for all contaminants.

7.1 Conclusions

The ESDM Report was prepared in accordance with section 26 of O. Reg. 419/05 and guidance from the MECP guidance document "Preparing an Emissions Summary and Dispersion Modelling Report, Version 4.1", dated March 2018.

The contaminants of concern were compared against the corresponding Schedule 3 standards or applicable screening levels.

The Existing and Future Operation emission rate estimates for each source are included in the Source Summary Table, Table B.1. The emission rates for both scenarios listed in Table B.1 have a data quality rating of "Above-Average". The emission rates correspond to the maximum operating scenario where all significant sources discharge into the atmosphere simultaneously at their respective maximum emission rates. Therefore, the emission rate estimates are expected to be conservative.

The Emission Summary Tables demonstrate that the Facility is currently operating in compliance with the Schedule 3, POI limits and applicable screening levels for all contaminants of concern in both the Existing Operation scenario and the Future Operation scenario where only the Building 2, 2A, 8A, 30 and GETS will be operational.

In addition, all significant noise sources were assessed in the updated Acoustic Assessment Report (AAR).

7.2 Assessment of Contaminants with no MECP POI Limits

All contaminants of concern have a POI standard, guideline or screening level as per the MECP Air Contaminants Benchmarks (ACB) list.

Table 7-1: Existing Operation: Emission Summary Table (Copy of Table E-1)

Contaminant Name	Contaminant CAS Number	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum Ground Level POI Concentration (µg/m^3)	Averaging Period (hours)	MECP POI Limit (µg/m^3)	Benchmark and Category	Limiting Effect	Percentage of MECP POI Limit (%)
Nitrogen Oxides	10102-44-0	9.93E-01	AERMOD V. 22112	77.4	24	200	Schedule 3 Standard, B1	Health	39%
Nitrogen Oxides	10102-44-0	9.93E-01	AERMOD V. 22112	164.4	1	400	Schedule 3, Standard, B1	Health	41%
Trichloroethylene	79-01-6	1.14E-02	AERMOD V. 22112	3.4	24	12	Schedule 3, Standard, B1	Health	28%
Nitrogen Oxides	10102-44-0	1.30E-02	ASHRAE (2015)[1]	39.7	24	200	Schedule 3, Standard, B1	Health	20%
Nitrogen Oxides	10102-44-0	1.30E-02	ASHRAE (2015)[1]	96.7	1	400	Schedule 3, Standard, B1	Health	24%

Notes:

Standard – Standard under Ontario Regulation 419/05 – Air Pollution – Local Air Quality.
B1 - Benchmark 1
[1] For the ASHRAE assessment, total emission rate for nitrogen oxides consists of the sum of emissions from the [redacted] located adjacent to the [redacted]. Refer to Section 6.4, and Appendix B.7.

Table 7-2: Future Operation: Emission Summary Table (Copy of Table E-2)

Contaminant Name	Contaminant CAS Number	Total Facility Emission Rate (g/s)	Air Dispersion Model Used	Maximum Ground Level POI Concentration (µg/m^3)	Averaging Period (hours)	MECP POI Limit (µg/m^3)	Benchmark and Category	Limiting Effect	Percentage of MECP POI Limit (%)
Nitrogen Oxides	10102-44-0	9.87E-02	AERMOD V. 22112	26.8	24	200	Schedule 3 Standard, B1	Health	13%
Nitrogen Oxides	10102-44-0	9.87E-02	AERMOD V. 22112	45.4	1	400	Schedule 3, Standard, B1	Health	11%
Trichloroethylene	79-01-6	3.00E-03	AERMOD V. 22112	6.2	24	12	Schedule 3, Standard, B1	Health	52%

Notes:

Standard – Standard under Ontario Regulation 419/05 – Air Pollution – Local Air Quality.
B1 - Benchmark 1

Appendix A – Legal Documents

A.1 Current ECA

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 7836-9HDRYN
Issue Date: March 24, 2014

General Electric Canada Holdings operating as General Electric Canada
107 Park Street North
Peterborough, Ontario
K9J 7B5

Site Location: 107 Park Street North
Peterborough City, County of Peterborough
K9J 7B5

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:

An electric motor and generators manufacturing facility, consisting of the following business units and their respective processes as described in the original *ESDM Report* :

- commutator shop,
- large motor - armature (winding),
- large motor unwound - machine shop,
- large motor assembly/test,
- large motor unwound - punch press,
- steam plant,
- large motor unwound - welded products,
- pump and treat,
- hazardous waste and paint storage,
- renewal parts,
- large motor unwound - non-metallics,
- small motor,
- wind hub,
- solar inverters, and
- large motor unwound - components;

including the *Equipment* and any other ancillary and support processes and activities, **operating at a *Facility Production Limit* as outlined in the following table:**

Products	*Facility Production Limit*
Wind Energy	1,065 units per year
Large Motors	250 complete machines and 50 major components
Renewable Parts	25,000 replacement components
Solar	400 solar inverters
Wind	300 wind hubs
Service Repairs	400 component repairs
Drives	250 large motor drives

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 Maximum Ground Level Concentration*" means a concentration accepted by the *Ministry,* as described in the Guide to Applying for Approval (Air & Noise), for a *Compound of Concern* listed in the *Original ESDM Report* 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*
2. "*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* ;.

3. "*Acoustic Assessment Report*" means the report, prepared in accordance with *Publication NPC-233* and Appendix A of the *Basic Comprehensive User Guide,* byConestoga-Rovers & Associates and dated November 6, 2013 submitted in support of the application, that documents all sources of noise emissions and *Noise Control Measures* present at the *Facility* and includes all up-dated *Acoustic Assessment Reports* as required by the Documentation Requirements conditions of this *Approval* to demonstrate continued compliance with the *Performance Limits* following the implementation of any *Modification.*

4. "*Acoustic Assessment Summary Table*" means a table prepared in accordance with the *Basic Comprehensive User Guide* summarising the results of the *Acoustic Assessment Report,* up-dated as required by the Documentation Requirements conditions of this *Approval.*

5. "*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* ;

6. "*Acoustic Audit Report* " means a report presenting the results of an *Acoustic Audit* , prepared in accordance with *Publication NPC-233* ;

7. "*Air Standards Manager*" means the Manager, Human Toxicology and Air Standards Section, Standards Development Branch, or any other person who represents and carries out the duties of the Manager, Human Toxicology and Air Standards Section, Standards Development Branch, as those duties relate to the conditions of this *Approval.*

8. "*Approval*" means this entire Environmental Compliance Approval and any *Schedules* to it.

9. "*Basic Comprehensive User Guide*" means the *Ministry* document titled "Basic Comprehensive Certificates of Approval (Air) User Guide" dated March 2011, as amended.

10. "*Company*" means General Electric Canada Holdings operating as General Electric Canada 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.*

11. "*Compound of Concern*" means a contaminant that, based on generally available information, may be discharged to the air in a quantity from the *Facility* that:

    (a) is non-negligible in accordance with section 26(1)4 of *O. Reg. 419/05* in comparison to the relevant *Ministry Point of Impingement Limit;* or

    (b) if a *Ministry Point of Impingement Limit* is not available for the compound, may cause an adverse effect at a *Point of Impingement* based on generally available toxicological information.

12. "*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.*

13. "*Director*" means a person appointed by the Minister pursuant to section 5 of the *EPA.*

14. "*District Manager*" means the District Manager of the appropriate local district office of the *Ministry,* where the *Facility* is geographically located.

15. "*Emission Summary Table*" means the most updated table contained in the *ESDM Report,* which is prepared in accordance with section 26 of *O. Reg. 419/05* and the *Procedure Document* listing the appropriate *Point of Impingement* concentration for each *Compound of Concern* from the *Facility* and providing comparison to the corresponding *Ministry Point of Impingement Limit* or *Maximum Concentration Level Assessment,* or *Jurisdictional Screening Level.*

16. "*Environmental Assessment Act*" means the Environmental Assessment Act, R.S.O. 1990, c.E.18, as amended.

17. "*EPA*" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended.

18. "*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.

19. "*Equipment with Specific Operational Limits*" means 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.*

20. "*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,* is prepared after the issuance of this *Approval* in accordance with section 26 of *O. Reg. 419/05* and the *Procedure Document* by the *Company* or its consultant.

21. "*Facility*" means the entire operation located on the property where the *Equipment* is located.

22. "*Facility Production Limit*" means the production limit placed by the *Director* on the main product(s) or raw materials used by the *Facility.*

23. "*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* ;

24. "*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.

25. "*Log*" means the up-to-date log that is used to track all *Modifications* to the *Facility* since the date of this *Approval* as required by the Documentation Requirements conditions of this *Approval.*

26. "*Maximum Concentration Level Assessment*" means the Maximum Concentration Level Assessment for the purposes of an *Approval,* described in the *Basic Comprehensive User Guide,* prepared by a *Toxicologist* using currently available toxicological information, that demonstrates that the concentration at any *Point of Impingement* for a *Compound of Concern* that does not have a *Ministry Point of Impingement Limit* is not likely to cause an adverse effect as defined by the *EPA.*

27. "*Ministry*" means the ministry of the government of Ontario responsible for the *EPA* and its regulations and includes all officials, employees or other persons acting on its behalf.

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: Air Pollution - Local Air Quality (including Schedule 6 of O. Reg. 419 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 Abatement Action Plan*" means the noise abatement program developed by the *Company* (detailed in *Schedule* "B" of this *Approval*), submitted to the *Director* and *District Manager* and approved by the *Director* , designed to achieve compliance with the sound level limits set in *Publication NPC-205* and/or *Publication NPC-232* , as applicable.

31. "*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, described in the *Company* 's application, *Schedule* "B" of this *Approval* and in the supporting documentation referred to herein, including the *Acoustic Assessment Report* , to the extent approved by this *Approval* ;

32. "*O. Reg. 419/05*" means the Ontario Regulation 419/05, Air Pollution – Local Air Quality, as amended.

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 Conestoga-Rovers & Associatesand dated November 6, 2013 submitted in support of the application, and includes any changes to the report made up to the date of issuance of this *Approval.*

34. "*Performance Limits*" means the performance limits specified in Condition 3.2 of this *Approval* titled Performance Limits.

35. "*Point of Impingement*" has the same meaning as in section 2 of *O. Reg. 419/05.*

36. "*Point of Reception*" means Point of Reception as defined by *Publication NPC-205* and/or *Publication NPC-232,* as applicable.

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 a contaminant or contaminants into the air at 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-205*" means the *Ministry* Publication NPC-205, "Sound Level Limits for Stationary Sources in Class 1 & 2 Areas (Urban)", October, 1995, as amended.

41. "*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.

42. "*Publication NPC-232*" means the *Ministry* Publication NPC-232, "Sound Level Limits for Stationary Sources in Class 3 Areas (Rural)", October, 1995, as amended.

43. "*Publication NPC-233*" means the *Ministry* Publication NPC-233, "Information to be Submitted for Approval of Stationary Sources of Sound", October, 1995, as amended.

44. "*Schedules*" means the following schedules attached to this *Approval* and forming part of this *Approval* namely:

    Schedule A - Supporting Documentation;
    Schedule B - *Noise Abatement Action Plan.*

45. "*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.

46. "*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 that must be submitted annually to the *Ministry* as required by the section of this *Approval* titled Reporting Requirements.

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 - *Noise Abatement Action Plan*

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.*

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 ten (10) years from 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. REQUEST FOR *MAXIMUM CONCENTRATION LEVEL ASSESSMENT* AND *PERFORMANCE LIMITS*

3.1 REQUEST FOR *MAXIMUM CONCENTRATION LEVEL ASSESSMENT*

3.1.1 If the *Company* proposes to make a *Modification* to the *Facility,* the *Company* shall determine if the proposed *Modification* will result in:

(a) a discharge of a *Compound of Concern* that was not previously discharged; or

(b) an increase in the concentration at a *Point of Impingement* of a *Compound of Concern.*

3.1.2 If a proposed *Modification* mentioned in Condition 3.1.1 will result in the discharge of a *Compound of Concern* that was not previously discharged, the *Company* shall submit a *Maximum Concentration Level Assessment* to the *Director* for review by the *Air Standards Manager* in the following circumstances:

(a) The *Compound of Concern* does not have a *Ministry Point of Impingement Limit* or a *Jurisdictional Screening Level.*

(b) The *Compound of Concern* does not have a *Ministry Point of Impingement Limit* and the concentration at a *Point of Impingement* will exceed the *Jurisdictional Screening Level.*

(c) Prior to the proposed *Modification,* a contaminant was discharged in a negligible amount and the proposed *Modification* will result in the discharge of the contaminant being considered a *Compound of Concern* and the *Compound of Concern* does not have a *Ministry Point of Impingement Limit* or a *Jurisdictional Screening Level.*

(d) Prior to the proposed *Modification,* a contaminant was discharged in a negligible amount and the proposed *Modification* will result in the discharge of the contaminant being considered a *Compound of Concern.* Additionally, the *Compound of Concern* does not have a *Ministry Point of Impingement Limit* and the concentration at a *Point of Impingement* will exceed the *Jurisdictional Screening Level.*

3.1.3 If a proposed *Modification* mentioned in Condition 3.1.1 will result in an increase in the concentration at a *Point of Impingement* of a *Compound of Concern,* the *Company* shall submit a *Maximum Concentration Level Assessment* to the *Director* for review by the *Air Standards Manager* in the following circumstances:

(a) The *Compound of Concern* does not have a *Ministry Point of Impingement Limit* or a *Jurisdictional Screening Level* and the concentration at a *Point of Impingement* will exceed the *Acceptable Maximum Ground Level Concentration.*

(b) The *Compound of Concern* does not have a *Ministry Point of Impingement Limit* or a *Jurisdictional Screening Level* and the concentration at a *Point of Impingement* will exceed the most recently accepted *Maximum Concentration Level Assessment* submitted under Condition 3.1.2 or this Condition.

(c) The *Compound of Concern* does not have a *Ministry Point of Impingement Limit* and the concentration at a *Point of Impingement* will exceed the *Jurisdictional Screening Level* and the *Acceptable Maximum Ground Level Concentration.*

(d) The *Compound of Concern* does not have a *Ministry Point of Impingement Limit* and the concentration at a *Point of Impingement* will exceed the *Jurisdictional Screening Level* and the most recently accepted *Maximum Concentration Level Assessment* submitted under Condition 3.1.2 or this Condition.

(e) The *Compound of Concern* does not have a *Ministry Point of Impingement Limit, Acceptable Maximum Ground Level Concentration* or a *Maximum Concentration Level Assessment* and the concentration at a *Point of Impingement* will exceed the *Jurisdictional Screening Level.*

3.1.4 Subject to the Operational Flexibility set out in Condition 2 of this *Approval,* the *Company* may make the *Modification* if the submission of a *Maximum Concentration Level Assessment* under Condition 3.1.2 or 3.1.3 is not required.

3.1.5 A *Company* that is required to submit an assessment under Condition 3.1.2 or 3.1.3 shall submit the assessment at least thirty (30) days before the proposed *Modification* occurs.

3.1.6 The *Ministry* shall provide to the *Company* written confirmation of the receipt of the assessment under Condition 3.1.2 or 3.1.3.

3.1.7 If an assessment is submitted under Condition 3.1.2 or 3.1.3, the *Company* shall not modify the *Facility* unless the *Ministry* accepts the assessment.

3.1.8 If the *Ministry* notifies the *Company* that it does not accept the assessment submitted under Condition 3.1.2 or 3.1.3, the *Company* shall:

(a) revise and resubmit the assessment; or

(b) notify the *Ministry* that the *Company* will not be modifying the *Facility.*

3.1.9 The re-submission under Condition 3.1.8 (a) is considered by the *Ministry* as a new submission.

3.2. ***PERFORMANCE LIMITS***

3.2.1 Subject to Condition 3.2.2, the *Company* shall, at all times, ensure that all *Equipment* that is a source of a *Compound of Concern* is operated to comply with the following *Performance Limits:*

(a) for a *Compound of Concern* that has a *Ministry Point of Impingement Limit,* the maximum concentration of that *Compound of Concern* at any *Point of Impingement* shall not exceed the corresponding *Ministry Point of Impingement Limit;*

(b) for a *Compound of Concern* that has an *Acceptable Maximum Ground Level Concentration* and no *Maximum Concentration Level Assessment,* the maximum concentration of that *Compound of Concern* at any *Point of Impingement* shall not exceed the corresponding *Acceptable Maximum Ground Level Concentration;* and

(c) for a *Compound of Concern* that has a *Maximum Concentration Level Assessment,* the maximum concentration of that *Compound of Concern* at any *Point of Impingement* shall not exceed the most recently accepted corresponding *Maximum Concentration Level Assessment.*

3.2.2 If the *Company* has modified the *Facility* and was not required to submit a *Maximum Concentration Level Assessment* with respect to a *Compound of Concern* under Condition 3.1.2 or 3.1.3, the *Company* shall, at all times, ensure that all *Equipment* that is a source of the *Compound of Concern* is operated such that the maximum concentration of the *Compound of Concern* shall not exceed the concentration listed for the *Compound of Concern* in the most recent version of the *ESDM Report.*

3.2.3 The *Company* shall ensure, subsequent to the completion of the *Noise Abatement Action Plan,* that the noise emissions from the *Facility* comply with the limits set out in *Ministry Publication NPC-205* or *Publication NPC-232,* as applicable.

3.2.4 The *Company* shall, at all times, ensure that the vibration emissions from the *Facility* comply with the limits set out in *Ministry Publication NPC-207.*

3.2.5 The *Company* shall, at all times, operate any *Equipment with Specific Operational Limits* approved by this *Approval* in accordance with the *Original ESDM Report* and Conditions in this *Approval.*

4. DOCUMENTATION REQUIREMENTS

4.1 The *Company* shall, at all times, maintain documentation that describes the current operations of the *Facility,* including but not limited to:

(a) an *ESDM Report* that demonstrates compliance with the *Performance Limits* for the *Facility;*

(b) an *Acoustic Assessment Report* that demonstrates compliance with the *Performance Limits* for the *Facility;*

(c) an up-to-date *Log* that describes each *Modification* to the *Facility;* and

(d) a record of the changes to the *ESDM Report* and the *Acoustic Assessment Report* that documents how each *Modification* is in compliance with the *Performance Limits.*

4.2 The *Company* shall, during regular business hours, make the current *Emission Summary Table* and *Acoustic Assessment Summary Table* available for inspection at the *Facility* by any interested member of the public.

4.3 Subject to Condition 4.5, the *Company* shall prepare and complete no later than April 15 of each year documentation that describes the activities undertaken at the *Facility* in the previous calendar year, including but not limited to:

(a) a list of all *Compounds of Concern* for which a *Maximum Concentration Level Assessment* was submitted to the *Director* for review by the *Air Standards Manager* pursuant to Condition 3.1.2 or 3.1.3 of this *Approval;*

(b) if the *Company* has modified the *Facility* and was not required to submit a *Maximum Concentration Level Assessment* with respect to a *Compound of Concern* under Condition 3.1.2 or 3.1.3, a list and concentration level of all such *Compounds of Concern;*

(c) a review of any changes to *Ministry Point of Impingement Limits* that affect any *Compounds of Concern* emitted from the *Facility;* and

(d) a table of the changes in the emission rate of any *Compound of Concern* and the resultant increase or decrease in the *Point of Impingement* concentration reported in the *ESDM Report.*

4.4 Subject to Condition 4.5, the *Company* shall, at all times, maintain the documentation described in Condition 4.3.

4.5 Conditions 4.3 and 4.4 do not apply if Condition 2.1 has expired.

4.6 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 they describe the *Facility* as it was at the time that Condition 2.1 of this *Approval* expired.

5. REPORTING REQUIREMENTS

5.1 Subject to Condition 5.2, the *Company* shall provide the *Ministry* and the *Director* no later than April 15 of each year, a *Written Summary Form* 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* that took place in the previous calendar year that resulted in a change in the previously calculated concentration at the *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.*

5.2 Condition 5.1 does not apply if Condition 2.1 has expired.

6. OPERATION AND MAINTENANCE

6.1 The *Company* shall prepare and implement, not later than three (3) 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.

6.2 The *Company* shall ensure that all *Processes with Significant Environmental Aspects* are operated and maintained at all times in accordance with this *Approval,* the operating procedures and maintenance programs.

7. COMPLAINTS RECORDING PROCEDURE

7.1 If at any time, the *Company* receives any environmental complaints from the public regarding the operation of the *Equipment* approved by this *Approval,* the *Company* shall respond to these complaints according to the following procedure:

(a) the *Company* shall record and number each complaint, either electronically or in a log book, and 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) the *Company,* upon notification of a complaint, shall initiate appropriate steps to determine all possible causes of the complaint, and shall proceed to take the necessary actions to appropriately deal with the cause of the subject matter of the complaint; and

(c) the *Company* shall complete and retain on-site a report written within one (1) week of the complaint date, listing the actions taken to appropriately deal with the cause of the subject matter of the complaint and any recommendations for remedial measures, and managerial or operational changes to reasonably avoid the recurrence of similar incidents.

8. RECORD KEEPING REQUIREMENTS

8.1 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.

8.2 The *Company* shall retain, for a minimum of five (5) years from the date of their creation, except as noted below, all reports, records and information described in this *Approval* and shall include but not be limited to:

(a) If the *Company* has updated the *ESDM Report* in order to comply with Condition 4.1(a) of this *Approval,* a copy of each new version of the *ESDM Report;*

(b) If the *Company* has updated the *Acoustic Assessment Report,* in order to comply with Condition 4.1(b) of this *Approval,* a copy of each new version of the *Acoustic Assessment Report;*

(c) supporting information used in the emission rate calculations performed in the *ESDM Reports* and *Acoustic Assessment Reports* to document compliance with the *Performance Limits* (superseded information must be retained for a period of three (3) years after *Modification);*

(d) the *Log* that describes each *Modification* to the *Facility;*

(e) all documentation prepared in accordance with Condition 4.3 of this *Approval;*

(f) copies of any *Written Summary Forms* provided to the *Ministry* under Condition 5.1 of this *Approval;*

(g) the operating procedures and maintenance programs, including records on the maintenance, repair and inspection of the *Equipment* related to all *Processes with Significant Environmental Aspects;* and

(h) the complaints recording procedure, including records related to all environmental complaints made by the public as required by Condition 7.1 of this *Approval.*

9. REVOCATION OF PREVIOUS APPROVALS

9.1 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.*

10. NOISE CONTROL MEASURES

10.1 The *Company* shall:

(a) fully implement the *Noise Abatement Action Plan* specified in the *Acoustic Assessment Report,* and described in Schedule B of this *Approval;*

(b) ensure that the *Noise Control Measures* are properly maintained and continue to provide the acoustical performance outlined in the *Acoustic Assessment Report* .

11. ACOUSTIC AUDIT

11.1 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* ;

(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 six (6) months after the full implementation of the *Noise Abatement Action Plan.*

11.2 The *Director:*

(a) may not accept the results of the *Acoustic Audit* if the requirements of *Publication NPC-233* were not followed;

(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) Application for Approval (Air & Noise), dated November 6, 2013, signed by Gregory Cantrell and submitted by the *Company;*

(b) Emission Summary and Dispersion Modelling Report, prepared by Conestoga-Rovers & Associates and dated November 6, 2013;

(c) Revised Emission Summary Table submitted via email by Matthew Griffin on February 26, 2014;

(d) Acoustic Assessment Report prepared by Conestoga-Rovers & Associates, dated November 6, 2013 and signed by Sarah Tebbutt.

(e) Email dated February 6, 2014, from Matthew Griffin of Conestoga-Rovers & Associates.

SCHEDULE B

Noise Abatement Action Plan

The *Noise Abatement Action Plan* shall consist of the *Noise Control Measures* identified as Phase 1, Phase 2 and Phase 3, as outlined in the *Acoustic Assessment Report* . The *Noise Abatement Action Plan* shall be implemented according to the following schedule:

- Completed - Phase 1 *Noise Control Measures*
- Completed – Phase 2 *Noise Control Measures*
- December 31, 2014 – complete Phase 3 *Noise Control Measures,* representing completion of the *Noise Abatement Action Plan.*

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, REQUEST FOR *MAXIMUM CONCENTRATION LEVEL ASSESSMENT* AND *PERFORMANCE LIMITS*

2. Conditions No. 2 and 3 are included to limit and define the *Modifications* permitted by this *Approval,* and to set out the circumstances in which the *Company* shall submit a *Maximum Concentration Level Assessment* 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.*

DOCUMENTATION REQUIREMENTS

3. Condition No. 4 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.*

REPORTING REQUIREMENTS

4. Condition No. 5 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

5. Condition No. 6 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 PROCEDURE

6. Condition No. 7 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

7. Condition No. 8 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.

REVOCATION OF PREVIOUS APPROVALS

8. Condition No. 9 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.*

NOISE CONTROL MEASURES

9. Condition No. 10 is included to require the *Company* to implement a *Noise Abatement Action Plan* designed to ensure that the noise emissions from the *Facility* will be in compliance with applicable limits set in the *Ministry's* noise guidelines.

ACOUSTIC AUDIT

10. Condition No. 11 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 the *EPA* , the regulation and this *Approval* can be verified.

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 5019-9EJMBZ issued on March 5, 2014.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. 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 Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** 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) 314-4506 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 24th day of March, 2014

Rudolf Wan, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

MD/

c: District Manager, MOE Peterborough
Sarah Tebbutt, Conestoga-Rovers & Associates

Appendix B – Tables

B.1 Emission Source Summary Table

B.2 Maximum Operating Conditions

B.3 Combustion Products Emissions from Comfort Heating, Boilers, and HVAC Units

B.4 Estimated Maximum Emissions for Air Stripper

B.5 Negligibility Assessment

B.6 AERMOD Volume Sources and Associated Comfort Heating Equipment

B.7 ASHRAE Assessment

Table B.1: Emission Source Summary Table

Existing Operation															
Source			Source Data						Emission Data						
Building Number	Equipment ID	Description	Stack Gas Flow Rate (m^3/s)	Stack Gas Temp (°C)	Stack Diameter or Equivalent Diameter (inches)	Release Height Above Grade (m)	Release Type	Contaminant	CAS Number	Equipment Emission Rate (g/s)	Averaging Period (hour)	Data Quality	Estimation Technique	% of Overall Emission
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	6.17E-03	1, 24	Above Averag	Emission Factors	0.62%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	6.17E-03	1, 24	Above Averag	Emission Factors	0.62%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Vertical/Capped	Nitrogen Oxides	10102-44-0	2.47E-02	1, 24	Above Averag	Emission Factors	2.48%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	Nitrogen Oxides	10102-44-0	4.94E-02	1, 24	Above Averag	Emission Factors	4.97%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Vertical	Nitrogen Oxides	10102-44-0	1.85E-03	1, 24	Above Averag	Emission Factors	0.19%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Vertical	Nitrogen Oxides	10102-44-0	1.85E-03	1, 24	Above Averag	Emission Factors	0.19%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	4.94E-03	1, 24	Above Averag	Emission Factors	0.50%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	4.94E-03	1, 24	Above Averag	Emission Factors	0.50%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	4.94E-03	1, 24	Above Averag	Emission Factors	0.50%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Vertical/Capped	Nitrogen Oxides	10102-44-0	1.36E-02	1, 24	Above Averag	Emission Factors	1.37%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	6.17E-03	1, 24	Above Averag	Emission Factors	0.62%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	6.17E-03	1, 24	Above Averag	Emission Factors	0.62%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	6.79E-02	1, 24	Above Averag	Emission Factors	6.83%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	6.79E-02	1, 24	Above Averag	Emission Factors	6.83%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	4.94E-03	1, 24	Above Averag	Emission Factors	0.50%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.89E-03	1, 24	Above Averag	Emission Factors	0.19%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.89E-03	1, 24	Above Averag	Emission Factors	0.19%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.89E-03	1, 24	Above Averag	Emission Factors	0.19%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.89E-03	1, 24	Above Averag	Emission Factors	0.19%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	-	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	1.89E-03	1, 24	Above Averag	Emission Factors	0.19%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	4.94E-03	1, 24	Above Averag	Emission Factors	0.50%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	4.94E-03	1, 24	Above Averag	Emission Factors	0.50%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	4.94E-03	1, 24	Above Averag	Emission Factors	0.50%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	4.94E-03	1, 24	Above Averag	Emission Factors	0.50%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	4.94E-03	1, 24	Above Averag	Emission Factors	0.50%
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Horizontal	Nitrogen Oxides	10102-44-0	4.94E-03	1, 24	Above Averag	Emission Factors	0.50%

Source			Source Data				Emission Data							
Building Number	Equipment ID	Description	Stack Gas Flow Rate (m^3/s)	Stack Gas Temp (°C)	Stack Diameter or Equivalent Diameter (inches)	Release Height Above Grade (m)	Release Type	Contaminant	CAS Number	Equipment Emission Rate (g/s)	Averaging Period (hour)	Data Quality	Estimation Technique	% of Overall Emission
[redacted]							Horizontal	Nitrogen Oxides	10102-44-0	4.32E-03	1, 24	Above Averag	Emission Factors	0.43%
							Horizontal	Nitrogen Oxides	10102-44-0	4.32E-03	1, 24	Above Averag	Emission Factors	0.43%
							Horizontal	Nitrogen Oxides	10102-44-0	1.85E-03	1, 24	Above Averag	Emission Factors	0.19%
							Horizontal	Nitrogen Oxides	10102-44-0	4.32E-03	1, 24	Above Averag	Emission Factors	0.43%
							Horizontal	Nitrogen Oxides	10102-44-0	4.32E-03	1, 24	Above Averag	Emission Factors	0.43%
							Horizontal	Nitrogen Oxides	10102-44-0	4.32E-03	1, 24	Above Averag	Emission Factors	0.43%
							Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25

Source			Source Data				Emission Data							
Building Number	Equipment ID	Description	Stack Gas Flow Rate (m^3/s)	Stack Gas Temp (°C)	Stack Diameter or Equivalent Diameter (inches)	Release Height Above Grade (m)	Release Type	Contaminant	CAS Number	Equipment Emission Rate (g/s)	Averaging Period (hour)	Data Quality	Estimation Technique	% of Overall Emission
[redacted]							orizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
							orizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
							orizontal	Nitrogen Oxides	10102-44-0	1.23E-03	1, 24	Above Averag	Emission Factors	0.12%
							orizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
							orizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
							orizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
							orizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
							orizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
							orizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
							orizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
							orizontal	Nitrogen Oxides	10102-44-0	3.08E-03	1, 24	Above Averag	Emission Factors	0.31%
							orizontal	Nitrogen Oxides	10102-44-0	4.32E-03	1, 24	Above Averag	Emission Factors	0.43%
							orizontal	Nitrogen Oxides	10102-44-0	4.32E-03	1, 24	Above Averag	Emission Factors	0.43%
							orizontal	Nitrogen Oxides	10102-44-0	1.36E-02	1, 24	Above Averag	Emission Factors	1.37%
							orizontal	Nitrogen Oxides	10102-44-0	1.36E-02	1, 24	Above Averag	Emission Factors	1.37%
							orizontal	Nitrogen Oxides	10102-44-0	3.08E-03	1, 24	Above Averag	Emission Factors	0.31%
							orizontal	Nitrogen Oxides	10102-44-0	3.08E-03	1, 24	Above Averag	Emission Factors	0.31%
							orizontal	Nitrogen Oxides	10102-44-0	3.08E-03	1, 24	Above Averag	Emission Factors	0.31%
							orizontal	Nitrogen Oxides	10102-44-0	3.08E-03	1, 24	Above Averag	Emission Factors	0.31%
							orizontal	Nitrogen Oxides	10102-44-0	3.08E-03	1, 24	Above Averag	Emission Factors	0.31%
							orizontal	Nitrogen Oxides	10102-44-0	3.08E-03	1, 24	Above Averag	Emission Factors	0.31%
							orizontal	Nitrogen Oxides	10102-44-0	4.32E-03	1, 24	Above Averag	Emission Factors	0.43%
							orizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
							orizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
							orizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
							orizontal	Nitrogen Oxides	10102-44-0	9.87E-03	1, 24	Above Averag	Emission Factors	0.99%
							orizontal	Nitrogen Oxides	10102-44-0	1.60E-03	1, 24	Above Averag	Emission Factors	0.16%
							orizontal	Nitrogen Oxides	10102-44-0	1.60E-03	1, 24	Above Averag	Emission Factors	0.16%
							orizontal	Nitrogen Oxides	10102-44-0	1.60E-03	1, 24	Above Averag	Emission Factors	0.16%
							orizontal	Nitrogen Oxides	10102-44-0	1.60E-03	1, 24	Above Averag	Emission Factors	0.16%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	3.08E-03	1, 24	Above Averag	Emission Factors	0.31%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%
							orizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25%

Source			Source Data				Emission Data							
Building Number	Equipment ID	Description	Stack Gas Flow Rate (m^3/s)	Stack Gas Temp (°C)	Stack Diameter or Equivalent Diameter (inches)	Release Height Above Grade (m)	Release Type	Contaminant	CAS Number	Equipment Emission Rate (g/s)	Averaging Period (hour)	Data Quality	Estimation Technique	% of Overall Emission
[redacted]							Horizontal	Nitrogen Oxides	10102-44-0	4.94E-03	1, 24	Above Averag	Emission Factors	0.50%
							Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Averag	Emission Factors	0.25

Source			Source Data				Emission Data							
Building Number	Equipment ID	Description	Stack Gas Flow Rate (m^3/s)	Stack Gas Temp (°C)	Stack Diameter or Equivalent Diameter (inches)	Release Height Above Grade (m)	Release Type	Contaminant	CAS Number	Equipment Emission Rate (g/s)	Averaging Period (hour)	Data Quality	Estimation Technique	% of Overall Emission
[redacted]							Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Avera	Emission Factors	0.25%
							Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Avera	Emission Factors	0.25%
							Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Avera	Emission Factors	0.25%
							Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Avera	Emission Factors	0.25%
							Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Avera	Emission Factors	0.25%
							Horizontal	Nitrogen Oxides	10102-44-0	2.47E-03	1, 24	Above Avera	Emission Factors	0.25%
							Horizontal	Nitrogen Oxides	10102-44-0	3.08E-03	1, 24	Above Avera	Emission Factors	0.31%
								Trichloroethylene	79-01-6	3.00E-03	24	Marginal	Calculations/Judgemen	100.00%
								Vinyl Chloride	75-01-4	1.00E-05	24	Marginal	Calculations/Judgemen	100.00%
								cis-1,2-Dichloroethylene	156-59-2	1.00E-03	24	Marginal	Calculations/Judgemen	100.00%
								trans-1,2-Dichloroethylene	156-60-5	8.00E-05	24	Marginal	Calculations/Judgemen	100.00%
Future Operation														
[redacted]							Horizontal	Nitrogen Oxides	10102-44-0	6.17E-03	1, 24	Above Avera	Emission Factors	7.14%
							Horizontal	Nitrogen Oxides	10102-44-0	6.17E-03	1, 24	Above Avera	Emission Factors	7.14%
							/ertical/Capped	Nitrogen Oxides	10102-44-0	2.47E-02	1, 24	Above Avera	Emission Factors	28.57%
							-	Nitrogen Oxides	10102-44-0	4.94E-02	1, 24	Above Avera	Emission Factors	57.14%
							Vertical	Trichloroethylene	79-01-6	3.00E-03	24	Marginal	Calculations/Judgemen	100.00%
							Vertical	Vinyl Chloride	75-01-4	1.00E-05	24	Marginal	Calculations/Judgemen	100.00%
							Vertical	cis-1,2-Dichloroethylene	156-59-2	1.00E-03	24	Marginal	Calculations/Judgemen	100.00%
							Vertical	trans-1,2-Dichloroethylene	156-60-5	8.00E-05	24	Marginal	Calculations/Judgemen	100.00%

Notes:
- [1] Natural Gas Heat Rating for each equipment is provided by the Client.

Table B.2: Maximum Operating Conditions

Existing Operation

Equipment ID	Description	Contaminant	Worst Case Operating Condition
[redacted]	[redacted]	Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.112 m^3/s.
[redacted]	[redacted]	Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.112 m^3/s.
[redacted]	[redacted]	Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.841 m^3/s.
[redacted]	[redacted]	Nitrogen Oxides	BLR_2A_1 and BLR_2A_2 have a common single stack, whose maximum flow rate is 0.841 m^3/s.
[redacted]	[redacted]	Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.021 m^3/s.
[redacted]	[redacted]	Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.021 m^3/s.
[redacted]	[redacted]	Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
[redacted]	[redacted]	Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.014

Equipment ID	Description	Contaminant	Worst Case Operating Condition
[redacted]	[redacted]	Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.014 m^3/s.

Equipment ID	Description	Contaminant	Worst Case Operating Condition
[redacted]		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.028 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.035 m^3/s.
		Trichloroethylene, Vinyl Chloride, cis-1,2-Dichloroethylene, trans-1,2-Dichloroethylene	Operating 24 hours a day, 365 days a year, with a maximum design flow rate of [redacted] and a maximum exhaust flow rate of [redacted]
Future Operation			
[redacted]		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.112 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.112 m^3/s.
		Nitrogen Oxides	Operating 24 hours a day, 365 days a year, with a maximum exhaust flow rate of 0.841 m^3/s.
		Nitrogen Oxides	BLR_2A_1 and BLR_2A_2 have a common single stack, whose maximum flow rate is 0.841 m^3/s.
		Trichloroethylene, Vinyl Chloride, cis-1,2-Dichloroethylene, trans-1,2-Dichloroethylene	Operating 24 hours a day, 365 days a year, with a maximum design flow rate of [redacted] and a maximum exhaust flow rate of [redacted]

Notes:
- Maximum exhaust flow rates for the comfort heating equipments, were stoichiometrically estimated based on amount of flue gas generated from combusting natural gas in air.
- The maximum exhaust flow rate for the air stripper was acquired from the 2023 ESDM update, prepared by GHD for GE.

Table B.3: Combustion Products Emissions from Comfort Heating, Boilers, and HVAC Units

Existing Operation

Building #	Equipment ID	Description	Natural Gas Rating [1] (BTU/hour)	Natural Gas Consumption rate (scf/hour)	Natural Gas Consumption rate (m^3/hour)	Contaminant	Emission Factor [2] (kg/10^6 m^3)	Emission Rate (g/s)
[redacted]						Nitrogen Oxides	1600.00	6.17E-03
						Nitrogen Oxides	1600.00	6.17E-03
						Nitrogen Oxides	1600.00	2.47E-02
						Nitrogen Oxides	1600.00	4.94E-02
						Nitrogen Oxides	1600.00	1.85E-03
						Nitrogen Oxides	1600.00	1.85E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	4.94E-03
						Nitrogen Oxides	1600.00	4.94E-03
						Nitrogen Oxides	1600.00	4.94E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	1.36E-02
						Nitrogen Oxides	1600.00	6.17E-03
						Nitrogen Oxides	1600.00	6.17E-03
						Nitrogen Oxides	1600.00	6.79E-02
						Nitrogen Oxides	1600.00	6.79E-02
						Nitrogen Oxides	1600.00	4.94E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	1.89E-03
						Nitrogen Oxides	1600.00	1.89E-03
						Nitrogen Oxides	1600.00	1.89E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	1.89E-03
						Nitrogen Oxides	1600.00	1.89E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	4.94E-03

Building #	Equipment ID	Description	Natural Gas Rating [1] (BTU/hour)	Natural Gas Consumption rate (scf/hour)	Natural Gas Consumption rate (m^3/hour)	Contaminant	Emission Factor [2] (kg/10^6 m^3)	Emission Rate (g/s)
[redacted]						Nitrogen Oxides	1600.00	4.94E-03
						Nitrogen Oxides	1600.00	4.94E-03
						Nitrogen Oxides	1600.00	4.94E-03
						Nitrogen Oxides	1600.00	4.94E-03
						Nitrogen Oxides	1600.00	4.94E-03
						Nitrogen Oxides	1600.00	4.32E-03
						Nitrogen Oxides	1600.00	4.32E-03
						Nitrogen Oxides	1600.00	1.85E-03
						Nitrogen Oxides	1600.00	4.32E-03
						Nitrogen Oxides	1600.00	4.32E-03
						Nitrogen Oxides	1600.00	4.32E-03
						Nitrogen Oxides	1600.00	2.47

Building #	Equipment ID	Description	Natural Gas Rating [1] (BTU/hour)	Natural Gas Consumption rate (scf/hour)	Natural Gas Consumption rate (m^3/hour)	Contaminant	Emission Factor [2] (kg/10^6 m^3)	Emission Rate (g/s)
[redacted]						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	1.23E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	3.08E-03
						Nitrogen Oxides	1600.00	4.32E-03
						Nitrogen Oxides	1600.00	4.32E-03
						Nitrogen Oxides	1600.00	1.36E-02
						Nitrogen Oxides	1600.00	1.36E-02
						Nitrogen Oxides	1600.00	3.08E-03
						Nitrogen Oxides	1600.00	3.08E-03
						Nitrogen Oxides	1600.00	3.08E-03
						Nitrogen Oxides	1600.00	3.08E-03
						Nitrogen Oxides	1600.00	3.08E-03
						Nitrogen Oxides	1600.00	3.08E-03
						Nitrogen Oxides	1600.00	4.32E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	9.87E-03
						Nitrogen Oxides	1600.00	1.60E-03
						Nitrogen Oxides	1600.00	1.60E-03
						Nitrogen Oxides	1600.00	1.60E-03
						Nitrogen Oxides	1600.00	1.60E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	3.08E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03

Building #	Equipment ID	Description	Natural Gas Rating [1] (BTU/hour)	Natural Gas Consumption rate (scf/hour)	Natural Gas Consumption rate (m^3/hour)	Contaminant	Emission Factor [2] (kg/10^6 m^3)	Emission Rate (g/s)
[redacted]						Nitrogen Oxides	1600.00	2.47E-03

Building #	Equipment ID	Description	Natural Gas Rating [1] (BTU/hour)	Natural Gas Consumption rate (scf/hour)	Natural Gas Consumption rate (m^3/hour)	Contaminant	Emission Factor [2] (kg/10^6 m^3)	Emission Rate (g/s)
[redacted]						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	2.47E-03
						Nitrogen Oxides	1600.00	3.08E-03
Future Operation								
[redacted]						Nitrogen Oxides	1600.00	6.17E-03
						Nitrogen Oxides	1600.00	6.17E-03
						Nitrogen Oxides	1600.00	2.47E-02
						Nitrogen Oxides	1600.00	4.94E-02

Notes:

- [1] Natural Gas Heat Rating for each equipment is provided by the Client.
- [2] Emission factor for Small Boilers [redacted] of heat input), from Table 1.4-1 of AP-42 was used.
- A natural gas higher heating value os 1020 Btu/scf was used.

Table B.4: Estimated Maximum Emissions for Air Stripper

Source ID	Description	Contaminant	CAS Number	Maximum Detected Concentration [1] (µg/L)	Percent Emitted to Atmosphere (%)	Total Emissions (kg/year)	Emission Rate (g/s)
[redacted]	Air stripper	Trichloroethylene	79-01-6	[redacted]	100	[redacted]	3.00E-03
		Vinyl Chloride	75-01-4	[redacted]	100	[redacted]	1.00E-05
		cis-1,2-Dichloroethylene	156-59-2	[redacted]	100	[redacted]	1.00E-03
		trans-1,2-Dichloroethylene	156-60-5	[redacted]	100	[redacted]	8.00E-05

Air Stripper Operating Schedule

Hours per Day	24
Days per Year	365
Hours per Year	8760

Air Stripper Design Flow Rate

Liters per minute	[redacted]
Maximum Air exhaust (cfm)	[redacted]

Notes:

- [1] Concentrations are based suggested maximums from AECOM, email dated April 19, 2023.

Table B.5: Negligibility Assessment

Existing Operation											
Contaminant Name	CAS Number	Total Facility Emission Rate (g/s)	Equipment ID Closest to the Property Line POI	Description	Distance to Property Line POI (m)	Urban Dispersion Factor ($\mu g/m^3$ per g/s emission)	Site-Specific Emission Threshold (g/s)	Contaminant Emitted in Negligible Amount?	Averaging Period (hours)	MECP POI Limit (µg/m3)	Limiting Effect
Nitrogen Oxides	10102-44-0	9.93E-01	[redacted]	[redacted]	[redacted]	4107.15	[redacted]	No	24	200	Health
Nitrogen Oxides	10102-44-0	9.93E-01				10000.00		No	1	400	Health
Trichloroethylene	79-01-6	3.00E-03				4107.15		No	24	12	Health
Vinyl Chloride	75-01-4	1.00E-05				4107.15		Yes	24	1	Health
cis-1,2-Dichloroethylene	156-59-2	1.00E-03				4107.15		Yes	24	105	Health
trans-1,2-Dichloroethylene	156-60-5	8.00E-05				4107.15		Yes	24	105	Health
Future Operation											
Nitrogen Oxides	10102-44-0	8.64E-02	[redacted]	[redacted]	[redacted]	4107.152724	[redacted]	No	24	200	Health
Nitrogen Oxides	10102-44-0	8.64E-02				10000		No	1	400	Health
Trichloroethylene	79-01-6	3.00E-03				4107.152724		No	24	12	Health
Vinyl Chloride	75-01-4	1.00E-05				4107.152724		Yes	24	1	Health
cis-1,2-Dichloroethylene	156-59-2	1.00E-03				4107.152724		Yes	24	105	Health
trans-1,2-Dichloroethylene	156-60-5	8.00E-05				4107.152724		Yes	24	105	Health

Table B.6: AERMOD Sources and Associated Equipment

Existing Operation									
AERMOD Source ID	Equipment ID	Contaminant	CAS Number	Averaging Period (hour)	Equipment Emission Rate (g/s)	Source Emission Rate (g/s)	Source Type	Coordinate Easting (m)	Coordinate Northing (m)
[redacted]	[redacted]	Nitrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	713109.53	4908149.72
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713134.81	4908108.08
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713096.28	4908129.47
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713035.74	4908256.34
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713054.37	4908234.43
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713074.93	4908261.55
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713096.36	4908073.73
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713084.37	4908100.64
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713071.64	4908131.00
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713063.46	4908158.08
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713056.64	4908180.17
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713036.65	4908200.35
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713017.83	4908236.98
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713076.19	4908013.56
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713066.38	4908038.57
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713060.61	4908073.94
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713044.48	4908110.80
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713027.36	4908142.69
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713018.55	4908166.35
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713005.97	4908188.74
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					

AERMOD Source ID	Equipment ID	Contaminant	CAS Number	Averaging Period (hour)	Equipment Emission Rate (g/s)	Source Emission Rate (g/s)	Source Type	Coordinate Easting (m)	Coordinate Northing (m)
[redacted]	[redacted]	itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712995.66	4908221.71
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	713013.39	4908133.76
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712996.66	4908176.16
		itrogen Oxides	10102-44-0	1, 24			Volume	712971.37	4908230.89
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712934.89	4908211.26
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	713063.85	4908021.66
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24			Volume	713051.90	4908052.23
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24			Volume	713039.82	4908083.95
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24			Volume	713028.37	4908000.02
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	713011.38	4908045.45
		itrogen Oxides	10102-44-0	1, 24	3				
		itrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712993.51	4908091.23
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712952.00	4908140.05
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712943.32	4908168.61
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712958.54	4908106.34
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712995.74	4908006.60
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712985.67	4908034.79
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712974.98	4908061.08
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712965.79	4908085.61
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712947.42	4908110.27
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712939.00	4908136.32
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712929.05	4908162.11
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712914.84	4908193.94
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712903.27	4908114.93
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712893.82	4908141.23
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712881.12	4908174.06
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24					
		itrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712948.18	4907993.02
		itrogen Oxides	10102-44-0	1, 24					

AERMOD Source ID	Equipment ID	Contaminant	CAS Number	Averaging Period (hour)	Equipment Emission Rate (g/s)	Source Emission Rate (g/s)	Source Type	Coordinate Easting (m)	Coordinate Northing (m)
[redacted]	[redacted]	Nitrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	712936.73	4908020.57
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712925.40	4908052.78
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712913.58	4908085.74
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	713272.91	4908168.23
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713256.71	4908162.01
		Nitrogen Oxides	10102-44-0	1, 24			Volume	712903.77	4908067.37
		Nitrogen Oxides	10102-44-0	1, 24			Volume	712931.69	4907982.07
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712891.19	4908095.81
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712859.48	4908173.56
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712881.12	4908085.24
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712868.42	4908119.08
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712860.36	4908145.00
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712847.03	4908169.41
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712848.66	4908070.90
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712832.18	4908095.43
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712820.10	4908125.37
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712809.16	4908155.44
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712920.50	4907970.37
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712913.58	4908002.45
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712904.77	4908027.61
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712892.95	4908057.05
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712893.58	4907957.28
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712886.53	4907981.94
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712866.90	4908002.83
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	712853.06	4908043.09
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Point	713231.62	4908216.72
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	713107.08	4908039.27
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	713144.51	4908051.63
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	713113.69	4908084.55
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24		[redacted]	Volume	713191.30	4908160.03

AERMOD Source ID	Equipment ID	Contaminant	CAS Number	Averaging Period (hour)	Equipment Emission Rate (g/s)	Source Emission Rate (g/s)	Source Type	Coordinate Easting (m)	Coordinate Northing (m)
[redacted]	[redacted]	Nitrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]			
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713168.02	4908216.52
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713151.92	4908215.76
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713118.96	4908265.58
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Point	713110.66	4908286.97
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713125.75	4908199.65
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713146.01	4908144.68
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713194.07	4908074.74
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713092.30	4908211.48
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24					
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713164.00	4908180.29
		Nitrogen Oxides	10102-44-0	1, 24					
		Trichloroethylene	79-01-6	24			Point	713094.73	4908023.40
Future Operation									
[redacted]	[redacted]	Nitrogen Oxides	10102-44-0	1, 24	[redacted]	[redacted]	Volume	713272.91	4908168.23
		Nitrogen Oxides	10102-44-0	1, 24			Volume	713256.71	4908162.01
		Nitrogen Oxides	10102-44-0	1, 24			Point	713231.62	4908216.72
		Nitrogen Oxides	10102-44-0	1, 24					
		Trichloroethylene	79-01-6	24			Point	713100.14	4908023.18

B.7 ASHRAE Assessment

Nox Emissions Assessment						
Exhaust Information	**Units**	**HTR_22_NW_6**	**HTR_22_NW_7**	**HTR_22_NW_8**	**HTR_22_NW_9**	**HTR_22_NW_10**
Exhaust flowrate	m^3/s	2.80E-02	2.80E-02	2.80E-02	2.80E-02	3.50E-02
Emission Rate, m	g/s	2.47E-03	2.47E-03	2.47E-03	2.47E-03	3.08E-03
Contaminant mass concentration in exhaust, C_e	g/m^3	0.088	0.088	0.088	0.088	0.088
Exhaust Exit Velocity, V_e	m/s	3.5	3.5	3.5	3.5	2.8
Outlet Air Temperature	°C	200.0	200.0	200.0	200.0	200.0
Exhaust Diameter, d_e	m	0.102	0.102	0.102	0.102	0.127
Exhaust Height Above Roof, hs	m	1.00	1.00	1.00	1.00	1.00
Building Height, z	m	8.5	8.5	8.5	8.5	8.5
Downwind Distance from Exhaust to Intake, x	m	22.60	10.00	13.50	26.60	44.50
Capping factor, β		0	0	0	0	0
height of highest intake, active obstacle, or recirculation zone, h_{top}	m	0.00	0.00	0.00	0.00	0.00
z_0	m	1	1	1	1	1
n		0.24	0.24	0.24	0.24	0.24

Parameters:

U_H	mean wind speed at height H of upwind wall in undisturbed flow approaching building (Equation 7)
σ_0	standard deviation of initial plume spread at the exhaust used to account for initial dilution (Equation 20)
i_y, u_y, j_y	Equation 22
z	vertical distance, m
$i_y x$	Equation 20
$i_z x$	Equation 21
σ_y	Equation 20
σ_z	Equation 21
h_D	downwash correction to be subtracted from stack height (Equation 9)
β_j	jet re-entrainment coefficient
x	downwind horizontal distance from centre of stack (Equations 20 and 21)

equation numbering per 2019 ASHRAE Handbook - HVAC Applications (SI) Chapter 46: Building Air Intake and Exhaust Design

[redacted]	*96.69 µg/m^3 (1-hour)*	*39.71 µg/m^3 (24-hour)*

stack wake downwash adjustment; jet entrainment coefficient; Logarithmic wind profile; Momentum Flux m^4/s^2; plume rise v. distance; plume rise for uncapped stack; hplume -htop if hplume-dhtop = 0; Dr- Roof-Level Dilution Estimation Method

[redacted]

z_0= 1 m n= 0.24

Parameter	U_H	δ_s	i_y	i_z	i_r	$i_y x$	$i_z x$	σ_0	σ_y	σ_z	Ve/U_H	h_s	β_j	U_H/U_s	F_{ns}	$3F_{ns}X$	$\beta_j^2/3^2_s$	h_s	$F_{ns}U_H/U^4$	$U_H\beta_j$	h_t	βh_s	βh_t	h_r	h_{plume}	ζ	ζ^2	$2\sigma_z^2$	$\zeta^2/(2\sigma z^2)$	$\exp(\zeta^2/2\sigma z^2)$	$4U_H\sigma_y\sigma_z$	$V_r d^2_e$	D_r	(15-min)	D_r (1-hr)	1-hr C (µg/m³)	24-hr C (µg/m³)
Unit:	(m/s)	(m)	(-)	(-)	(-)	(m)	(m)	(m)	(m)																													
	1	0.04	0.38	0.29	0.19	6.47	4.31	6.47	4.31	3.5	0.00	0.62	5.35	0.0309	2.1	0.4	1.75	0.17	0.62	0.59	0.00	0.00	0.00	1.00	1.00	1.00	37.16	0.03	1.03E+00	111.47	0.04	3.E+03	4.E+03	20.8	8.5
	2	0.04	0.38	0.29	0.19	6.47	4.31	6.47	4.31	1.7	0.30	0.91	5.35	0.0309	2.1	3.3	0.86	0.17	1.82	0.20	0.00	0.00	0.00	0.70	0.70	0.48	37.16	0.01	1.01E+00	222.94	0.04	6.E+03	8.E+03	10.5	4.3
	3	0.04	0.38	0.29	0.19	6.47	4.31	6.47	4.31	1.2	0.30	1.20	5.35	0.0309	2.1	13.0	0.54	0.17	3.60	0.10	0.00	0.00	0.00	0.70	0.70	0.48	37.16	0.01	1.01E+00	334.41	0.04	9.E+03	1.E+04	7.0	2.9
	4	0.04	0.38	0.29	0.19	6.47	4.31	6.47	4.31	0.9	0.30	1.49	5.35	0.0309	2.1	35.5	0.39	0.17	5.96	0.06	0.00	0.00	0.00	0.70	0.70	0.48	37.16	0.01	1.01E+00	445.88	0.04	1.E+04	2.E+04	5.3	2.2
	5	0.04	0.38	0.29	0.19	6.47	4.31	6.47	4.31	0.7	0.30	1.78	5.35	0.0309	2.1	79.1	0.30	0.17	8.90	0.04	0.00	0.00	0.00	0.70	0.70	0.48	37.16	0.01	1.01E+00	557.35	0.04	2.E+04	2.E+04	4.2	1.7
	6	0.04	0.38	0.29	0.19	6.47	4.31	6.47	4.31	0.6	0.30	2.07	5.35	0.0309	2.1	154.0	0.24	0.17	12.41	0.03	0.00	0.00	0.00	0.70	0.70	0.48	37.16	0.01	1.01E+00	668.82	0.04	2.E+04	3.E+04	3.5	1.4
	7	0.04	0.38	0.29	0.19	6.47	4.31	6.47	4.31	0.5	0.30	2.36	5.35	0.0309	2.1	272.4	0.20	0.17	16.50	0.02	0.00	0.00	0.00	0.70	0.70	0.48	37.16	0.01	1.01E+00	780.30	0.04	2.E+04	3.E+04	3.0	1.2
	8	0.04	0.38	0.29	0.19	6.47	4.31	6.47	4.31	0.4	0.30	2.65	5.35	0.0309	2.1	448.4	0.17	0.17	21.17	0.02	0.00	0.00	0.00	0.70	0.70	0.48	37.16	0.01	1.01E+00	891.77	0.04	3.E+04	3.E+04	2.6	1.1
	9	0.04	0.38	0.29	0.19	6.47	4.31	6.47	4.31	0.4	0.30	2.94	5.35	0.0309	2.1	698.2	0.14	0.17	26.42	0.01	0.00	0.00	0.00	0.70	0.70	0.48	37.16	0.01	1.01E+00	1003.24	0.04	3.E+04	4.E+04	2.3	1.0
	10	0.04	0.38	0.29	0.19	6.47	4.31	6.47	4.31	0.3	0.30	3.23	5.35	0.0309	2.1	1040.2	0.13	0.17	32.25	0.01	0.00	0.00	0.00	0.70	0.70	0.48	37.16	0.01	1.01E+00	1114.71	0.04	3.E+04	4.E+04	2.1	0.9
	11	0.04	0.38	0.29	0.19	6.47	4.31	6.47	4.31	0.3	0.30	3.51	5.35	0.0309	2.1	1494.4	0.11	0.17	38.66	0.01	0.00	0.00	0.00	0.70	0.70	0.48	37.16	0.01	1.01E+00	1226.18	0.04	3.E+04	5.E+04	1.9	0.8
																																				Maximum Concentration (µg/m³)		***10.4***	***4.3***

Note: Maximum concentration is divided by 2, since the receptor intake is not at the same height of exhaust.

[redacted]

z_0= 1 m n= 0.24

Parameter	U_H	δ_s	i_y	i_z	i_r	$i_y x$	$i_z x$	σ_0	σ_y	σ_z	Ve/U_H	h_s	β_j	U_H/U_s	F_{ns}	$3F_{ns}X$	$\beta_j^2/3^2_s$	h_s	$F_{ns}U_H/U^4$	$U_H\beta_j$	h_t	βh_s	βh_t	h_r	h_{plume}	ζ	ζ^2	$2\sigma_z^2$	$\zeta^2/(2\sigma z^2)$	$\exp(\zeta^2/2\sigma z^2)$	$4U_H\sigma_y\sigma_z$	$V_r d^2_e$	D_r	(15-min)	D_r (1-hr)	1-hr C (µg/m³)	24-hr C (µg/m³)
Unit:	(m/s)	(m)	(-)	(-)	(-)	(m)	(m)	(m)	(m)																													
	1	0.04	0.38	0.29	0.19	2.86	1.91	2.86	1.91	3.5	0.00	0.62	5.35	0.0309	0.9	0.4	1.34	0.17	0.62	0.59	0.00	0.00	0.00	1.00	1.00	1.00	7.28	0.14	1.15E+00	21.83	0.04	7.E+02	9.E+02	95.1	39.0
	2	0.04	0.38	0.29	0.19	2.86	1.91	2.86	1.91	1.7	0.30	0.91	5.35	0.0309	0.9	3.3	0.65	0.17	1.82	0.20	0.00	0.00	0.00	0.70	0.70	0.48	7.28	0.07	1.07E+00	43.66	0.04	1.E+03	2.E+03	51.0	21.0
	3	0.04	0.38	0.29	0.19	2.86	1.91	2.86	1.91	1.2	0.30	1.20	5.35	0.0309	0.9	13.0	0.41	0.17	3.60	0.10	0.00	0.00	0.00	0.70	0.70	0.48	7.28	0.07	1.07E+00	65.49	0.04	2.E+03	3.E+03	34.0	14.0
	4	0.04	0.38	0.29	0.19	2.86	1.91	2.86	1.91	0.9	0.30	1.49	5.35	0.0309	0.9	35.5	0.30	0.17	5.96	0.06	0.00	0.00	0.00	0.70	0.70	0.48	7.28	0.07	1.07E+00	87.32	0.04	3.E+03	3.E+03	25.5	10.5
	5	0.04	0.38	0.29	0.19	2.86	1.91	2.86	1.91	0.7	0.30	1.78	5.35	0.0309	0.9	79.1	0.23	0.17	8.90	0.04	0.00	0.00	0.00	0.70	0.70	0.48	7.28	0.07	1.07E+00	109.14	0.04	3.E+03	4.E+03	20.4	8.4
	6	0.04	0.38	0.29	0.19	2.86	1.91	2.86	1.91	0.6	0.30	2.07	5.35	0.0309	0.9	154.0	0.18	0.17	12.41	0.03	0.00	0.00	0.00	0.70	0.70	0.48	7.28	0.07	1.07E+00	130.97	0.04	4.E+03	5.E+03	17.0	7.0
	7	0.04	0.38	0.29	0.19	2.86	1.91	2.86	1.91	0.5	0.30	2.36	5.35	0.0309	0.9	272.4	0.15	0.17	16.50	0.02	0.00	0.00	0.00	0.70	0.70	0.48	7.28	0.07	1.07E+00	152.80	0.04	5.E+03	6.E+03	14.6	6.0
	8	0.04	0.38	0.29	0.19	2.86	1.91	2.86	1.91	0.4	0.30	2.65	5.35	0.0309	0.9	448.4	0.13	0.17	21.17	0.02	0.00	0.00	0.00	0.70	0.70	0.48	7.28	0.07	1.07E+00	174.63	0.04	5.E+03	7.E+03	12.8	5.2
	9	0.04	0.38	0.29	0.19	2.86	1.91	2.86	1.91	0.4	0.30	2.94	5.35	0.0309	0.9	698.2	0.11	0.17	26.42	0.01	0.00	0.00	0.00	0.70	0.70	0.48	7.28	0.07	1.07E+00	196.46	0.04	6.E+03	8.E+03	11.3	4.7
	10	0.04	0.38	0.29	0.19	2.86	1.91	2.86	1.91	0.3	0.30	3.23	5.35	0.0309	0.9	1040.2	0.10	0.17	32.25	0.01	0.00	0.00	0.00	0.70	0.70	0.48	7.28	0.07	1.07E+00	218.29	0.04	7.E+03	9.E+03	10.2	4.2
	11	0.04	0.38	0.29	0.19	2.86	1.91	2.86	1.91	0.3	0.30	3.51	5.35	0.0309	0.9	1494.4	0.09	0.17	38.66	0.01	0.00	0.00	0.00	0.70	0.70	0.48	7.28	0.07	1.07E+00	240.12	0.04	7.E+03	9.E+03	9.3	3.8
																																				Maximum Concentration (µg/m³)		***47.5***	***19.5***

Note: Maximum concentration is divided by 2, since the receptor intake is not at the same height of exhaust.

[redacted]

z_0= 1 m n= 0.24

Parameter	U_H	δ_s	i_y	i_z	i_r	$i_y x$	$i_z x$	σ_0	σ_y	σ_z	Ve/U_H	h_s	β_j	U_H/U_s	F_{ns}	$3F_{ns}X$	$\beta_j^2/3^2_s$	h_s	$F_{ns}U_H/U^4$	$U_H\beta_j$	h_t	βh_s	βh_t	h_r	h_{plume}	ζ	ζ^2	$2\sigma_z^2$	$\zeta^2/(2\sigma z^2)$	$\exp(\zeta^2/2\sigma z^2)$	$4U_H\sigma_y\sigma_z$	$V_r d^2_e$	D_r	(15-min)	D_r (1-hr)	1-hr C (µg/m³)	24-hr C (µg/m³)
Unit:	(m/s)	(m)	(-)	(-)	(-)	(m)	(m)	(m)	(m)																													
	1	0.04	0.38	0.29	0.19	3.86	2.57	3.86	2.57	3.5	0.00	0.62	5.35	0.0309	1.2	0.4	1.48	0.17	0.62	0.59	0.00	0.00	0.00	1.00	1.00	1.00	13.26	0.08	1.08E+00	39.78	0.04	1.E+03	2.E+03	55.5	22.8
	2	0.04	0.38	0.29	0.19	3.86	2.57	3.86	2.57	1.7	0.30	0.91	5.35	0.0309	1.2	3.3	0.72	0.17	1.82	0.20	0.00	0.00	0.00	0.70	0.70	0.48	13.26	0.04	1.04E+00	79.56	0.04	2.E+03	3.E+03	28.9	11.9
	3	0.04	0.38	0.29	0.19	3.86	2.57	3.86	2.57	1.2	0.30	1.20	5.35	0.0309	1.2	13.0	0.46	0.17	3.60	0.10	0.00	0.00	0.00	0.70	0.70	0.48	13.26	0.04	1.04E+00	119.34	0.04	3.E+03	5.E+03	19.2	7.9
	4	0.04	0.38	0.29	0.19	3.86	2.57	3.86	2.57	0.9	0.30	1.49	5.35	0.0309	1.2	35.5	0.33	0.17	5.96	0.06	0.00	0.00	0.00	0.70	0.70	0.48	13.26	0.04	1.04E+00	159.11	0.04	5.E+03	6.E+03	14.4	5.9
	5	0.04	0.38	0.29	0.19	3.86	2.57	3.86	2.57	0.7	0.30	1.78	5.35	0.0309	1.2	79.1	0.25	0.17	8.90	0.04	0.00	0.00	0.00	0.70	0.70	0.48	13.26	0.04	1.04E+00	198.89	0.04	6.E+03	8.E+03	11.5	4.7
	6	0.04	0.38	0.29	0.19	3.86	2.57	3.86	2.57	0.6	0.30	2.07	5.35	0.0309	1.2	154.0	0.20	0.17	12.41	0.03	0.00	0.00	0.00	0.70	0.70	0.48	13.26	0.04	1.04E+00	238.67	0.04	7.E+03	9.E+03	9.6	4.0
	7	0.04	0.38	0.29	0.19	3.86	2.57	3.86	2.57	0.5	0.30	2.36	5.35	0.0309	1.2	272.4	0.17	0.17	16.50	0.02	0.00	0.00	0.00	0.70	0.70	0.48	13.26	0.04	1.04E+00	278.45	0.04	8.E+03	1.E+04	8.2	3.4
	8	0.04	0.38	0.29	0.19	3.86	2.57	3.86	2.57	0.4	0.30	2.65	5.35	0.0309	1.2	448.4	0.14	0.17	21.17	0.02	0.00	0.00	0.00	0.70	0.70	0.48	13.26	0.04	1.04E+00	318.23	0.04	9.E+03	1.E+04	7.2	3.0
	9	0.04	0.38	0.29	0.19	3.86	2.57	3.86	2.57	0.4	0.30	2.94	5.35	0.0309	1.2	698.2	0.12	0.17	26.42	0.01	0.00	0.00	0.00	0.70	0.70	0.48	13.26	0.04	1.04E+00	358.01	0.04	1.E+04	1.E+04	6.4	2.6
	10	0.04	0.38	0.29	0.19	3.86	2.57	3.86	2.57	0.3	0.30	3.23	5.35	0.0309	1.2	1040.2	0.11	0.17	32.25	0.01	0.00	0.00	0.00	0.70	0.70	0.48	13.26	0.04	1.04E+00	397.79	0.04	1.E+04	2.E+04	5.8	2.4
	11	0.04	0.38	0.29	0.19	3.86	2.57	3.86	2.57	0.3	0.30	3.51	5.35	0.0309	1.2	1494.4	0.09	0.17	38.66	0.01	0.00	0.00	0.00	0.70	0.70	0.48	13.26	0.04	1.04E+00	437.57	0.04	1.E+04	2.E+04	5.2	2.2
																																				Maximum Concentration (µg/m³)		***27.8***	***11.4***

Note: Maximum concentration is divided by 2, since the receptor intake is not at the same height of exhaust.

[redacted]

z_0= 1 m n= 0.24

Parameter	U_H	δ_s	i_y	i_z	i_r	$i_y x$	$i_z x$	σ_0	σ_y	σ_z	Ve/U_H	h_s	β_j	U_H/U_s	F_{ns}	$3F_{ns}X$	$\beta_j^2/3^2_s$	h_s	$F_{ns}U_H/U^4$	$U_H\beta_j$	h_t	βh_s	βh_t	h_r	h_{plume}	ζ	ζ^2	$2\sigma_z^2$	$\zeta^2/(2\sigma z^2)$	$\exp(\zeta^2/2\sigma z^2)$	$4U_H\sigma_y\sigma_z$	$V_r d^2_e$	D_r	(15-min)	D_r (1-hr)	1-hr C (µg/m³)	24-hr C (µg/m³)
Unit:	(m/s)	(m)	(-)	(-)	(-)	(m)	(m)	(m)	(m)																													
	1	0.04	0.38	0.29	0.19	7.61	5.07	7.61	5.07	3.5	0.00	0.62	5.35	0.0309	2.5	0.4	1.85	0.17	0.62	0.59	0.00	0.00	0.00	1.00	1.00	1.00	51.47	0.02	1.02E+00	154.42	0.04	4.E+03	6.E+03	15.1	6.2
	2	0.04	0.38	0.29	0.19	7.61	5.07	7.61	5.07	1.7	0.30	0.91	5.35	0.0309	2.5	3.3	0.90	0.17	1.82	0.20	0.00	0.00	0.00	0.70	0.70	0.48	51.47	0.01	1.01E+00	308.84	0.04	9.E+03	1.E+04	7.6	3.1
	3	0.04	0.38	0.29	0.19	7.61	5.07	7.61	5.07	1.2	0.30	1.20	5.35	0.0309	2.5	13.0	0.57	0.17	3.60	0.10	0.00	0.00	0.00	0.70	0.70	0.48	51.47	0.01	1.01E+00	463.26	0.04	1.E+04	2.E+04	5.1	2.1
	4	0.04	0.38	0.29	0.19	7.61	5.07	7.61	5.07	0.9	0.30	1.49	5.35	0.0309	2.5	35.5	0.41	0.17	5.96	0.06	0.00	0.00	0.00	0.70	0.70	0.48	51.47	0.01	1.01E+00	617.68	0.04	2.E+04	2.E+04	3.8	1.6
	5	0.04	0.38	0.29	0.19	7.61	5.07	7.61	5.07	0.7	0.30	1.78	5.35	0.0309	2.5	79.1	0.31	0.17	8.90	0.04	0.00	0.00	0.00	0.70	0.70	0.48	51.47	0.01	1.01E+00	772.10	0.04	2.E+04	3.E+04	3.1	1.3
	6	0.04	0.38	0.29	0.19	7.61	5.07	7.61	5.07	0.6	0.30	2.07	5.35	0.0309	2.5	154.0	0.25	0.17	12.41	0.03	0.00	0.00	0.00	0.70	0.70	0.48	51.47	0.01	1.01E+00	926.52	0.04	3.E+04	3.E+04	2.5	1.0
	7	0.04	0.38	0.29	0.19	7.61	5.07	7.61	5.07	0.5	0.30	2.36	5.35	0.0309	2.5	272.4	0.21	0.17	16.50	0.02	0.00	0.00	0.00	0.70	0.70	0.48	51.47	0.01	1.01E+00	1080.94	0.04	3.E+04	4.E+04	2.2	0.9
	8	0.04	0.38	0.29	0.19	7.61	5.07	7.61	5.07	0.4	0.30	2.65	5.35	0.0309	2.5	448.4	0.18	0.17	21.17	0.02	0.00	0.00	0.00	0.70	0.70	0.48	51.47	0.01	1.01E+00	1235.35	0.04	3.E+04	5.E+04	1.9	0.8
	9	0.04	0.38	0.29	0.19	7.61	5.07	7.61	5.07	0.4	0.30	2.94	5.35	0.0309	2.5	698.2	0.15	0.17	26.42	0.01	0.00	0.00	0.00	0.70	0.70	0.48	51.47	0.01	1.01E+00	1389.77	0.04	4.E+04	5.E+04	1.7	0.7
	10	0.04	0.38	0.29	0.19	7.61	5.07	7.61	5.07	0.3	0.30	3.23	5.35	0.0309	2.5	1040.2	0.13	0.17	32.25	0.01	0.00	0.00	0.00	0.70	0.70	0.48	51.47	0.01	1.01E+00	1544.19	0.04	4.E+04	6.E+04	1.5	0.6
	11	0.04	0.38	0.29	0.19	7.61	5.07	7.61	5.07	0.3	0.30	3.51	5.35	0.0309	2.5	1494.4	0.12	0.17	38.66	0.01	0.00	0.00	0.00	0.70	0.70	0.48	51.47	0.01	1.01E+00	1698.61	0.04	5.E+04	6.E+04	1.4	0.6
																																				Maximum Concentration (µg/m³)		***7.6***	***3.1***

Note: Maximum concentration is divided by 2, since the receptor intake is not at the same height of exhaust.

[redacted]

z_0= 1 m n= 0.24

Parameter	U_H	δ_s	i_y	i_z	i_r	$i_y x$	$i_z x$	σ_0	σ_y	σ_z	Ve/U_H	h_s	β_j	U_H/U_s	F_{ns}	$3F_{ns}X$	$\beta_j^2/3^2_s$	h_s	$F_{ns}U_H/U^4$	$U_H\beta_j$	h_t	βh_s	βh_t	h_r	h_{plume}	ζ	ζ^2	$2\sigma_z^2$	$\zeta^2/(2\sigma z^2)$	$\exp(\zeta^2/2\sigma z^2)$	$4U_H\sigma_y\sigma_z$	$V_r d^2_e$	D_r	(15-min)	D_r (1-hr)	1-hr C (µg/m³)	24-hr C (µg/m³)
Unit:	(m/s)	(m)	(-)	(-)	(-)	(m)	(m)	(m)	(m)																													
	1	0.04	0.38	0.29	0.19	12.73	8.49	12.73	8.49	2.8	0.38	0.69	5.35	0.0309	4.1	0.5	2.04	0.17	0.69	0.53	0.00	0.00	0.00	0.62	0.62	0.38	144.06	0.00	1.00E+00	432.17	0.04	1.E+04	1.E+04	6.9	2.8
	2	0.04	0.38	0.29	0.19	12.73	8.49	12.73	8.49	1.4	0.38	1.06	5.35	0.0309	4.1	4.5	0.97	0.17	2.11	0.17	0.00	0.00	0.00	0.62	0.62	0.38	144.06	0.00	1.00E+00	864.33	0.04	2.E+04	3.E+04	3.4	1.4
	3	0.04	0.38	0.29	0.19	12.73	8.49	12.73	8.49	0.9	0.38	1.42	5.35	0.0309	4.1	18.1	0.61	0.17	4.25	0.09	0.00	0.00	0.00	0.62	0.62	0.38	144.06	0.00	1.00E+00	1296.50	0.04	3.E+04	4.E+04	2.3	0.9
	4	0.04	0.38	0.29	0.19	12.73	8.49	12.73	8.49	0.7	0.38	1.78	5.35	0.0309	4.1	50.7	0.43	0.17	7.12	0.05	0.00	0.00	0.00	0.62	0.62	0.38	144.06	0.00	1.00E+00	1728.67	0.04	4.E+04	5.E+04	1.7	0.7
	5	0.04	0.38	0.29	0.19	12.73	8.49	12.73	8.49	0.6	0.38	2.14	5.35	0.0309	4.1	114.6	0.33	0.17	10.70	0.03	0.00	0.00	0.00	0.62	0.62	0.38	144.06	0.00	1.00E+00	2160.84	0.04	5.E+04	6.E+04	1.4	0.6
	6	0.04	0.38	0.29	0.19	12.73	8.49	12.73	8.49	0.5	0.38	2.50	5.35	0.0309	4.1	225.4	0.26	0.17	15.01	0.02	0.00	0.00	0.00	0.62	0.62	0.38	144.06	0.00	1.00E+00	2593.00	0.04	6.E+04	8.E+04	1.1	0.5
	7	0.04	0.38	0.29	0.19	12.73	8.49	12.73	8.49	0.4	0.38	2.86	5.35	0.0309	4.1	401.8	0.22	0.17	20.05	0.02	0.00	0.00	0.00	0.62	0.62	0.38	144.06	0.00	1.00E+00	3025.17	0.04	7.E+04	9.E+04	1.0	0.4
	8	0.04	0.38	0.29	0.19	12.73	8.49	12.73	8.49	0.3	0.38	3.23	5.35	0.0309	4.1	665.7	0.18	0.17	25.80	0.01	0

Appendix C – Zoning Maps, Building Details and Heights

C.1 Zoning Maps



0 50 100 200 300 400 500 600

Metres

peterborough

Map No. 18

The map is current to: Dec 31, 2021

Map Accuracy and Interpretation

The information depicted on this hardcopy or digital map file is schematic in nature. Accurate interpretation of information shown, should be obtained from appropriate City staff.

Key Map 18

Consolidation Date: Dec 31, 2021

ByLaw No	Date Updated	File No	From Zoning	To Zoning	Location
1973-112	9/4/1979	Z-241-8	R.1,R.2	C.1	Lake St
1974-176	12/9/1974	Z-403	M.2	SP.59	Park St N
1976-046	3/15/1976	Z-251-9	R.1-R.2	R.3	Crescent St
1976-095	6/21/1976	Z-504	R.1,R.2,R.3,R.4	C.4	60-62 Lansdowne St
1977-039	3/7/1977	Z-512	R.1,R.2,R.3	R.4,2j	Bethune St
1978-035	3/20/1978	Z-543	C.1 & R.1, R.2	SP.100	242 Romaine St
1978-088	6/19/1978	Z-385	C.5	SP.107	431 George St S
1979-096	8/27/1979	Z-635	SP.68	SP.127,R.1,R.2,R.3,R.4	68 Lansdowne St W
1979-097	8/27/1979	Z-492	R.1,R.2,R.3	C.6	Dalhousie St
1980-017	2/4/1980	Z-671	C.4 & M.1	SP.141	George St & Sherbrooke St
1980-057	5/20/1980	Z-677	M.2	SP.146	294 Rink St
1980-097	9/2/1980	Z-688	R.1,R.2	SP.100	Romaine St
1981-014	2/2/1981	Z-702	C.4	SP.159	129 Aylmer St N
1981-067	5/19/1981	Z-706	R.1,R.2	SP.169	198-200 Lake St
1981-076	6/22/1981	Z-694	C.4; R.4	R.4; R.4,SP.172; SP.172	Townsend St
1981-139	10/5/1981	Z-725	C.1	SP.182	337 George St S
1982-103	7/5/1982	Z-760	C.5	C.50	215 Sherbrooke St
1982-172	11/22/1982	Z-291	C.4; C.5	C.4-1; C.5-1	City Wide
1983-045	4/18/1983	Z-734	PS	SP.198	Aylmer St N
1985-087	5/21/1985	Z-849	SP.68	C.4; SP.211	Princess St
1985-150	9/3/1985	Z-842	R.1,R.2	SP.76	2 George St N
1986-097	6/16/1986	Z-888	R.1,R.2	R.1,1o,2o,R.2,SP.222	340 George St N
1986-100	6/16/1986	Z-883	R.1,R.2	SP.224,R.1,R.2	438 George St S
1987-247	12/7/1987	Z-962	C.5	C.5-28	219 Sherbrooke St
1988-014	1/17/1988	Z-954	R.1,R.2	SP.224;R.1,R.2	450 George St S
1988-167	8/2/1988	Z8831	C.1	C.1-46	George St S
1988-287	11/21/1988	Z87984	R.1,R.2,R.3,R.4	R.1,R.2,R.3-34,R.4	187-189 Aylmer St
1989-158	6/19/1989	Z8928	R.1,R.2	C.4-62	99 Aylmer St

Key Map 18

Consolidation Date: Dec 31, 2021

ByLaw No	Date Updated	File No	From Zoning	To Zoning	Location
1989-160	6/19/1989	Z8916	SP.6	SP.224,R.2,R.1	438 George St S
1989-193	7/17/1989	Z8920	C.6	C.50	George St N
1990-238	8/27/1990	Z9032	R.1,R.2	SP.241	83 Aylmer St N
1990-346	11/4/1990	Z9039	SP.241,6a "H"	SP.241,6a	193 Aylmer St N
1991-045	2/18/1991	Z8970	R.1,R.2,R.3	R.4,3q,8b-81	846 Haggart St
1991-278	10/28/1991	Z9112	R.1,R.2,R.3	SP.249	182-190 Rubidge St
1992-073	4/13/1992	Z9136	R.1,R.2,R.3	SP.241	192 Aylmer St N
1993-009	1/11/1993	Z9203	PS	R.1,R.2	154 Lock St
1993-081	4/26/1993	Z9304	R.1,R.2	R.6	169 Lake St
1993-095	5/17/1993	Z9307	R.1,R.2	SP.258	11 Bethune St
1995-030	2/13/1995	Z9421	C.4	C.4-121	16 Lansdowne St W
1995-033	2/13/1995	Z9410	SP.131; SP.131 "H"	C.6; SP.131	139 George St N
1996-083	6/17/1996	Z9601	C.5-1-122-H	C.5-1-122	405 George St S
1996-138	10/7/1996	Z9610	M.1; M.1-112-127, M.2; M.2; SP.128	M3.2; M3.2-127; M3.4; R.1,R.2,R.3; SP.112-67; SP.268	100 Rubidge St, City Wide
1997-011	1/20/1997	Z9605	SP.275 "H"	SP.275	88 Lansdowne St W
1997-124	10/27/1997	Z9712	SP.141	SP.141	230 George St N
2000-062	5/8/2000	Z0004	R.1, R.2	R.1,R.2-160	257 Lake St
2000-114	10/2/2000	Z9924	C.4; C.6 & OS.3; OS.2; OS.3; OS.3 & C.4 & C.5 & C.2 & R.2 & PS; OS.3 & C.6; PS; R.1, R.2, R.3 & OS.3; R.1, R.2, R.3, R.4	OS.2; OS.3; PS.2	City Wide
2001-004	12/18/2000	Z0035	R.1, R.2, R.3, R.4	SP.302	225 Stewart St
2001-005	12/18/2000	Z0031	SP.74	C.5-173-H	187 Sherbrooke St
2001-053	4/17/2001	Z0039	R.1, R.2; SP.17; SP. 17-41	SP.17-H	Lansdowne St W, Park St S
2001-146	10/29/2001	Z0110	C.50	C.50-181	171 Rink St
2002-177	12/9/2002	Z0103	SP.268-176-H	SP.268-176	10 Lansdowne St W
2005-181	8/8/2005	Z0503	R.1,R.2,R.3	SP.241-H	188 Dalhousie St
2006-194	12/11/2006	Z0318	SP.237-H	SP.237	412 George St S

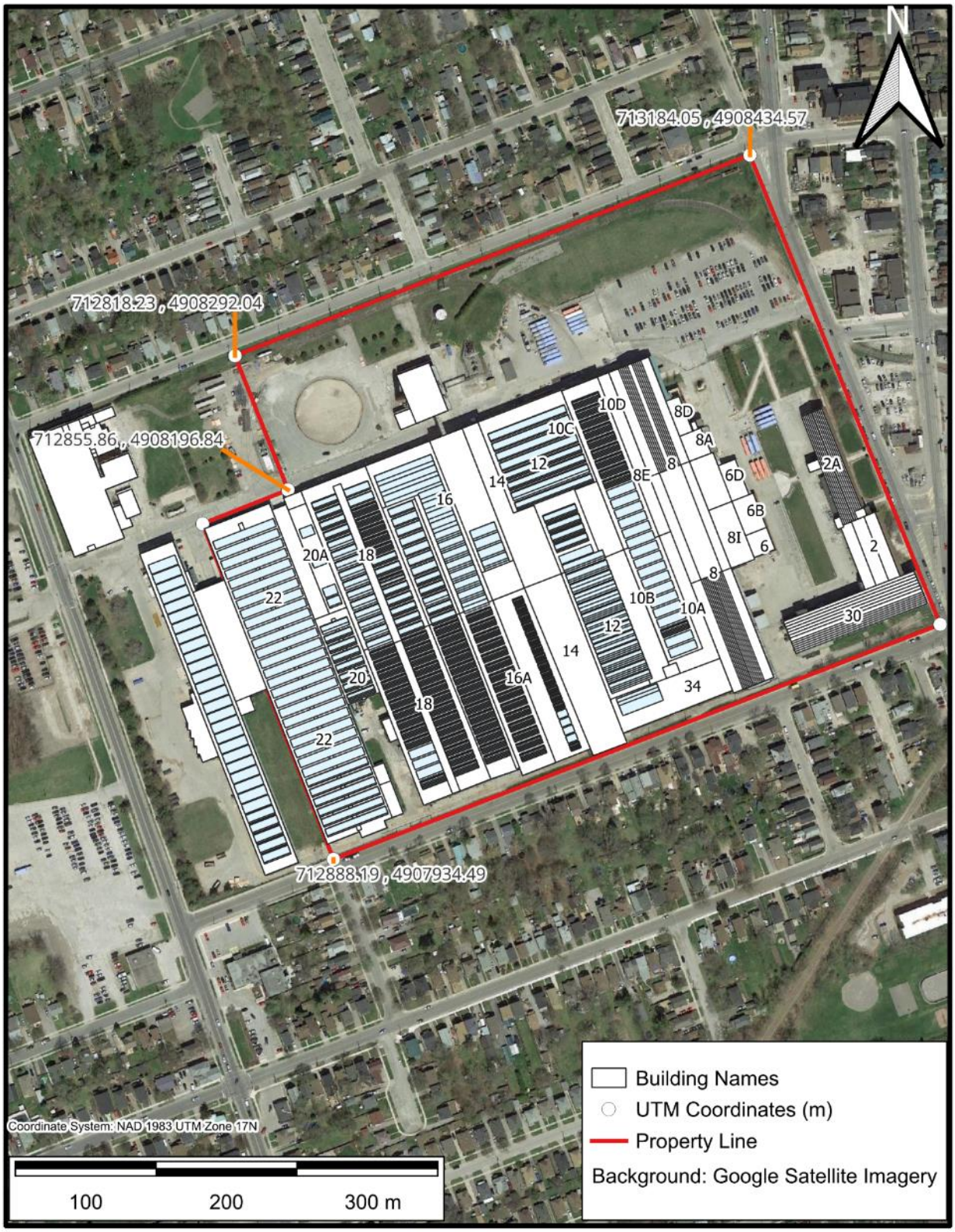
Key Map 18

Consolidation Date: Dec 31, 2021

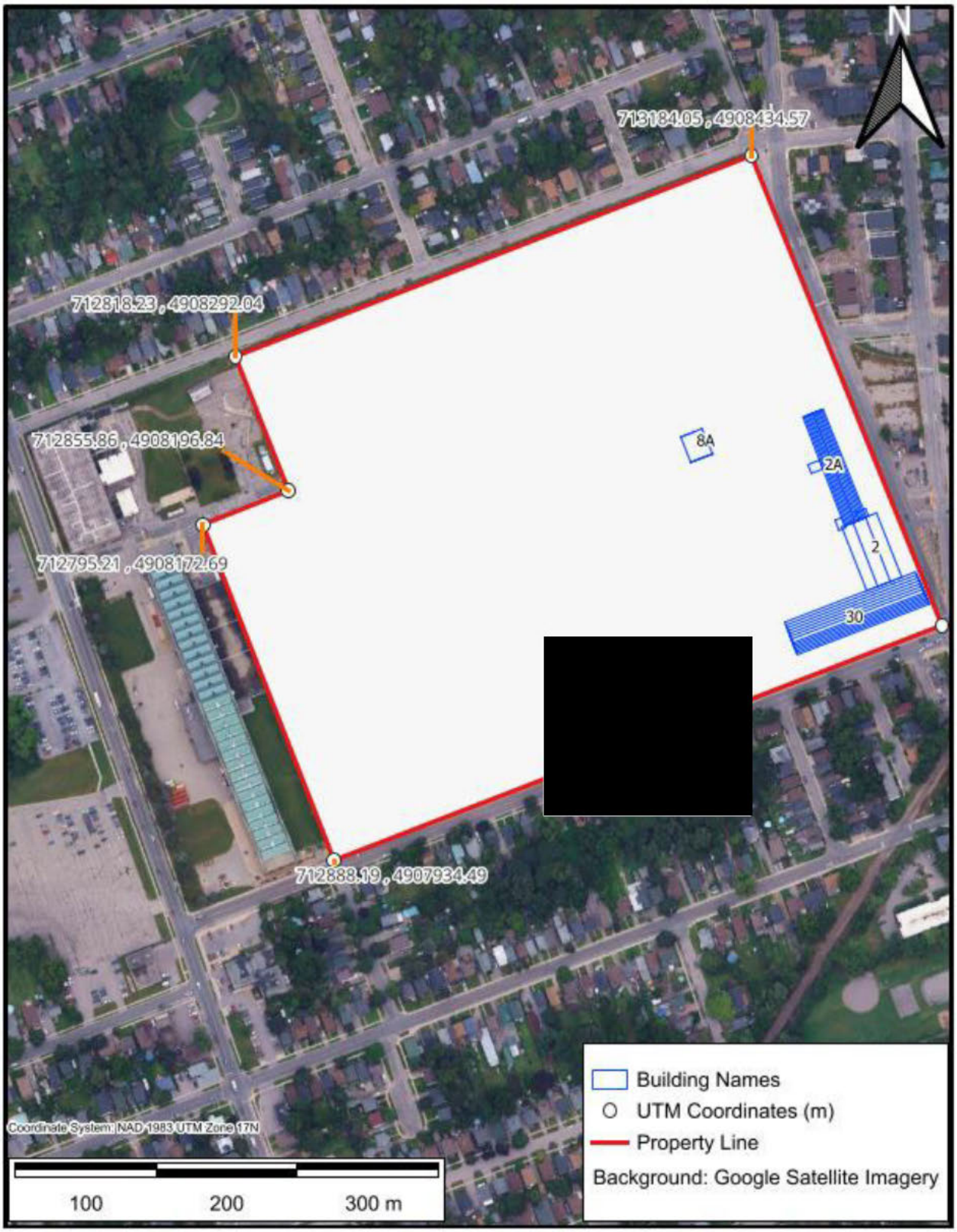
ByLaw No	Date Updated	File No	From Zoning	To Zoning	Location
2007-086	6/11/2007	Z0611	R.1,R.2,R.3,R.4	SP.336	Rink St
2008-190	12/15/2008	Z0503	SP.241-H	SP.241	192 Dalhousie St, 199 Dalhousie St
2010-118	7/5/2010	Z1001	SP.241,11h-H	SP.241,11h	206 Aylmer St N
2011-060	4/5/2011	Z0503	SP.241-H	SP.241	193 Dalhousie St
2011-080	6/6/2011	Z0503	SP.241-H	SP.241	189 Dalhousie St
2014-059	5/20/2014	Z1404	R.1,R.2,R.3,R.4	SP.241-118-H	253 Dalhousie St
2014-060	5/20/2014	Z1405	R.1,R.2,R.3,R.4	SP.241-118-289-H	244 Wolfe St
2014-090	6/30/2014	Z1318	R.5,2f,3y,5f,7d,8f, 10a -H	R.5,2f,3y,5f,7d,8f,10a	164 Park St N & 400 Wolfe St
2016-112	10/24/2016	Z1616	C.4	SP.241	112 Aylmer St N
2017-036	4/3/2017	Z1613	R.3,3p.4k,19d-H	R.3,3p,4k,19d	191 Bethune St
2017-105	9/11/2017	Z1707	PS.2	R.5-313 H	186 Romaine St
2017-125	11/14/2017	Z0503	SP.241-H	SP.241	185 Dalhousie St
2019-079	9/23/2019	Z1908	SP.208, R.1,R.2	SP.208,R.1,R.2-H	458 George St S
2020-061	9/28/2020	Z0323	SP.336-H	SP.336	59, 61 and 63 Olive Ave
2021-066	5/25/2021	Z0206	C.1-188-H	C.1-188	285 Perry St
2021-088	7/29/2021	Z2010	SP.85-H	SP.85	159 Aylmer St
2021-106	11/29/2021	Z1313	R.1,R.2,7c,20a-264-H	R.1,R.2,7c,20a-264	125 Romaine St

C.2 Building Numbers

C.2.1 Existing Building Numbers

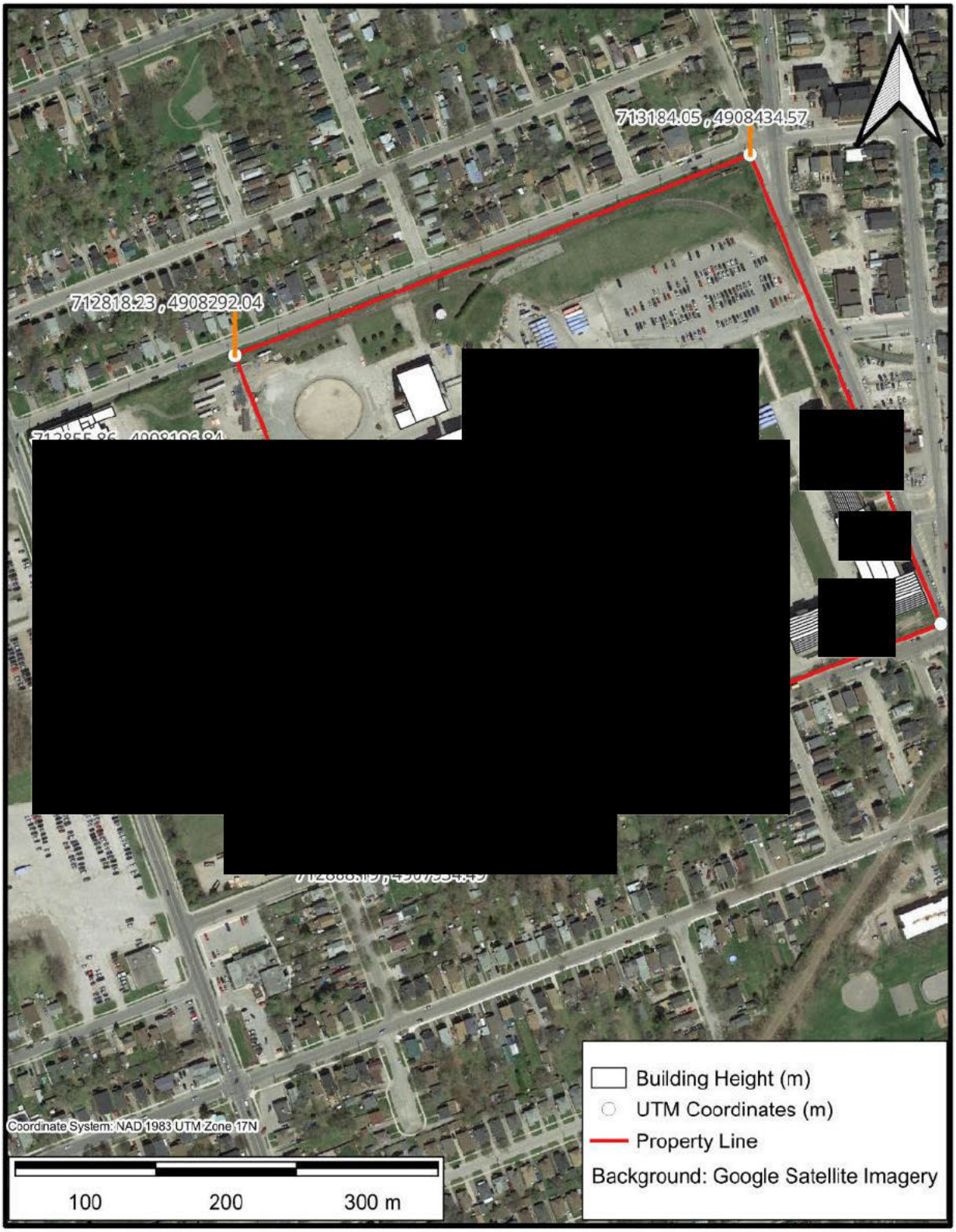


C.2.2 Future Building Numbers

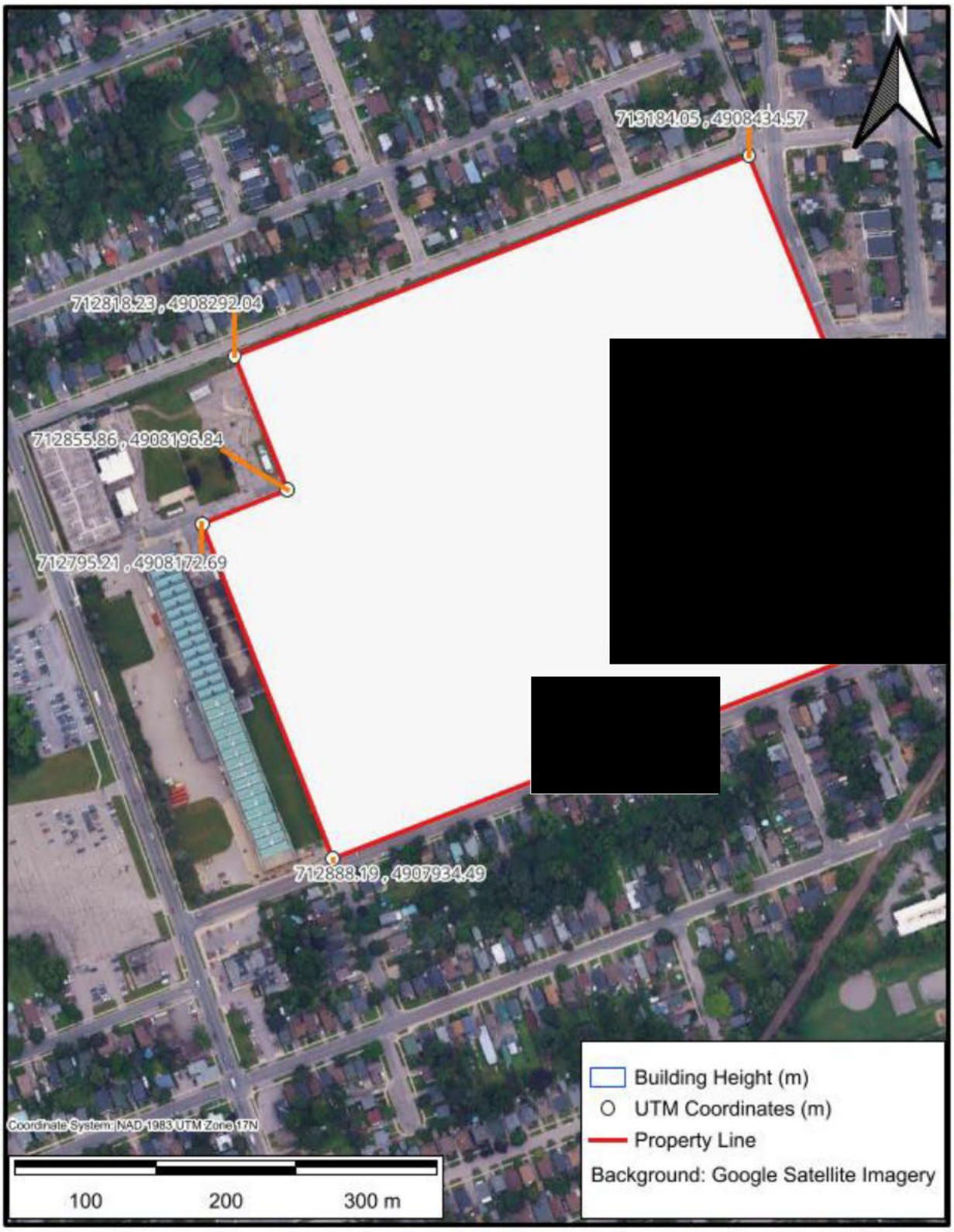


C.3 Building Heights

C.3.1 Existing Building Heights



C.3.2 Future Building Heights



Appendix D – Dispersion Modelling Files

D.1 Input and Output Files – Will be provided electronically to MECP upon request

Appendix E - ESDM Checklist

Ontario

Ministry of the Environment, Conservation and Parks

Emission Summary and Dispersion Modelling Report Checklist

Company Name

GEPR Energy Canada Inc.

Company Address

Unit Number	Street Number	Street Name	PO Box
	107	Park Street North	

City/Town	Province	Postal Code
Peterborough	Ontario	K9J 3V6

Location of Facility

107 Park Street North, Peterborough, Ontario, K9J3V6

The attached Emission Summary and Dispersion Modeling Report was prepared in accordance with s. 26 of O. Reg. 419/05 and the guidance in the MECP document "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009 and "Air Dispersion Modelling Guideline for Ontario" dated March 2009 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact

☑ By checking this each of the undersigned acknowledge that in providing their name on the applicable line below in electronic form will constitute a signature for the purposes of the *Electronic Commerce Act, 2000*, S.O. 2000, c. 17.

Company Contact

John Jankowski

Company Contact Name

Last Name	First Name	Middle Initial
Jankowski	John	

Title	Telephone Number
Site Operations Leader	705 748-7579

Signature	Date (yyyy/mm/dd)
	2026/01/23

Technical Contact

☑ By checking this each of the undersigned acknowledge that in providing their name on the applicable line below in electronic form will constitute a signature for the purposes of the *Electronic Commerce Act, 2000*, S.O. 2000, c. 17.

Technical Contact

AECOM Canada ULC

Technical Contact Name

Last Name	First Name	Middle Initial
Arsenault	Danielle	

Representing	Telephone Number
GEPR Energy Canada Inc.	289 527-2686

Signature	Date (yyyy/mm/dd)
	2026/01/23

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* This checklist is taken from the document titled "Procedure for Preparing an Emission Summary and Dispersion Modelling Report" dated March 2009.

Emission Summary and Dispersion Modelling Report Checklist

	Required Information	Submitted	Explanation/Reference
	Executive Summary and Emission Summary Table		
	1.1 Overview of ESDM Report	☑ Yes	Executive Summary
	1.2 Emission Summary Table	☑ Yes	Table E-1
1.0	**Introduction and Facility Description**		
	1.1 Purpose and Scope of ESDM Report (when report only represents a portion of facility)	☑ Yes	Section 1.1
	1.2 Description of Processes and NAICS code(s)	☑ Yes	Section 1.2
	1.3 Description of Products and Raw Materials	☑ Yes	Section 1.3
	1.4 Process Flow Diagram	☑ Yes	Section 1.4
	1.5 Operating Schedule	☑ Yes	Section 1.5
2.0	**Initial Identification of Sources and Contaminants**		
	2.1 Sources and Contaminants Identification Table	☑ Yes	Section 2
3.0	**Assessment of the Significance of Contaminants and Sources**		
	3.1 Identification of Negligible Contaminants and Sources	☑ Yes	Section 3.1
	3.2 Rationale for Assessment	☑ Yes	Section 3.2
4.0	**Operating Conditions, Emission Rate Estimating and Data Quality**		
	4.1 Description of operating conditions, for each significant contaminant that results in the maximum POI concentration for that contaminant	☑ Yes	Section 4.1
	4.2 Explanation of Method used to calculate the emission rate for each contaminant	☑ Yes	Section 4.2
	4.3 Sample calculation for each method	☑ Yes	Section 4.2
	4.4 Assessment of Data Quality for each emission rate	☑ Yes	Section 4.2
5.0	**Source Summary Table and Property Plan**		
	5.1 Source Summary Table	☑ Yes	Section 5, Appendix B
	5.2 Site Plan (scalable)	☑ Yes	Section 5, Appendix C
6.0	**Dispersion Modelling**		
	6.1 Dispersion Modelling Input Summary Table	☑ Yes	Section 6.1
	6.2 Land Use Zoning Designation Plan	☑ Yes	Section 6.2, Appendix C
	6.3 Dispersion Modelling Input and Output Files	☑ Yes	Section 6.3, Appendix E
7.0	**Emission Summary Table and Conclusions**		
	7.1 Emission Summary Table	☑ Yes	Section 7
	7.2 Assessment of Contaminants with no MECP POI Limits	☑ Yes	Section 7
	7.3 Conclusions	☑ Yes	Section 7
	Appendices (Provide supporting information or details such as…)		
	App A - Proof of Legal Name, App B - Tables	☑ Yes	
	App C - Figures, App D - ASHRAE Assessment	☑ Yes	
	App E - Dispersion Modelling Files, App F - ESDM Checklist	☑ Yes	

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Appendix 6: AECOM Canada ULC, “2024 PCB Monitoring Report for Stormwater and Groundwater GEPR Energy Canada Inc.” (excerpts)

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February 28, 2025

Project #
60720641

Subject: 2024 PCB Monitoring Report for Stormwater and Groundwater – GEPR Peterborough Site

Dear Ms. Bush:

We are pleased to submit to you the GEPR Energy Canada Inc. (Peterborough) 2024 PCB Monitoring Report for Stormwater and Groundwater. This report includes details of:

- Outfall stormwater and sediment sampling;
- Groundwater quality sampling;
- Soil sampled at the Site;
- Sediment sampling at catch basins and sewer maintenance holes; and,
- Maintenance activities.

If you have any comments or questions related to this report or require clarification, please contact the undersigned.

Sincerely,
AECOM Canada ULC



Marc Mitchell, B.Eng.
Senior Project Manager
Marc.Mitchell@aecom.com

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Executive Summary

The results of 2024 polychlorinated biphenyl (PCB) monitoring and sampling program at the GEPR Energy Canada Inc. (GEPR) Facility in Peterborough, Ontario are summarized below. This Report was prepared by AECOM Canada ULC (AECOM) for GEPR.

The Site includes the GEPR Facility at 107 Park Street North (herein referred to as the "Facility"), the adjacent Monaghan Road Parking Lot (herein referred to as the "Monaghan Road Property") located west of the Facility, adjacent Rink Street Parking Lot (herein referred to as the "Rink Street Property") located east of the Facility and adjacent Park Street Parking Lot (herein referred to as the "Park Street Property") located east of the Facility (***Figure 1***).

The majority of Site manufacturing operations ceased at the Facility in December 2018. Site closure activities, including removal of materials and chemicals used in manufacturing, manufacturing equipment, decommissioning and removal, and industrial cleaning were completed by mid 2020. Some employees who perform engineering, marketing and other office-based functions remain active at the Site in Buildings 2 and 2a. BWXT remains as a tenant in Buildings 21, 24, and 26. Parking for BWXT personnel will continue on the Monaghan Road Property.

Purpose and Objectives

The purpose of the PCB monitoring and sampling program at the Site is to assess the presence of PCBs in:

i) groundwater; and,
ii) stormwater and sediment within the Site storm sewer network.

This report fulfils the annual reporting requirements included within:

i) Environmental Compliance Approval for Stormwater 8032-BEJNAK dated September 30th 2019;
ii) Storm Sewer Monitoring Program under the Ministry of the Environment, Conservation and Parks (MECP) Director's Order Number 1-228916698 dated March 6th, 2024; and,
iii) Director's Instruction for Interim PCB Waste Management – Monaghan Road dated June 21st 1995 (Revoked May 2024).

Comments received from the MECP on the 2023 PCB Monitoring report and ongoing activities at the Site are provided in ***Appendix A***.

This report also includes a summary of other related sampling and remedial activities conducted in 2024 as part of ongoing investigations and best management practices at the Site conducted to reduce the concentration of PCBs in stormwater. These activities include:

i) Soil sampling;
ii) Visual inspection of catch basins (CBs) and sewer maintenance holes (MHs); and,
iii) Best management practices (BMPs).

Findings

Groundwater PCB Monitoring Program

i) At the Facility, MW25, MW26, and MW28 are located in the northern area of the former Building 4 Cover System, which cover the former PCB Waste Storage Area. PCB concentrations are consistent with historical trends. These monitoring locations are at least 25 m from the nearest storm sewer.

ii) While there is evidence that some existing on-site storm sewer lines at the Facility are below the water table, historically, groundwater sampling results at the Facility, other than those around former Building 4 Cover System, show PCB concentrations that are low to below the reporting limit. Dissolved PCBs in groundwater are unlikely to impact stormwater quality.

iii) At the Monaghan Road Property, PCB groundwater concentrations at the monitoring wells that were sampled in 2024 were either below the reporting limit, or when detected were below the Table 3 SCS of 7.8 µg/L and T7 Criterion of 1.8 µg/L.

Best Management Practices

Best Management Practices (BMPs) implemented at the Site are based on feedback from the storm sewer monitoring program. The BMPs have resulted in a year-over-year improvement in stormwater and sediment quality since 2015. BMPs undertaken at the Site in 2024 included:

i) Paved areas of the Facility and Monaghan Road Property were swept in May and June 2024 to minimize the potential for sediment loading to CBs and MHs.

ii) Maintenance of paved areas of the Facility was conducted to fill and patch potholes and resurface areas of damaged asphalt.

iii) A total of 162 CBs and MHs at the Facility and Monaghan Road Property and 17 MHs on the City of Peterborough roadways were inspected in May and June 2024.

iv) A total of 46 CB/MH were cleaned out in July and October 2024 to remove accumulated sediment to minimize the potential for accumulated sediment to impact stormwater quality.

v) Jellyfish OGS sumps and filters were cleaned in October 2024 following routine inspection.

vi) Filter cloths were inspected and replaced as needed at all the CBs where surface soil is suspected to be a contributor of sediment in stormwater.

vii) The Site Soil Management Plan provides requirements to minimize soil disturbance and sediment transport at the Site was implemented where applicable.

Storm Sewer Monitoring Program

The cumulative effect of the BMPs implemented at the Site has resulted in a year-over-year improving trend of stormwater and sediment quality from 2015 through 2024 as shown on ***Figure EX-1*** *and* ***Figure EX-2*** included on page v of the Executive Summary. PCB concentrations in stormwater and sediment in CB/MHs are compared to the Site Evaluation Criterion and ECA Effluent Quality Objectives of 0.02 µg/L (stormwater) and 0.2 µg/g (sediment). As with previous years, the results of monitoring and investigations are used to refine the BMP program at the Site. A summary of 2024 outfall monitoring data for each Zone is provided below.

- **Zone 1 (Facility, Wolfe Street)**
  This Zone contributes less than 1% of the overall Site stormwater from the only one outfall (CBR35). The concentration of PCBs in stormwater was below the laboratory detection limit of 0.01 µg/L in all three sampling events in 2024.

- **Zone 2 (Facility, Park Street)**
  Zone 2 contributes approximately 59% of the overall Site stormwater. There are two outfalls within Zone 2, MHR1 (44% of Site stormwater) and MHR41 (15% of Site stormwater). In 2024, the mean and median concentration of PCBs in stormwater at the Zone 2 outfalls were both 0.01 µg/L.
  - The concentration of PCBs in stormwater at STM.MHR1 was below the laboratory detection limit of 0.01 µg/L in six out of six sampling events in 2024.
  - The concentration of PCBs in stormwater at MHR41 was at or below the Site objective of 0.02 µg/L in five out of six sampling events in 2024 and 0.04 µg/L during the sixth sampling event.

  Under ECA #8032-BEJNAK, stormwater is sampled at STM.MH136683, MHR1 and MHR41 at least six times per year and the results are compared to yearly average concentration effluent objectives at MHR1 and MHR41 for Oil and Grease, TSS, Total PCB, and Total PAH. In 2024, stormwater was sampled six times.

  Total PAH concentrations are compared to the yearly average concentration ECA objective of 2 µg/L. In 2024, the Total PAH concentrations at all three monitoring locations (STM.MH136683, MHR1 and MHR41) were at or below the laboratory detection limit during all six sampling events except for the May 27th 2024 event, where the Total PAH concentrations at MHR1 and MHR41 were 3 µg/L and 2 µg/L respectively. In 2024, yearly average Total PAH concentrations at MHR1 and MHR41 were 0.54 µg/L and 0.38 µg/L.

  Oil and Grease concentrations are compared to the yearly average concentration ECA objective of 15 mg/L. In 2024, yearly average Oil and Grease concentrations at MHR1 and MHR41 were 7.8 mg/L and 4.0 mg/L.

  TSS concentrations are compared to the yearly average concentration ECA objective of 25 mg/L. In 2024, yearly average TSS concentrations at MHR1 and MHR41 were 0.8 mg/L and 0.8 mg/L.

  pH and temperature measurements are compared to the City of Peterborough By-Law for discharge to sewers. All measurements were within the pH range of >6.0 and <9.5 and below the temperature criterion of 40°C.

- **Zone 3 (Facility, Albert Street)**
  Zone 3 contributes approximately 21% of the overall Site stormwater. PCBs were below or at the Site criterion of 0.02 µg/L in stormwater in 7 out of 9 outfalls during all the 2024 monitoring events (at all outfalls except CBR94 and CBR107). Mean and median PCB concentrations were 0.06 µg/L and 0.01 µg/L respectively for Zone 3.

- **Zone 4 (Monaghan Road Property, Asphalt Parking Lot)**
  Zone 4 contributes about 8% of the overall Site stormwater. PCB concentrations in stormwater were below or at the Site criterion of 0.02 µg/L in 7 out of 9 outfall samples collected during the 2024 monitoring events. Mean and median PCB concentrations were 0.01 µg/L and 0.01 µg/L respectively for Zone 4.

- **Zone 5 (Monaghan Road Property, Gravel Parking Lot)**
  Zone 5 outfall (STM.MH166902 that collects all the water from Zone 5) mean PCB concentration was 0.02 µg/L in 2024.

- **Zones 6 and 7 (Rink Street and Park Street Gravel Parking Lots)**
  Zones 6 and 7 account for the remaining Site stormwater discharge from Park Street Property (1.1% of the discharge from the Site) and Rink Street Property (1.8% of the discharge from the Site). There are

no specific stormwater monitoring outfalls for these Zones; therefore, the outfalls from these zones are sampled as part of the stormwater monitoring activities at STM.MH135683 (the point of convergence of stormwater from the Site), which is included in the City MHs.

- **City MHs**
  Stormwater quality at all four city MHs (STM.MH136551, STM.MH135683, STM.MH13586 and STM.MH135703) were below the PCB laboratory reporting limit of 0.01 µg/L except for the two samples collected during the May 2024 sampling event at MH135683 and MH135703. Mean and median concentrations were <0.02 µg/L and <0.01 µg/L respectively. The City MHs were sampled during 6 events in 2024 (3 times at the four MH and 3 additional times at STM.MH135683 and STM.MH135703).

Recommendations

i) Continue with the established groundwater and storm sewer monitoring programs and BMPs in 2025 as per the Director's Order 1-228916698and ECA 8032-BEJNAK. No changes have been made to the 2025 programs based on the MECP comments.

ii) Complete the specific inspections, investigations and/or modifications that are outlined in ***Section 5.2***.

iii) Based on the results of ongoing monitoring activities, implement additional BMPs as required including BMPs targeted at specific zones or sub-catchment areas of the Site.

Figure EX-1: Summary of PCB Concentrations in Stormwater Outfalls by Catchment Zone

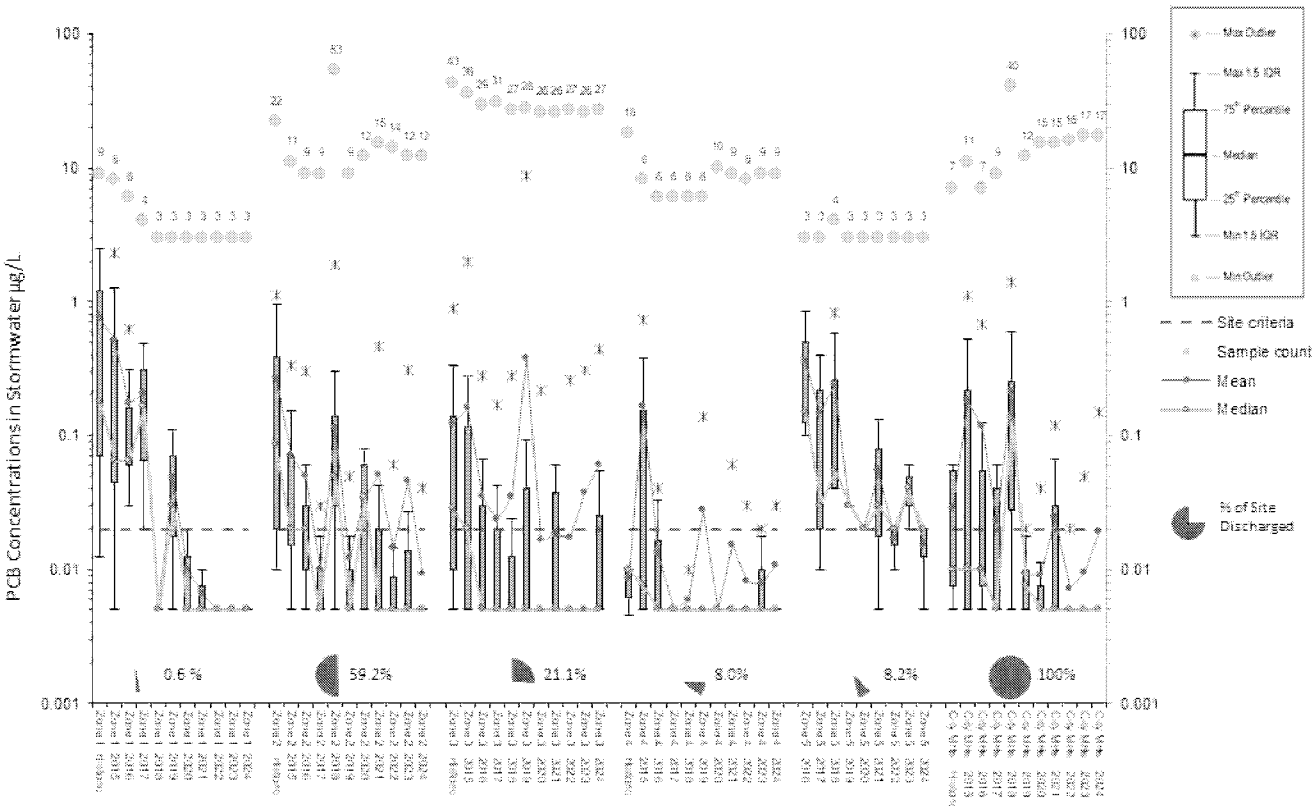


Figure EX-2: Summary of PCB Concentrations in Sediment

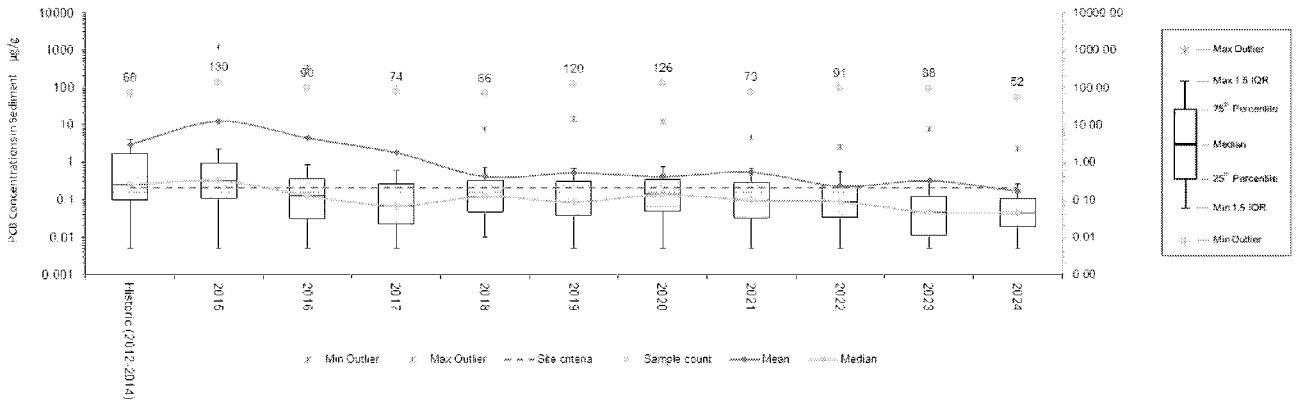


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Appendix A. Correspondence with MECP *(Electronic Copy Only)*

A1. Amended Monitoring Program: from CRA dated 14 May 2014. Response to Comments – 2014 Monitoring Program, GE Energy Motors, Peterborough, Ontario

A2. MOE, 1995. Interim PCB Waste Management – Monaghan Road Director's Instructions

A3. MECP Director's Order: from Peterborough District Office dated December 10th 2018. Director's Order Number GE-PTBO-DO001FA

A4. MECP ECA for Stormwater: Environmental Compliance Approval for Stormwater Management #8032-BEJNAK, Issue Date: September 30th 2019

A5. MECP Director's Order: from Peterborough District Office dated March 6th 2024. Director's Order Number 1-228916698

A6. Revocation of 1995. Interim PCB Waste Management – Monaghan Road Director's Instructions

A7. Monaghan Road Parking Lot, Monthly Inspection Logs

A8. MECP Comments regarding the groundwater component of the 2023 PCB Monitoring Report for Stormwater and Groundwater, dated January 31st 2025

A9. MECP Comments regarding the surface water component of the 2023 PCB Monitoring Report for Stormwater and Groundwater, September 17th 2024

Appendix B. Background and Site Geologic and Hydrogeological Summary *(Electronic Copy Only)*

B1. Background
B2. Site Geologic and Hydrogeological Summary

Appendix C. Historical Results *(Electronic Copy Only)*

C1. Historical PCB Results – Storm Sewer Program (*Data also in a Microsoft Excel file)*
C2. Historical PCB Results – Groundwater Program
C3. Historical PAH Results – Storm Sewer Program (*Data also in a Microsoft Excel file)*
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Appendix D. Certificates of Analysis *(Electronic Copy Only)*

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E2. GE Peterborough Soil Management Plan

Appendix F. Quality Assurance/Quality Control Sediment, Filter Cloth Residue and Stormwater *(Electronic Copy Only)*

Appendix G. Hydrologic Calculation

Appendix H. Total PCBs Compared to Table 2a: Provincial Sediment Quality Guidelines for PCBs and Organochlorine Pesticides

Appendix I. Hydrographs

Appendix J. Monitoring Programs

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J2. Stormwater Monitoring Programs (V011)

Appendix K. Storm Sewer Data Summary by Zones

List of Acronyms

AST ..... Aboveground Storage Tank
BV ..... Bureau Veritas
CB ..... Catch Basin
cm ..... Centimetre
mm ..... Millimeter
CRA..... formerly Conestoga Rovers & Associates, now GHD
DI..... Director's Instructions
GE ..... General Electric
GETS ..... Groundwater Extraction and Treatment System
HWIN..... Hazardous Waste Information Network
L ..... Litre
LNAPL..... Light Non-Aqueous Phase Liquid
L/min ..... Litre per minute
m ..... Metre
mbgs ..... Metres below ground surface
MH..... Maintenance Hole (sewer)
MOE..... Ministry of the Environment (name changed June 24, 2014)
MECP..... Ministry of the Environment, Conservation and Parks (Formerly MOECC)
MW..... Monitoring well
PCB..... Polychlorinated biphenyl
PAH..... Polycyclic Aromatic Hydrocarbon
PHC..... Petroleum Hydrocarbons
QA..... Quality assurance
QC..... Quality control
RL..... Reporting Limit
SCS..... Site Condition Standard
TOC..... Total organic carbon
TSS ..... Total suspended solids
UST..... Underground Storage Tank
UTM ..... Universal Transverse Mercator
µg/g ..... Microgram per gram
µg/L ..... Microgram per Litre

1. Introduction

The results of the 2024 polychlorinated biphenyl (PCB) monitoring activities associated with the GEPR Energy Canada Inc. (formerly GE Power Conversion – Motors [GE Canada or GE]) Facility in Peterborough, Ontario are presented in this report. This report was prepared by AECOM Canada ULC (AECOM) for GEPR Energy Canada Inc.

1.1 Site Location

The Site includes the GEPR Energy Canada Inc. (GEPR) Facility at 107 Park Street North (herein referred to as the "Facility"), the adjacent Monaghan Road Parking Lot (herein referred to as the "Monaghan Road Property") located west of the Facility and two adjacent parking lots located east of the Facility (herein referred to as the "Park Street Property" [also referred to as 107 Rubidge Street] and the "Rink Street Property" [also referred to as 297 Rink Street]). The Site location is presented on ***Figure 1*** and a Site plan is presented on ***Figure 2***.

Background information for the Site is provided in ***Appendix B***.

1.2 Purpose and Objectives

The purpose of the PCB monitoring and sampling program at the Site is to assess the presence of PCBs in:

i) groundwater; and,
ii) stormwater and sediment within the Site storm sewer network.

This report fulfils the annual reporting requirements included within:

i) Environmental Compliance Approval for Stormwater (ECA), 8032-BEJNAK dated September 30th 2019 (***Appendix A4***);

ii) Storm Sewer Monitoring Program under Ministry of the Environment, Conservation and Parks (MECP) Director's Order Number 1-228916698 dated March 6th, 2024 (***Appendix A5***); and,

iii) Director's Instruction for Interim PCB Waste Management – Monaghan Road dated June 21st 1995 (Revoked May 2024) (***Appendix A2*** and ***Figure 2***).

Comments received from the MECP on the 2023 PCB Monitoring report and ongoing activities at the Site are provided in ***Appendices A8*** and ***A9***. No changes have been made to the 2024 programs based on the MECP comments (see ***Section 4.2.6*** and ***4.3.4*** below).

This report also includes a summary of other related sampling and remedial activities conducted in 2024 as part of ongoing investigations and best management practices at the Site conducted to reduce the concentration of PCBs in stormwater. These activities include:

i) Soil sampling;
ii) Visual inspection of catch basins (CBs) and sewer maintenance holes (MHs); and,
iii) Best management practices (BMPs).

1.3 Current Site Use

The majority of Site manufacturing operations ceased at the Facility in December 2018. Site closure activities, including removal of materials and chemicals used in manufacturing, manufacturing equipment, decommissioning and removal, and industrial cleaning were completed by mid 2020. A number of employees who perform engineering, marketing and other office-based functions remain active at the Site in Buildings 2 and 2a. BWXT remains as a tenant in Buildings 21, 24, and 26. Parking for BWXT personnel will continue on the Monaghan Road Property.

2. Field Activities and Methodologies

The PCB monitoring program is evaluated annually based on the review of the previous recent findings. In May 2014, GE Canada submitted a written communication to the MECP detailing a significant broadening and enhancement to the monitoring activities for the Site in 2015 including the amended groundwater and stormwater monitoring program (***Appendix A1***).

On December 10th 2018, MECP issued Director's Order Number GE-PTBO-DO001FA detailing sampling locations, frequency and parameters (***Appendix A3***).

On September 30th 2019, MECP issued an ECA Number 8032-BEJNAK for stormwater that includes requirements for additional sampling locations, frequency and parameters (***Appendix A4***).

On March 6th 2024, MECP issued Director's Order Number 1-228916698 (***Appendix A5***) that replaced Director's Order GE-PTB-DO001FA.

On May 8th 2024, MECP revoked the 1995 Director's Instructions that established an interim PCB Waste Management Site on the Monaghan Road property (***Appendix A6***). The in situ management of PCB impacted soils previously managed in accordance with the 1995 Director's Instructions are now addressed by the Director's Order Number 1-228916698.

The groundwater and storm sewer monitoring programs are provided in ***Appendix J*** and the methodologies and soil management plan are provided in ***Appendix E***.

Methodologies and results of the soil vapour monitoring program conducted at the Site in 2024 are discussed in the 2024 Soil Vapour Monitoring Report (AECOM, 2025a). Methodologies and results for the groundwater level monitoring program, the full groundwater sampling at the Monaghan Road Property, the operation, monitoring and maintenance of the groundwater extraction and treatment system, and the trichloroethylene and degradation products groundwater monitoring program are presented in the Groundwater Extraction and Treatment System 2025 Monitoring Report (AECOM, 2025b). Both reports are issued separately and at the same time of this report.

The current PCB storm sewer and groundwater monitoring program includes the following activities:

Groundwater PCB Monitoring

i) Annual sampling program for total PCBs and Aroclors as per Director's Order Number 1-228916698 — 3 monitoring wells focused on the area of northern portion of the former Building 4 where the former PCB waste storage facility was located.

ii) Annual sampling program for total PCBs and Aroclors as per Director's Order Number 1-228916698 – 7 monitoring wells on the Monaghan Road Property.

Storm Sewer Monitoring

i) Storm Sewer Outfalls — Inspection and stormwater / sediment sampling at 17 storm sewer outfalls, five City MH, and at the Little Lake storm sewer outfall three times per year as per Director's Order Number 1-228916698. Inspection and stormwater / sediment sampling at STM.MH135703 and three additional times a year (total six times per year) per Director's Order Number 1-228916698.

ii) ECA sampling — Stormwater sampling at STM.MH136683, MHR1 and MHR41 every two months at least six (6) times per year as per ECA Number 8032-BEJNAK.

iii) Facility — Annual inspection and sediment sampling at all accessible CBs and MHs on Site and 14 City MH as a best management practice.

iv) Monaghan Road Property — Annual inspection and sediment sampling at 3 CBs as a best management practice.

v) Monaghan Road Property Parking Lot — Monthly visual inspection per Director's Order Number 1-228916698.

2.1 Groundwater Monitoring

The groundwater monitoring program details are provided in ***Appendix J1***.

2.1.1 Deviations from the Water Level Monitoring Program

The groundwater level monitoring program methodology details and variances are discussed under separate cover (AECOM, 2025b).

2.1.2 Deviations from the Groundwater PCB Sampling Program

There were no deviations from the PCB groundwater monitoring and sampling program implemented as per Director's Order Number 1-228916698 .

2.1.3 Quality Assurance/Quality Control Sampling

The project sampling plan minimizes errors by applying consistent and scientifically proven quality control (QC) measures in the field (i.e., Standard Operating Procedures), checks that might identify problems early (i.e., QC samples), and sample-handling procedures that minimize the possibilities of sample tampering (i.e., chain of custody forms) and shipping problems (i.e., by using the laboratory's shipping service).

Certain field QC samples are routine to document the data quality and to identify whether data quality problems exist. For the PCB sampling program, the basic field QC sampling consisted of blind field duplicates.

The results of the field and laboratory QC samples were compared against specific performance standards to determine if quality requirements were met within known probability limits. Overall, the program shows the analytical results to be acceptable and that they can be relied upon for interpretation of the distribution of PCBs dissolved in groundwater at the Site. For more details, see the Groundwater Extraction and Treatment System 2024 Monitoring Report (AECOM, 2025b).

2.2 Storm Sewer Monitoring

The 2024 storm sewer monitoring program detailed in ***Appendix J2*** incorporates changes made to the voluntary interim monitoring program in 2014 (***Appendix A1***), Director's Order Number 1-228916698 (***Appendix A5***) and ECA 8032-BEJNAK (***Appendix A4***). Additional sediment thickness measurements taken as part of CB and MH inspections were added to the voluntary interim program in 2015.

The 2024 PCB storm sewer inspection and sampling program is outlined in ***Table 2-1***. The CB and MH monitoring locations are shown on ***Figure 2.***

Table 2-1: Storm Sewer Monitoring and Sampling Program

Description	Director's Order 1-228916698	ECA for Stormwater 8032-BEJNAK	Sediment Sampling	Monaghan Road Property	Interim PCB Waste Management Area
Frequency	Three times per year	Six time per year	Once per year	Once per year	Monthly
Inspection	Visual Inspection Sediment Thickness	Visual Inspection pH, Temperature	Visual Inspection Sediment Thickness	Visual Inspection Sediment Thickness	Visual Inspection (As per MECP Director's Instructions [Appendix A2])
Sampling	Stormwater (PCBs, TSS) Sediment (PCBs, TOC)	Stormwater (PCBs, TSS, PAHs, Oil and Grease, pH, temperature)	Sediment (PCBs, TOC)	Sediment (PCBs, TOC)	-
Timing	Spring, Summer, and Fall	Bimonthly	Spring	Spring	Monthly
Locations	**Facility** STM.MHR1 MHR35 STM.MHR41 CBR35 CBR73 CBR82 C.STM.MH CBR90 CBR94 CBR107 CBR111 CBR112 STM.CBMHR113 **Monaghan Road Property** CBMHR130 CBR140* CBR137 CBR142* **Park Street** STM.MH135686 **Rink Street** STM.MH135683 **Wolfe Street** STM.MH136551 **Monaghan Road** STM.MH166902 **George Street** STM.MH135703** **Little Lake** 15 metres from the inlet	**Facility** STM.MHR1 STM.MHR41 **Rink Street** STM.MH135683	All CBs at the Site **Park Street** STM.MH135686 **Rink Street** STM.MH135683 **Wolfe Street** STM.MH136551 **Monaghan Road** STM.MH166902 STM.MH166900 STM.MH166898 STM.MH166896 STM.MH166894 STM.MH166892 STM.MH132174 STM.MH135625 STM.MH135624 STM.MH135556 **George Street** STM.MH135703	**Monaghan Road Property** DICBR135 CBMHR133 MHR124	**Interim PCB Waste Management Area**

*Notes: *CBR140 and CBR142 are sampled but are not considered the monitoring location for Zone 5, as per Director's Order GE-PTBO-DO001FA.*
***STM.MH135703 is sampled six times per year*

The annual visual inspection, sediment thickness measurement, and sediment sampling at the Facility, Rink Street Property, Park Street Property and Monaghan Road Property CBs and MHs were completed in May and June 2024.

The three times per year visual inspection, sediment thickness measurements, and sediment and stormwater sampling at the storm sewer outfalls and off-site locations were completed on July 10th, August 9th, and November 21st 2024 corresponding to 10 mm+ rain events.

Six ECA sampling events were completed on April 3rd, May 27th, July 10th, August 9th, September 24th, and November 21st 2024 corresponding to 10 mm+ rain events.

An authorized person completed the monthly inspections of the Interim PCB Waste Management Area each month in 2024 (***Appendix A7)***. These inspections included an assessment of the condition of the asphalt cover.

2.2.1 Deviations from the Storm Sewer Monitoring Program

There were no deviations from the 2024 storm sewer monitoring program. Notwithstanding, the following samples were not collected:

i) No samples were collected from CBR142 as there was no water present during all three outfall sampling events.

ii) C.STM.MH was inaccessible during all three outfall sampling events and was not sampled.

iii) There was insufficient water to collect a sample at STM.MH135686 during the November 21st 2024 ECA sampling event.

2.2.2 Quality Assurance/Quality Control Sampling

The project sampling plan minimizes errors by applying checks that might identify problems (i.e., quality control (QC) samples). ***Appendix F*** compares the results of the QC sampling in both the field and laboratory against specific performance standards to determine if quality requirements are met within known probability limits. Data quality objectives are control points or thresholds to provide perspective for judging the acceptability of data. The various data quality objectives and their performance standards for the 2024 monitoring events are listed at the beginning of each section in ***Appendix F*** where they are discussed. The review of the QC programs are provided in ***Appendix F***. Overall, the QC programs showed the analytical results to be acceptable and that decision-making was not affected.

2.3 Additional Sampling

Additional sampling conducted at the Site included:

i) Soil sampling;
ii) Stormwater sampling; and,
iii) Sampling of soil collected in filter cloths installed in CBs.

2.3.1 Soil Sampling

From 2015 to 2024, approximately 400 soil/roof debris samples were collected at the Site and analyzed for PCBs. This includes, three soil samples collected from the Monaghan Road Property, immediately west of the ditch at the north end of the BWXT parking area, collected in 2024 to characterize the soil in this area ahead of planned tree planting activities. The concentration of PCBs in these samples ranged between 0.3 µg/g and 8.6 µg/g.

Soil sampling methodology is outlined in ***Appendix E1***. Historical soil sampling results are provided in ***Appendix C5*** and ***Figures 9*** and ***10***. A surface soil sample is defined as any sample collected at the surface, with a sample start depth of zero metres below ground surface (mbgs) and are plotted on ***Figure 9***. A sub-surface soil sample is a sample with a start depth below 0.0 mbgs and are plotted on ***Figure 10***.

2.3.2 Stormwater Sampling

Stormwater sampling is conducted as outlined in ***Appendix E1.*** On October 11, 2024, three additional stormwater samples were collected in Zone 2 at MHJF1, MHJF2 and MHJF3, associated with catchment MHR1 and MHR41,

for the purpose of characterising wash water prior to discharge to the sanitary sewers. All samples were submitted for analysis of Total PCBs including Aroclors and for Total Suspended Solids (TSS). Analytical results are provided in ***Appendix C1***.

2.3.3 Filter Cloth Sampling

Filter cloth CB inserts are installed in 26 CBs to: a) reduce sediment loading from surface water flow into the CBs; and, b) assess the quantity and quality of sediment entering the CBs. The filter cloth inserts are sized to fit around the CB grate and include a sewn sump designed to collect sediment and a bypass for high flow events. The filter pore size is 50 microns.

Locations where filter cloth inserts are installed were chosen considering sediment and surface soil sampling results and are shown on ***Figure 3*** and summarized in ***Table 2-2***. Where sufficient soil is present on filter cloth, a soil sample is collected and submitted for analysis of Total PCBs including Aroclors.

Samples of the filter cloth filtrate are collected using the same methodology employed for the surface soil sampling outlined in ***Appendix E.*** Following sampling, any remaining accumulated filtrate is removed and disposed as non-hazardous investigation-derived waste. Sampling results are provided in ***Appendix C1***.

Table 2-2: Summary of Filter Cloth Locations and Sampling

Zone	Catchment Area	Catch Basins with Filter Cloth Installed	Samples Collected in 2024
Zone 2	MHR1	CBR3, CBR8, CBR19, CBR27, CBR60, CBR101, STM.CBMHR46	3
	MHR41	CBR96, CBR97, CBR98, CBR104, CBR106, CBR110	2
Zone 3	CBR107	CBR107	-
	CBR111	CBR111	1
	CBR113	CBR78, CBR80, CBR114, CBR115	-
	CBR82	CBR82	-
	CBR90	CBR90	1
	CBR94	CBR94, CBR95	-
	CBMHR113	CBMHR113	-
Zone 4	CBR137	CBR137	-
Zone 5	MH166904	CBR140	-

3. Remedial Work Completed During 2024

BMPs implemented at the Site are based on feedback from the storm sewer monitoring program. Implementation of BMPs has resulted in a year-over-year improvement in stormwater and sediment quality since 2015.

3.1 Best Management Practices

3.1.1 Site Sweeping

Following the spring melt, paved areas of the Site, including both the Facility and the Monaghan Road Property, are swept to collect any residual grit and to reduce the potential for sediment to be washed into CBs during heavy rain events. A street sweeper vehicle is used to sweep all areas on-site that are identified to contain grit. Areas inaccessible by the sweeper vehicle are manually cleaned with brooms and portable vacuums.

Sweeping activities took place in May and June 2024.

3.1.2 CBs and MHs Cleanout

All the accessible storm sewer CBs and MHs at the Site containing measurable amounts of sediment with PCB concentrations above the Site criterion were cleaned out in July and October 2024 by Green for Life (GFL) under sub-contract to AECOM as part of the annual CB cleaning. A list of the 46 CB/MH locations associated with the annual cleaning activity in 2024 is provided in ***Appendix C1***.

In addition, CBR94, CBR107 and CBR140 were cleaned out on December 17th 2024 following maintenance activities at those locations.

CBs and MHs containing sediment with PCB concentrations below 50 µg/g are cleaned out using a vacuum truck and a pump truck. The vacuum truck is used to remove loose sediment and water from the CBs and MHs. The CBs and MHs are subsequently pressure-washed and the remaining residue is collected using the vacuum truck. Once the vacuum truck is full, water is pumped out to a pump truck and taken off-site for treatment and disposal. A profile for the solid wastes is established based on sediment sampling results and additional waste characterization analysis. Based on these results, the waste sludge is taken off-site with the vacuum truck for disposal under Hazardous Waste Information Network (HWIN) waste class 251 L.

3.2 Site Maintenance

3.2.1 Surface Cover

In order to maintain the integrity of existing paved surfaces around the Site, a number of areas were patched and or resurfaced in June, September, and October 2024. The work was aimed at reducing potential for erosion and movement of loose surface materials into catch basins around the Facility.

The permeable surfaces constructed with Ecoraster used by BWXT staff for parking were maintained in August 2024. Existing clear stone gravel material was graded to match existing grades and where necessary, sections of Ecoraster tiles were replaced and imported clear stone gravel used as fill material.

The gravel parking area at the north end of the Monaghan Road property adjacent to the Prince of Wales school was regraded in August 2024 to eliminate areas where the gravel was starting to erode due to surface water runoff.

At the same time, the swale at the west side of the parking areas was reestablished in order to minimize surface runoff across the access road that would otherwise lead to erosion of the driveway surface.

Maintenance activities were completed at the asphalt parking lot at the south end of the Monaghan Road property in August 2023. Loose debris was swept from the asphalt surface and vegetation that had started to establish along asphalt joints was removed. The joints were subsequently sealed with and asphalt tar sealant.

3.2.2 Jellyfish OGS

In an effort to improve the overall water quality and mitigate the risk of oil spills leaving the site through the storm system, oil grit separators (OGS) with pre-treatment and membrane filtration (also referred to as Jellyfish OGS) were installed at MHR1 and MHR41 outfalls in 2020.

Following routine inspection, the Jellyfish OGS sumps and filters were cleaned as part of routine maintenance activities on October 28th and 30th 2024.

3.2.3 Other Activities

Based on outfall sampling results, additional investigations and maintenance work was completed at CBR94, CBR107, and CBR140.

Zone 3, CBR94

- On July 11th 2024, a Closed-Circuit Television (CCTV) camera was used to visually inspect the interior of the sewer line and pipe entering CBR94 from CBR95 to the north and decommissioned CBR92 and CBR93 to west. No issues with the integrity of the pipes entering CBR94 were observed.
- The inspection confirmed that the line from the west was plugged with a concrete plug approximately 3.5 m upstream from CBR94, which is consistent with the location of CBR92 and CBR93 that were sealed and decommissioned in 2019. The sewer pipe running into CBR94 from CBR95 to the north was relined at the same time.
- A subsequent inspection during a rainfall event on July 16th 2024 identified some water entering CBR94 from the west. The source of this water is uncertain, but it is understood that there are historical sewer pipes that drain along the east wall of Building 8.
- CBR94 was cleaned out in July 2024 and again in December 2024.

Zone 3, CBR107

- The outfall from CBR107 to Albert Street was restored as part of general restoration activities in the area south of Building 30 that were completed in fall 2023. Additional maintenance work was carried out at CBR107 to reduce water potentially infiltrating the CB structure from below ground surface.
- On July 11th 2024, a CCTV camera was used to visually inspect the interior of the sewer line and pipe entering CBR107 from the north and east.
- The inspection confirmed that the lines from the north and west were plugged with a concrete plug and mechanical packer respectively.
- During a subsequent inspection during a rainfall event on July 16th 2024, no flow was observed entering CBR107 from the lateral sewer lines. Surface water was observed entering over the gravel surface surrounding the CB with some flow entering from between the frame and concrete CB structure.

- On November 1st 2024, a mechanical packer plug was placed in the line entering CBR107 from the north and an additional mechanical packer was placed in CBR108 east of CBR107 to ensure the isolation of CBR107 from the upstream sewer lines.
- At the same time, material was excavated around the CBR107 frame to a depth of 0.3 m. The frame was reset and sealed on the concrete CB structure to mitigate the potential for surface water to enter the CB from between the frame and concrete CB structure.
- CBR107 was cleaned out in July 2024 and again in December 2024.

Zone 5, CBR140

- In 2021, the interior walls of CBR140 had been coated with an epoxy sealant intended to prevent surface water that infiltrated through surrounding soils from entering the CB through the CB walls. During routine inspections of CBR140 in 2024 it was observed that the epoxy coating had started to deteriorate.
- On October 24th 2024, soil and gravel material was excavated around the CBR140 frame to a depth of 0.6 m.
- The exterior of the CB concrete moduloc sections was sealed with tar sealant to fill cracks and pathways between the surrounding soil/gravel and the interior of the CB. The frame was reset and sealed on the concrete CB modloc structure.
- The 1 micron bag filters installed on the outfalls from shallow drains entering the CB from the north and south were replaced.
- CBR107 was cleaned out in July 2024 and again in December 2024. The filter cloth on the CB grate was replaced in December 2024.

4. Results and Discussion

4.1 Groundwater Elevation Results

Groundwater levels were collected in accordance with the 2024 Groundwater Level Monitoring Program (***Appendix J1***). Groundwater elevations are presented in ***Appendix I***.

In June 2024, groundwater levels were collected where possible at the monitoring wells in the annual program, including three shallow monitoring wells, MW11R2, MW59R and MW60R, installed in June 2024 on City of Peterborough property, in the off-site eastern MNA zone. MW11R2, MW59R and MW60R were installed as replacement wells for MW11R, MW12R, MW59 and MW60, which were previously removed from the program.

Groundwater elevation contours have been prepared using the groundwater levels gauged in June 2024 to illustrate groundwater elevations at the Site and are presented on ***Figure 5***. The highest topographical location at the Site is near MW76, at the northwest corner of the Monaghan Road Property near High Street. Groundwater in the silty sand and gravel alluvium deposit flows in a southeasterly direction under unconfined conditions. The depth of the water table changes from 10.22 mbgs at MW76, at the top of the hill, to 0.13 mbgs at the bottom of the hill at MW72, as the ground surface drops 20 m. The depth of the water table gradually deepens away from the hill. In June 2024, the water table near former Building #4 (at the Facility, near Park Street North), the water table was approximately 2.9 mbgs (the average for MW25, MW26 and MW28).

On October 4, 2014, level loggers were installed at MW61 and MW71 in support of the soil vapour sampling program. Other loggers are deployed across the Site to provide information as needed. In 2024, the level loggers were deployed as follows:

i) at MW61 and MW71 to the south of the Facility in support of the soil vapour sampling program;
ii) at MW70 beneath the Plant Building;
iii) at MW74 at the Monaghan Road Property; and,
iv) at MW32 onsite, adjacent to Parks Avenue North.

Groundwater elevation hydrographs for the period of January 2020 to October 2024 are presented in ***Appendix I***. The hydrographs show some seasonal fluctuations that follow similar trends with each other. Based on the logger in MW74 at the Monaghan Road Property, the groundwater elevation varies by about 1.0 m throughout the year and is the lowest during the summer and fall. At the Facility and off-site south of the Facility, the water table varies by about 0.3 m throughout the year. Overall, other than seasonal variations, the water table at the Facility remained relatively constant throughout the year.

4.2 Groundwater Monitoring Results

4.2.1 Applicable Criteria

For the purposes of assessing the need for additional characterization and delineation of PCBs in groundwater, the generic standards for groundwater, as specified in *Ontario Regulation 153/04, Table 3: Generic Site Condition Standards in a Non-Potable Groundwater Condition for Coarse-Textured Soils* (MOE, 2011a&b) (herein referred to as the "Table 3 SCS") are used as the Applicable Standard for the Site. The PCB Table 3 SCS is 7.8 µg/L.

For the purposes of being protective of the vapour intrusion pathway in a shallow groundwater condition (where the depth to groundwater is <3 mbgs), the T7 Criteria is used. The T7 Criteria for PCB is 1.8 µg/L and is defined as the higher of *Table 7: Generic Site Condition Standards for Shallow Soils in a Non-Potable Groundwater Condition for Coarse-Textured Soils* and Table 7 GW2 Component Value for Volatiles for potentially volatile compounds. For PCBs, the Table 7 GW2 Component Value for Volatiles applies.

4.2.2 Facility Groundwater Quality

This section discusses the 2024 groundwater PCB analytical data from the monitoring wells listed in ***Appendix J1*** as "PCB—Facility, Director's Order" and shown along with groundwater contours on ***Figure 5***. The analytical results are presented in ***Table 4-1*** and ***Appendix C2.*** Laboratory analytical reports for sampling conducted in 2024 are included in ***Appendix D2***.

Table 4-1: 2024 Total PCB Concentrations in Groundwater, Facility

ID	Date	Groundwater Total PCB Concentration (µg/L)	PCB Concentration Over Time Plot
MW25	24-Jun-24	**120 / 130**	Figure 4.1
MW26	24-Jun-24	3.2	Figure 4.2
MW28	24-Jun-24	**81**	Figure 4.3

Notes: # / # → normal environmental sample / field duplicate; ***bold*** *where above Table 3 SCS of 7.8 µg/L*

MW25, MW26, and MW28 are monitoring locations where PCB concentrations have historically been above the Table 3 SCS, as plotted on ***Figures 4.1, 4.2*** and ***4.3***. These monitoring wells are located in the area of the former Building 4 Cover System, which covers the former capacitor manufacturing area. In 2024, PCB concentrations at MW25 and MW28 were above the Table 3 SCS (***Table 4-1***) while MW26 was lower than the Table 3 SCS. All three locations are considered to be in a shallow groundwater condition in June 2024 and all three were above the PCB T7 Criterion of 1.8 µg/L. The three monitoring wells are located in an open parking lot or grassed area.

4.2.3 Groundwater Interaction with Storm Sewer Lines at the Facility

Given the shallowness of the water table, the groundwater contours were transformed into an interpolated water table surface and compared to known storm sewer invert elevations to identify sections of the storm sewer network that may intersect the water table. ***Figure 2*** identifies the portions of storm sewer network where there is a potential for groundwater interaction, and also provides a summary of the locations where potential damage within the storm sewer lines has been detected.

In 2024, PCBs were analyzed in groundwater samples collected from MW25, MW26 and MW28, located in the vicinity of former Building 4 Cover System at the Facility, and results were consistent with historical trends. There is no existing on-site storm sewer line in the immediate area. These monitoring locations are at least 25 m from the nearest storm sewer. Groundwater in this location is unlikely to impact stormwater quality in this area.

4.2.4 Monaghan Road Property Groundwater Quality

The monitoring wells listed in ***Appendix J1*** under the heading of "PCB—Monaghan Road, Director's Order" are shown along with groundwater contours on ***Figure 5***. The PCB analytical results are summarized in ***Table 4-2***.

Table 4-2: 2024 Total PCB Concentrations in Groundwater, Monaghan Road Property

ID	Date	Groundwater Total PCB Concentration (µg/L)
MW35	19 Jun 2024	< 0.01
MW37A	18 Jun 2024	0.06
MW38	18 Jun 2024	0.08
MW73	19 Jun 2024	0.02
MW102	19 Jun 2024	0.07 / 0.07
MW103	19 Jun 2024	< 0.01
MW104	18 Jun 2024	< 0.01

Note: # / # → normal environmental sample / field duplicate

PCBs in groundwater sampled as part of the Director's Order were generally below or near the reporting limit of 0.01 µg/L with two exceptions. All concentrations were below the Table 3 SCS of 7.8 µg/L and the T7 Criterion of 1.8 µg/L.

4.2.5 Groundwater Interaction with Storm Sewer Lines – Monaghan Road Property

Given the shallowness of the water table, the groundwater contours were transformed into an interpolated water table surface and compared to known storm sewer invert elevations to identify sections of the storm sewer network that may intersect the water table. ***Figure 2*** identifies the portions of storm sewer network where there is a potential for groundwater interaction, and also provides a summary of the locations where potential damage within the storm sewer lines has been detected. There are no known potential disconnects with the storm sewer lines at the Monaghan Road Property.

In 2024, PCBs were detected in groundwater adjacent to storm sewer lines as follows:

- **MW37A and MW38**: PCB concentrations in groundwater were 0.06 and 0.08 µg/L.
  These monitoring wells are located on the eastern edge of the asphalt parking lot and are located in close proximity to the storm sewer line connecting C.B.M.H.R130 and STM. MH166904. The PCB concentration at both MW37A and MW38 is below Table 3 SCS and T7 Criterion and groundwater at this location in unlikely to impact stormwater quality.
- **MW73:** PCB concentration in groundwater was 0.02 µg/L

  This monitoring well is located on the western edge of the asphalt parking lot. There is no existing storm sewer line in its vicinity. PCB concentration at MW73 is low. Groundwater at this location is unlikely to impact stormwater quality.
- **MW102**: PCB concentrations in groundwater were 0.0.07 µg/L.
  This monitoring well was installed in 2019, in the centre of the asphalt parking lot and is located approximately 40 m upgradient of a storm sewer line. The PCB concentration is below Table 3 SCS and T7 Criterion and groundwater at this location are unlikely to impact stormwater quality.

4.2.6 Groundwater Monitoring Sampling Plan Recommendations

MECP comments regarding the groundwater component of the 2023 PCB Monitoring Report for Stormwater and Groundwater were received in January 2025 (***Appendix A8***). The MECP reviewer concurred with the conclusions and recommendations with respect to groundwater and agreed with the recommendation to continue with the established groundwater and storm sewer monitoring program and BMPs in 2025.

The 2025 groundwater monitoring program is provided in ***Appendix J1***. The program is consistent with the Director's Order 1-228916698 provided in ***Appendix A5***.

4.3 Storm Sewer Monitoring Results

The purpose of the storm sewer monitoring program is to monitor water and sediment quality at the Site storm sewer outfalls so that recommendations may be made on best management and other measures that may positively affect stormwater quality.

Routine monitoring activities include the inspection and sampling of stormwater and sediment three times per year during or immediately following a rain event at: a) all storm sewer outfalls from the Site; b) at five off-site City storm sewer MHs representative of combined stormwater flow from the Site; and, c) Little Lake outfall representative of

the water in the Little Lake adjacent to the storm sewer entrance. In order to build up a more complete picture of the Site storm sewer system, other relevant on-site CBs and MHs are also inspected, and accumulated sediment sampled annually (see ***Section 2.2***).

Additional sampling and Site investigations are carried out throughout the year to assess the possible factors contributing to outfall monitoring and sampling results. Ongoing BMPs and repair and maintenance activities are conducted to support the monitoring program and improve sediment and stormwater quality. The additional sampling carried out at the Site in 2024 is summarized in ***Section 2.3***. Additional remedial work completed in 2024 is detailed in ***Section 3***.

A table of all historical storm sewer monitoring data are included as ***Appendices C1, C3*** and ***C4*** and a copy is also provided in Excel format. Laboratory analytical reports for sampling conducted in 2024 are included in ***Appendix D1***. .

For reference, a table showing total PCB concentrations compared to Provincial Sediment Quality Guidelines is provided as ***Appendix H***. For samples that exceed the low effect level, the site-specific severe effect level is calculated using TOC concentrations.

Sediment accumulation in CBs and MHs measured across the Site in 2024 is shown on ***Figure 6***. The PCB concentrations in sediment samples collected from CBs and MHs across the Site in 2024 are shown on ***Figure 7***. The results of the surface water flow mapping across the Site are shown on ***Figure 8.*** Soil PCB concentrations collected on-site historically are shown on ***Figures 9*** and ***10.***

The results of the storm sewer monitoring program are presented in detail with tables and figures in ***Appendix K***. The discussions are organized by Zone 1 through 7, and then by Outfall Catchment Area within each Zone (see ***Figure 2***). For each Outfall Catchment Area, the 2024 monitoring results are summarized in tabular format together with the results of any additional sampling carried out within the Outfall Catchment Area. Historical monitoring results for each Outfall Catchment Zone are presented graphically on accompanying figures.

In the box-and-whisker plots on ***Figures 11*** and ***12***, the boxes represent concentrations between the 25th and 75th percentile; the median (or the 50th percentile of an ordered set of samples) is shown as a bar across this box; and the maximum and minimum values by the whiskers above and below the 25th and 75th percentiles (minus any outliers if present). In addition to the box-and-whisker plot, the mean (or average) values are plotted with a brown dot and line. (Note that the greater that the mean value is above the median value: (a) the less likely that the data are “normally” distributed and the more likely the data are “log-normally” distributed; and, (b) the less meaningful other statistics like standard deviation are for an assumed normal distribution.) For this analysis, a PCB concentration below the laboratory reporting limit was assumed to have the value of 50% the laboratory reporting limit. Also added to the plot on ***Figure 11*** is the estimated percentage of stormwater discharge that is represented by each of the zones compare to the total from all the zones together. Details of the methodology used to estimate the percentage of stormwater discharge are presented in ***Appendix G***.

4.3.1 Summary of Stormwater PCB Monitoring Results

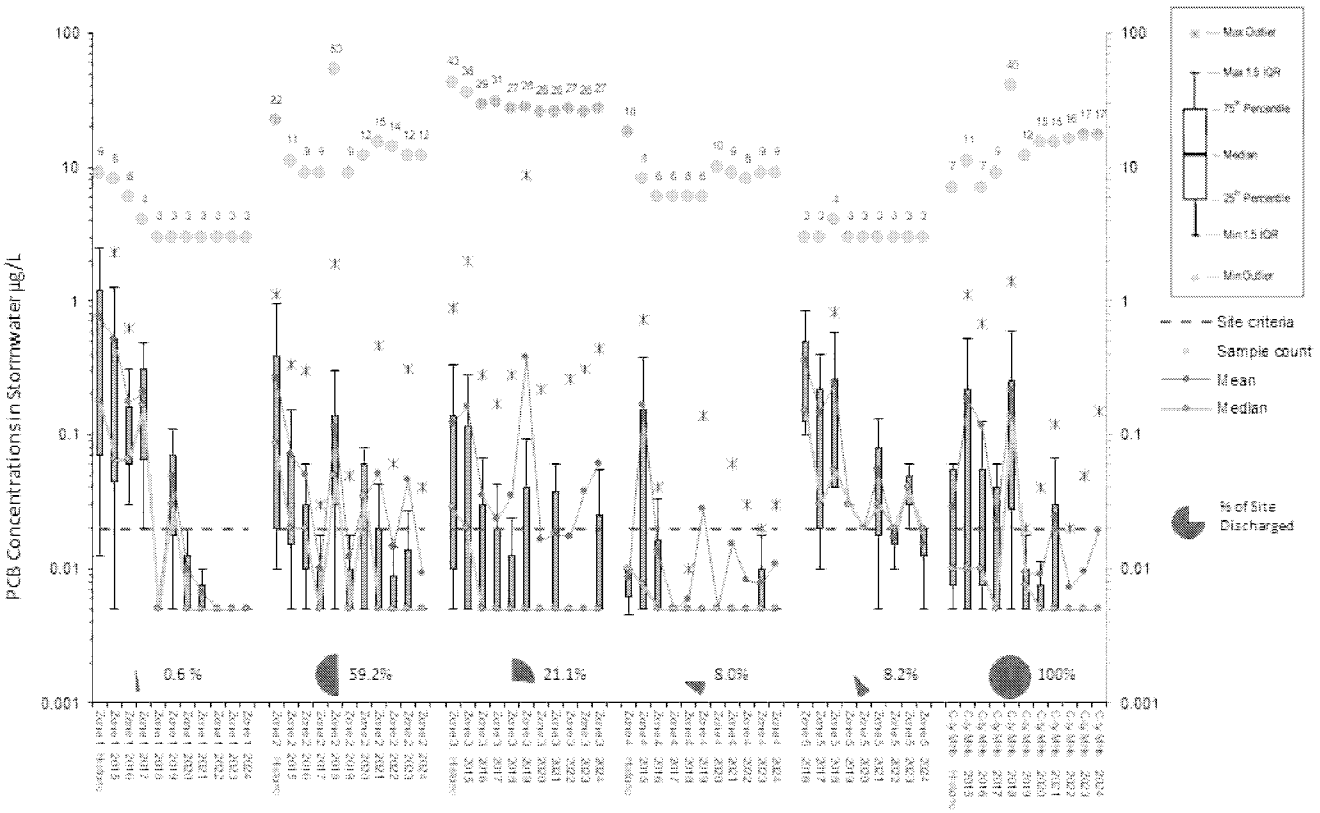
A statistical summary of PCB concentrations in stormwater by Zone is presented in ***Table 4-3*** and the box and whisker plot is presented on ***Figure 11.*** For each Zone, combined historical data from 2012, 2013 and 2014 are compared with annual data from 2015 through 2024. PCB concentrations in stormwater on ***Figure 11*** are compared to the Site Evaluation Criterion and ECA Effluent Quality Objectives of 0.02 µg/L (stormwater criterion). The mean and median PCB concentrations in the stormwater outfalls at Catchment Zones 1, 2, 3, 4, 5 and City MHs are summarized in ***Table 4-3***.

Table 4-3: Summary of Catchment Zones Mean and Median PCB Concentrations in Stormwater

Year	Mean						Median					
	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	City MHs	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	City MHs
<2014	0.76	0.27	0.12	0.01	0.36	0.03	0.18	0.09	0.03	0.01	0.15	0.01
2015	0.51	0.07	0.16	0.17	0.15	0.18	0.07	0.02	0.02	0.01	0.03	0.01
2016	0.17	0.05	0.03	0.01	0.24	0.12	0.07	0.02	0.01	0.01	0.06	0.01
2017	0.21	0.01	0.02	0.01	0.03	0.02	0.17	0.01	0.01	0.01	0.03	0.01
2018	0.01	0.11	0.03	0.01	0.02	0.21	0.01	0.05	0.01	0.01	0.02	0.14
2019	0.05	0.01	0.38	0.03	0.06	0.01	0.03	0.01	0.01	0.01	0.03	0.01
2020	0.01	0.03	0.02	0.01	0.02	0.01	0.01	0.04	0.01	0.01	0.02	0.01
2021	0.01	0.05	0.02	0.02	0.04	0.02	0.01	0.01	0.01	0.01	0.04	0.01
2022	0.01	0.01	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01
2023	0.01	0.05	0.04	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01
2024	0.01	0.01	0.06	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.01

Notes: Concentrations in (µg/L); PCB Concentration below laboratory reporting limit were assumed as half of the reporting limit;
2018 Hydrocarbon sheen event increased the PCB concentration at the Zone 2 outlets;
2019 Building cleaning activities resulted in wash water release into Zone 3 outfall CBR112, subsequently increasing the PCB mean concentration at Zone 3.
2020 Jellyfish OGS construction in MHR41 area increased the PCB concentration in Zone 2 outlet.
2021 Excluding CBR22 data, the 2021 PCB concentrations in stormwater at MHR1 and MHR41 (together making up 99.98% of Zone 2 flow) had a mean of 0.018 µg/L and a median of <0.01 µg/L.
2023 Zone 2 includes data that appears to be an outlier (appears anomalous) that is not consistent with subsequent sampling events

Figure 11: Summary of PCB Concentrations in Stormwater Outfalls by Catchment Zone



While PCB concentrations are generally found in stormwater in all Zones, some Zones are potentially contributing more than others during precipitation events. When the stormwater quality data are reviewed location by location since 2015, improvements in the quality are evident at all locations. The cumulative effects of the BMPs implemented at the Site have resulted in year-over-year improvements of stormwater quality in all zones (***Figure 11)*** between 2015 and 2024. In 2018, Zone 2 and City MHs statistics for water quality in the storm sewers was affected following a water main break under Building 14 and the resulting March 2018 Hydrocarbon sheen event (see ***Table 4-3***). In 2019, Zone 3 statistics for water quality in the storm sewers was affected by a wash water release from the building cleaning activities. In 2024, outlier samples in Zone 3 results in higher mean concentrations while median concentrations remain below the PCB objective of 0.02 µg/L.

The City MH results represent sampling of the combined stormwater discharge from the Site. This includes samples collected STM.MH136551 (Zone 1), STM.MH135686 (Zone 3, 4, 5), STM.MH135683 (All Zones) and STM.MH135703 (All Zones, last MH before Little Lake). The City MHs were sampled during six events in 2024. Mean and median concentrations were 0.02 µg/L and 0.01 µg/L respectively.

- All 17 samples collected at City MHs in 2024 were below the PCB laboratory reporting limit of 0.01 µg/L except for the two samples collected during the May 2024 sampling event at MH135683 and MH135703.

Zone 1 contributes less than 1% of the overall Site stormwater from the only one outfall (CBR35). Stormwater outfall quality from Zone 1 was below the PCB laboratory reporting limit of 0.01 µg/L in three out of three events in 2024.

Zone 2 contributes approximately 59% of the overall Site stormwater (***Appendix G***). There are two outfalls within Zone 2, MHR1 (44.0% of Site stormwater) and MHR41 (15.2% of Site stormwater). Mean and median PCB concentrations were 0.02 µg/L and 0.01 µg/L respectively for Zone 2.

- Largest volume outfall MHR1 showed PCB concentrations below the laboratory detection limit of 0.01 µg/L in six out of six sampling events in 2024.
- The concentration of PCBs was at or below or at the Site criterion of 0.02 µg/L in stormwater at MHR41 in five out of six sampling events in 2024.

Zone 3 contributes approximately 21% of the overall Site stormwater. PCB concentrations were below or at the Site criterion of 0.02 µg/L in stormwater in 7 out of 9 outfalls sampled during the 2024 monitoring events. Mean and median PCB concentrations were 0.06 µg/L and 0.01 µg/L respectively for Zone 3.

- The highest PCB concentrations in stormwater in 2024 were detected at CBR94 and CBR107 with a mean concentration in 2024 of 0.36 µg/L and 0.12 µg/L respectively.
- Out of the other seven outfalls within Zone 3, a PCB concentration above the laboratory reporting limit was only detected once out of 21 samples.
- The mean and median PCB concentrations in Zone 3 excluding CBR94 and CBR107 were both 0.01 µg/L.
- The outfall from CBR107 to Albert Street was restored as part of general restoration activities in the area south of Building 30 that were completed in fall 2023. Additional maintenance work was carried out at CBR107 in November 2024 to reduce water potentially infiltrating the CB structure from below ground surface.
- CBR94 and CBR107 were cleaned out in December 2024 following the November sampling event.

Zone 4 contributes stormwater discharge from the south part of the Monaghan Road Property (approximately 8% of the overall Site stormwater discharge). PCB concentrations were below or at the Site criterion of 0.02 µg/L in stormwater in 7 out of 9 outfall samples collected during the 2024 monitoring events. Mean and median PCB concentrations were 0.01 µg/L and 0.01 µg/L respectively for Zone 4.

Zone 5 contributes all the stormwater discharge from the north part of the Monaghan Road Property (approximately 8% of the discharge from the Site). Zone 5 outfall (STM.MH166902 that collects all the stormwater from Zone 5) mean PCB concentration was 0.02 µg/L in 2024.

Zones 6 and 7 (not included in ***Table 4-3*** or ***Figure 11***) account for the remaining Site stormwater discharge from Park Street Property (1.1% of the discharge from the Site) and Rink Street Property (1.8% of the discharge from the Site). There is no specific stormwater monitoring outfall for these Zones but outfall from these zones are sampled as part of the stormwater monitoring activities at STM.MH135683 (the point of convergence of stormwater from the Site).

Little Lake receives the water from the Site and the surrounding City of Peterborough properties. Little Lake 15 m downstream of the storm sewer outlet was sampled 3 times for PCBs in surface water in 2024. The PCB concentrations were below the laboratory reporting limit during all three sampling events. This is consistent with monitoring results since sampling at this location began in 2018.

4.3.2 Summary of Sediment PCB Monitoring Results

A statistical summary of PCB concentrations in sediment accumulated in on-site CBs and MHs is presented in ***Table 4-4*** and the box and whisker plot on ***Figure 12***. For each Zone, combined historical data from 2012, 2013 and 2014 are compared with annual data from 2015 through 2024. These data only includes samples collected during the annual CB/MH inspection event and does not include samples collected during outfall sampling events.

PCB concentrations in sediment on ***Figure 12*** are compared to the Site Evaluation Criterion of 0.2 µg/g (sediment criterion). Sediment loading to the storm sewers has been reduced with the annual CB cleanout events, Site sweeping activities, and other Site management and containment BMP controls, which has also contributed to a reduction in PCB concentrations over time.

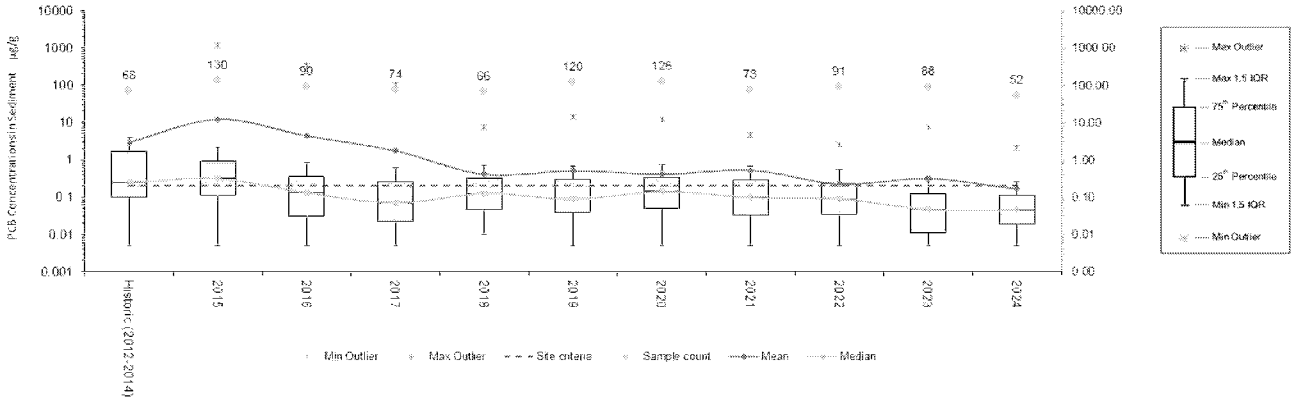
Median PCB concentrations in CB/MH sediment have been below the Site Evaluation Criterion of 0.2 µg/g (sediment criterion) since 2016. Median PCB concentrations in CB/MH sediment in 2024 was 0.05 µg/g, equal to the 2023 median and the lowest since sampling started in 2012. Mean PCB concentrations in CB/MH sediment in 2024 was 0.17 µg/g, below the Site Evaluation Criterion and the lowest since the sampling started in 2012. The 75th percentile PCB concentration was below the sediment criterion of 0.2 µg/g for the second consecutive year.

Table 4-4: Summary of the Max, Median and Mean Concentrations in Sediment

Measurement	Historical (2012-2014)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Sample Location count	68	129	89	73	66	120	126	73	91	88	52
Max	65.95	1200	350	100	7.3	14	12	4.7	2.5	7.6	2.2
Median	0.25	0.32	0.13	0.07	0.13	0.09	0.14	0.1	0.09	0.05	0.04
Mean	2.91	11.89	4.29	1.73	0.41	0.51	0.41	0.53	0.23	0.32	0.17

Notes: Data used in this table includes only samples collected during annual CB/MH inspection (and does not include sediment samples collected during outfall sampling events).
Concentrations in (µg/g); PCB Concentration below laboratory reporting limit were assumed as half of the reporting limit.

Figure 12: Summary of PCB Concentrations in Sediment



Notes: Concentrations in (µg/g); PCB Concentration below laboratory reporting limit were assumed as half of the reporting limit

Sediment was sampled from nine city MHs. All nine MHs showed PCB concentrations below the Site Evaluation Criterion of 0.2 µg/g in 2024.

One sediment sample was collected from Zone 1 during the spring CB/MH inspection event at CBR36. PCB concentrations was 0.019 µg/g. Sufficient sediment accumulation for sampling was observed at CBR35 during the July and November outfall sampling events; the maximum PCB concentration was 0.83 µg/g.

Sediment sampled from Zone 2 Catchment during the spring CB/MH inspection showed PCB concentrations below the Site Evaluation Criterion of 0.2 µg/g in seven out of 31 locations sampled in 2024. The highest concentration of PCB in accumulated sediment was 2.2 µg/g, which was observed at CBR3. This was also the highest PCB concentration detected in sediment samples across the Site in 2024.

Sediment sampled from Zone 3 Catchment during the spring CB/MH inspection showed PCB concentrations below the Site Evaluation Criterion of 0.2 µg/g in eight out of eight CBs/MHs sampled in 2024. The highest PCB concentration of 0.13 µg/g was observed at CBR78.

Sediment sampled from Zone 4 Catchment during the spring CB/MH inspection showed PCB concentrations below the Site Evaluation Criterion of 0.2 µg/g in three out of three CBs/MHs sampled in 2024.

Sediment sampled from Zone 5 Catchment during the spring CB/MH inspection showed PCB concentrations below the Site Evaluation Criterion of 0.2 µg/g in the one CBs/MHs that had sufficient sediment for sampling in 2024. The highest PCB concentration detect in this zone was 0.064 µg/g at MH166902.

Sediment was not sampled at Zone 6 or 7 CBs/MHs in 2024 as the accumulated material was gravel that could not be sampled as sediment.

A total of 46 CB/MHs containing sediment and gravel were cleaned out in two separate events in July and October of 2024. CBR94, CBR107, and CBR140 were cleaned a second time in December 2024.

4.3.3 ECA sampling

In September 2019, ECA sampling was added to the stormwater outfall sampling program. As part of the ECA 8032-BEJNAK MHR1, MHR41 and MH135683 are sampled six times in a year for Total PCBs, Polycyclic Aromatic Hydrocarbons (PAHs), Oil and Grease, Total Suspended Solids (TSS), pH, and temperature during a 10 mm rain

event. Stormwater quality is compared to yearly average concentration effluent objectives at MHR1 and MHR41 for Oil and Grease, TSS, Total PCB, and Total PAH.

Results of the ECA sampling for PCBs are included in the discussions on stormwater and sediment data and results in ***Sections* 4.3.1** and **4.3.2** above. Stormwater quality met all the ECA yearly average objectives for all the other parameters (PAHs, Oil and Grease, pH, temperature and Total Suspended Solids) at MHR1 and MHR41.

Total PCB concentrations are compared to the yearly average concentration ECA objective of 0.02 µg/L. In 2024, the yearly average concentration for Total PCB at MHR1 and MHR41 was <0.01 µg/L and 0.013 µg/L respectively.

Total PAH concentrations are compared to the yearly average concentration ECA objective of 2 µg/L. In 2024, the Total PAH concentrations at all three monitoring locations were at or below the laboratory detection limit during all six sampling events except for the May 27th 2024 event where Total PAH concentrations at MHR1 and MHR41 were 3 µg/L and 2 µg/L respectively. In 2024, yearly average Total PAH concentrations at MHR1 and MHR41 were 0.54 µg/L and 0.38 µg/L.

Oil and Grease concentrations are compared to the yearly average concentration ECA objective of 15 mg/L. In 2024, yearly average Oil and Grease concentrations at MHR1 and MHR41 were 0.8 mg/L and 0.8 mg/L.

TSS concentrations are compared to the yearly average concentration ECA objective of 25 mg/L. In 2024, yearly average TSS concentrations at MHR1 and MHR41 were 7.8 mg/L and 4.0 mg/L.

pH and temperature measurements are compared to the City of Peterborough By-Law for discharge to sewers. All measurements were within the pH range of >6.0 and <9.5 and below the temperature criterion of 40°C.

4.3.4 Storm Sewer Monitoring Program Recommendations

MECP comments regarding the surface water component for the 2023 PCB Monitoring Report for Stormwater and Groundwater (2023 Report) were received in September 2024 (see ***Appendix A9***).

The MECP reviewer concurred with the conclusions of the 2023 Report that in general stormwater quality and sediment concentration in 2023 were better than previous years. PCB concentrations in stormwater and sediment related to the Site continue to improve showing that BMPs employed at the site are effective. The reviewer provided five recommendations; these are listed below with AECOM's response provided in italics.

1. BMPs should continue as planned.

   Response: The 2024 and proposed 2025 BMPs are consistent with 2023 BMPs.

2. All sampling events should use the same MDL.

   Response: All submissions to the laboratory include the request for same low-level reporting/method detection limits (RDL/MDL). However, as the requested RDL/MDL are at the lowest end of what is practical, the laboratory may on occasion be required to adjust RDL/MDL to meet quality control requirements.

   Regarding PAH analysis, two separate analyses with different RDL/MDL will continue to be requested where PAH samples are submitted for analysis:

   - *Total PAH (which is referenced in the ECA objective and which has a higher RDL/MDL); and,*
   - *O.Reg 153 PAH (which has a lower RDL/MDL and includes individual PAHs).*

3. The George St. manhole which is just upgradient of the discharge to Little Lake should be sampled more frequently after significant rain events for PCBs and PAHs.

Response: *This location has been sampled six times per year for PCBs (instead of three times per year) in response to Ministry comments received in May 2023. This change was implemented during the July 2023 and was added to the revised Director's Order Number 1-228916698 dated March 6th, 2024.*

As noted in MECP's comments, there are multiple stormwater sources that contribute to stormwater outfall to Little Lake apart from the Site. Sources include neighbouring industrial properties as well as general urban runoff from nearby roadways and parking lots.

Due to the comingling of stormwater sources at the George St. maintenance hole and the Little Lake 15 m sample locations, PAH results collected from the George St. maintenance hole would not be representative of stormwater leaving the Site; therefore, the addition of PAH analysis at the George St. maintenance hole is not recommended.

PCBs will continue to be monitored at this sampling location in accordance with the current sampling plan.

The samples collected from MHR1, MHR41, and MHR135683 are representative of the stormwater samples collected at the Site and will continue to be collected and analyzed for PAH.

4. Little Lake at 15 m should also be sampled for PAHs.

Response: *As noted above, there are multiple stormwater sources that contribute to stormwater outfall to Little Lake apart from the Site; therefore, the addition of PAH analysis at the Little Lake 15 m location is not recommended as it would not be reflective of stormwater from the Site.*

PCBs will continue to be monitored at this sampling location in accordance with the current sampling plan.

The samples collected from MHR1, MHR41, and MHR135683 are representative of the stormwater samples collected at the Site and will continue to be collected and analyzed for PAH.

5. Sediment at MHR1 and MHR41 should be sampled.

Response: *Sediment sampling at MHR1 and MHR41 are part of the sampling program; however, no sediment has been observed at these locations since 2015 (3 cm at MHR41).*

The 2025 stormwater monitoring program is provided in ***Appendix J2***. The program is consistent with ECA 8032-BEJNAK and the Director's Order 1-228916698, provided in ***Appendices A4*** and ***A5***.

5. Summary of Findings and Recommendations

5.1 Findings

The following provides a summary of the main findings derived from the 2024 monitoring programs and other activities.

Groundwater PCB Monitoring Program

i) At the Facility, MW25, MW26, and MW28 are located in the northern area of the former Building 4 Cover System, which cover the former PCB Waste Storage Area. PCB concentrations are consistent with historical trends. These monitoring locations are at least 25 m from the nearest storm sewer.

ii) While there is evidence that some existing on-site storm sewer lines at the Facility are below the water table, historically, sampling results at the Facility, other than those around former Building 4 Cover System, show PCB concentrations that are low to below the reporting limit. Dissolved PCBs in groundwater are unlikely to impact stormwater quality.

iii) At the Monaghan Road Property, PCB groundwater concentrations at the monitoring wells that were sampled in 2024 were either below the reporting limit, or when detected were below the Table 3 SCS of 7.8 µg/L and T7 Criterion of 1.8 µg/L.

Best Management Practices

BMPs implemented at the Site are based on feedback from the storm sewer monitoring program. The BMPs have resulted in a year-over-year improvement in stormwater and sediment quality since 2015. BMPs undertaken at the Site in 2024 included:

i) Paved areas of the Facility and Monaghan Road Property were swept in May and June 2024 to minimize the potential for sediment loading to CBs and MHs.

ii) Maintenance of paved areas of the Facility was conducted to fill and patch potholes and resurface areas of damaged asphalt.

iii) A total of 162 CBs and MHs at the Facility and Monaghan Road Property and 17 MHs on the City of Peterborough roadways were inspected in May and June 2024.

iv) A total of 46 CB/MH were cleaned out in July and October 2024 to remove accumulated sediment to minimize the potential for accumulated sediment to impact stormwater quality.

v) Jellyfish OGS sumps and filters were cleaned in October 2024 following routine inspection.

vi) Filter cloths were inspected and replaced as needed at all the CBs where surface soil is suspected to be a contributor of sediment in stormwater.

vii) The Site Soil Management Plan (***Appendix E2***) provides requirements to minimize soil disturbance and sediment transport at the Site was implemented where applicable.

The outfall from CBR107 to Albert Street was restored as part of general restoration activities in the area south of Building 30 that were completed in fall 2023. Additional maintenance work was carried out at CBR107 in November 2024 to reduce water potentially infiltrating the CB structure from below ground surface.

Storm Sewer Monitoring Program

The cumulative effect of the BMPs implemented at the Site has resulted in a year-over-year improving trend of stormwater and sediment quality from 2015 through 2024 (see ***Figure 11*** and ***Figure 12***). PCB concentrations in stormwater and sediment in CB/MHs are compared to the Site Evaluation Criterion and ECA Effluent Quality Objectives of 0.02 µg/L (stormwater) and 0.2 µg/g (sediment). As with previous years, the results of monitoring and investigations are used to refine the BMP program at the Site. A summary of 2024 outfall monitoring data for each Zone is provided below.

Zone 1 – Facility (Wolfe Street)

i) Zone 1 which consists of only CBR35 catchment area, contributes less than 1% of the overall Site stormwater.

ii) CBR11 was decommissioned in 2019 and removed from the outfall sampling program in 2020. CBR35 is the only remaining active outfall in Zone 1.

iii) CBR35 Outfall was separated from the local traffic with concrete barriers in 2020.

iv) The concentrations of PCBs in stormwater at CBR35 outfall was below the laboratory detection limit of 0.01 µg/L in all three sampling events in 2024.

v) The mean PCB concentrations in sediment sampled from the two CBs in CBR35 was 0.42 µg/g in 2024.

vi) CBR36 with detectable PCBs in sediment in Zone 1 were cleaned out in July 2024.

Zone 2 – Facility (Park Street)

i) Zone 2 contributes approximately 59% of the overall Site stormwater from the three catchments MHR1 (44%), MHR41 (15%).

ii) In 2024, the mean and median concentration of PCBs in stormwater at the Zone 2 outfalls were both 0.01 µg/L.

   a. The concentration of PCBs in stormwater at MHR1 was below the laboratory detection limit of 0.01 µg/L in six out of six sampling events in 2024.
   b. The concentration of PCBs in stormwater at MHR41 was at or below the Site criterion of 0.2 µg/L in five out of six sampling events and 0.04 µg/L during the sixth sampling event.

iii) Sediment sampled from Zone 2 Catchment showed PCB concentrations below the Site criterion of 0.2 µg/g in seven out of 31 locations sampled in 2024. Highest concentration of PCB in accumulated sediment was 2.2 µg/g, which was observed at CBR3. This was also the highest concentration observed across the Site in 2024.

iv) All accessible CBs/MHs containing measurable amounts of sediment with PCB concentrations above the Site criterion were cleaned out in July and October 2024.

Zone 3 — Facility (Albert Street)

i) Zone 3 contributes approximately 21% of the overall Site stormwater.

ii) Mean and median PCB concentrations in stormwater at the Zone 3 outfalls were 0.06 µg/L and 0.01 µg/L respectively. PCB concentrations were below or at the Site criterion of 0.02 µg/L in stormwater in 7 out of 9 outfalls sampled during the 2024 monitoring events (at all outfalls except CBR94 and CBR107).

iii) Sediment sampled from Zone 3 Catchment during the spring CB/MH inspection showed PCB concentrations below the Site Evaluation Criterion of 0.2 µg/g in eight out of eight CBs/MHs sampled in 2024. The highest PCB concentration of 0.13 µg/g was observed at CBR78.

iv) All accessible CBs/MHs containing measurable amounts of sediment with PCB concentrations above the Site criterion were cleaned out in July and October 2024. Following the December outfall sampling event, CBR94 and CBR107 were cleaned a second time.

Zone 4 – Monaghan Road Property

i) Zone 4 contributes approximately 8% of the overall Site stormwater.

ii) PCB concentrations in stormwater were below or at the Site criterion of 0.02 µg/L in 7 out of 9 outfall samples collected during the 2024 monitoring events. Mean and median PCB concentrations were 0.01 µg/L and 0.01 µg/L respectively for Zone 4.

iii) Sediment sampled from Zone 4 Catchment during the spring CB/MH inspection showed PCB concentrations below the Site Evaluation Criterion of 0.2 µg/g in three out of three CBs/MHs sampled in 2024.

iv) CBR127 and CBR128 containing measurable amounts of sediment with PCB concentrations above the Site criterion were cleaned out in October 2024.

Zone 5 – Monaghan Road Property (Gravel Parking Lot)

i) Zone 5 contributes approximately 8% of the overall Site stormwater.

ii) Some of the surface water from an area at the north of the Monaghan Road property flows overland toward City CBs and MHs located on Monaghan Road. This area was defined as Zone 5 in 2015 and in 2016 MH166902 was established as the outfall monitoring location for Zone 5. CBR140 and CBR142 Outfalls were included in the sampling program per the Director's Order 1-228916698 but are not considered outfalls.

iii) Zone 5 outfall (STM.MH166902 that collects all the stormwater from Zone 5) mean PCB concentration was 0.02 µg/L in 2024.

iv) Sediment sampled from Zone 5 CBs/MHs showed PCB concentrations below the Site criterion of 0.2 µg/g in the one CBs/MH that had sufficient sediment for sampling in 2024.

v) Sediment in CBR140 was cleaned out in October and December 2024.

Zone 6 – Park Street Property

i) Zone 6 contributes approximately 1% of the overall Site stormwater.

ii) Some of the surface water from this area flows overland toward City CBs and MHs located on Townsend, Park and Rubidge Streets. There are no outfall stormwater monitoring locations for this Zone.

iii) Sediment was not sampled at Zone 6 CBs/MHs in 2024 as the accumulated material was gravel that could not be sampled as sediment.

Zone 7 – Rink Street Property

i) Zone 7 contributes approximately 2% of the overall Site stormwater.

ii) Some of the surface water from this area flows overland toward city CBs and MHs located on Rubidge and Park Streets. There are no outfall monitoring locations for this Zone.

iii) Sediment was not sampled at Zone 7 CBs/MHs in 2024 as the accumulated material was gravel that could not be sampled as sediment.

City Storm Sewer MHs

i) The City MHs were sampled during six events in 2024 (three times at the four MH and three additional times at STM.MH135683 and at STM.MH135703).

ii) All 17 samples collected at City MHs in 2024 were below the PCB laboratory reporting limit of 0.01 µg/L except for the two samples collected during the May 2024 sampling event at MH135683 and MH135703. Mean and median concentrations were <0.02 µg/L and <0.01 µg/L respectively.

a. City STM.MH136551 receives stormwater from Zone 1. PCB concentrations in stormwater at STM.MH136551 was below the laboratory reporting limit for PCBs of 0.01 µg/L during all three sampling events in 2024. There was insufficient sediment for sampling during all events.

b. City STM.MH135686 receives stormwater from Zone 3, 4 and 5. PCB concentrations in stormwater at STM.MH135686 were below the laboratory reporting limit of 0.01 µg/L PCBs during two out of two sampling events in 2024. There was insufficient water to sample during the third outfall sampling event. There was insufficient sediment for sampling during all events.

c. City STM.MH135683 receives stormwater from all the zones. PCB concentrations in stormwater at STM.MH135683 were below the laboratory reporting limit of 0.01 µg/L PCBs during five out of six sampling events and 0.15 µg/L during the other sampling event in 2024. There was insufficient sediment for sampling during all events.

d. City STM.MH135703 receives stormwater from all the zones and is the last MH before the Little Lake outlet. PCB concentrations in stormwater at STM.MH135703 were below the laboratory reporting limit of 0.01 µg/L PCBs during five out of six sampling events and 0.1 µg/L during the other sampling event in 2024. There was insufficient sediment for sampling during all events.

iii) Little Lake outfall receives the water from the Site and the surrounding City of Peterborough properties. Little Lake near the storm sewer outlet was sampled three times for PCBs in surface water in 2024. The PCB concentrations have consistently been below the laboratory reporting limit during all three sampling events.

ECA Sampling

i) Under ECA #8032-BEJNAK, stormwater is sampled at STM.MH136683, MHR1 and MHR41 at least six times per year and the results are compared to yearly average concentration effluent objectives at MHR1 and MHR41 for Oil and Grease, TSS, Total PCB, and Total PAH.

ii) In 2024, the yearly average concentration for Total PCB at MHR1 and MHR41 was < 0.01 µg/L and 0.013 µg/L respectively.

iii) Oil and Grease, TSS, and Total PAH concentrations were below the respective yearly average concentration ECA objectives of 15 mg/L, 25 mg/L, and 2 µg/L.

5.2 Recommendations

Based on the results of the 2024 programs, the following recommendations are provided.

Groundwater PCB Monitoring Program

The 2025 groundwater monitoring program is presented in ***Appendix J3***. No changes to the program will be made based on MECP comments in ***Appendix A8***.

Best Management Practices

Existing BMPs should be continued to minimize potential for sediment loading to the storm sewer system including:

i) Sweeping the paved areas of the Site following snow melt in spring 2025.
ii) Inspection of all accessible CBs and MHs at the Site and removal of accumulated sediment where warranted based on results of the inspection.

iii) Continue to repair CBs and MHs as required to maintain the integrity of the system.
iv) Maintenance of the CB filter cloth inserts where appropriate.
v) Maintain all the implemented BMPs at Monaghan Road Property and the Facility.
vi) Based on the results of ongoing monitoring activities, implement additional BMPs as required including BMPs targeted at specific zones or sub-catchment areas of the Site.

Storm Sewer Monitoring Program

i) Monitoring stormwater and storm sewer sediment quality should continue in 2025 in accordance with the Director's Order Number 1-228916698 and ECA 8032-BEJNAK. No changes to the program will be made based on MECP comments in ***Appendix A9***.
ii) Monthly inspections of the Monaghan Road Parking Area each month should continue in 2025 as required under the Director's Order Number 1-228916698.

Zone 1 – Facility (Wolfe Street)

i) Established BMPs should be maintained including concrete barriers to minimize vehicle and other site traffic and sediment control measures along the grass / asphalt interface.

Zone 2 – Facility (Park Street)

i) Established BMPs should be maintained, and the monitoring of stormwater should continue in 2025 to establish whether any further investigation of possible sources of PCBs in stormwater is warranted.
ii) Jellyfish OGS filters should be inspected in the spring and cleaned as required.

Zone 3 — Facility (Albert Street)

i) Established BMPs around CBR 82, MHR35, CBR94, CBR111 and CBMHR113 should be maintained including concrete barriers to minimize vehicle and other site traffic and maintaining the condition of asphalt surface cover as required.
ii) Storm sewer connections at CBR94 outfall should be evaluated to determine if the pipe entering CBR94 from the west can be sealed permanently without adverse impacts to stormwater drainage and the integrity of the adjacent Building 8.
iii) Ongoing monitoring of CBR107 outfall should continue to ensure stormwater quality continues to improve following the maintenance work completed in fall 2024.

Zone 4 – Monaghan Road Property (Paved Area)

i) Asphalt cover should continue to be monitored as required under the Director's Order and any damage to the integrity of the cover should be repaired.

Zone 5 – Monaghan Road Property (Gravel Parking Lot)

i) Surface cover and berms should continue to be monitored and maintained in good condition.
ii) Ongoing monitoring of CBR140 and CBR141 outfall should continue to ensure stormwater quality continues to improve following the maintenance work completed in fall 2024.

City Storm Sewer MHs

i) Accumulated sediment in MHs upstream of STM.MH166902 bordering the Site should be monitored and cleaned out if needed in 2025.

6. Glossary

Borehole log—*in drilling*, the record of geologic units penetrated, drilling progress, depth, water level, sample recovery, volumes and types of materials used, and other significant facts regarding the drilling of an exploratory borehole or well. ASTM D653

Chlorinated Solvent—an organic solvent containing chlorine atoms (e.g., methylene chloride and 1,1,1-trichloromethane). Uses of chlorinated solvents include aerosol spray containers, in highway paint, and dry cleaning fluids. EPA

Cross Contamination—the movement of underground contaminants from one level or area to another due to invasive subsurface activities. EPA

Decontamination—the process of washing and rinsing to remove contaminated material; applies to all equipment that can or has come into contact with contaminants. MFE

Dissolved Oxygen (DO)—the oxygen freely available in water, vital to fish and other aquatic life and for the prevention of odours. EPA

Equipotential line—*in geohydrology/hydrogeology*, a line connecting points of equal hydraulic head. A set of such lines provides a contour map of a potentiometric surface. ASTM D5270

Extraction Well—a discharge well used to remove groundwater. EPA *(Note: also known as pumping well)*

Field blanks—QC samples used to indicate potential contamination from ambient air and sampling instruments (also ambient blanks).

Groundwater flow—the movement of water in the zone of saturation. ASTM D653

Head—pressure at a point in a liquid, expressed in terms of the vertical distance of the point below the surface of the liquid. ASTM D653

Holding Time—elapsed time between sample collection and commencement of sample preparation or analysis, as appropriate. Analytical Protocol O. Reg. 153/04

Hydraulic Conductivity—the rate at which water can move through a permeable medium. (i.e., the coefficient of permeability) EPA

Hydraulic Gradient— hydraulic gradient, i (D), n—*in hydraulics*, the change in total head (head loss, Dh) per unit distance (L) in the direction of fluid flow, in which i = Dh/L. ASTM D653

Immiscibility—the inability of two or more substances or liquids to readily dissolve into one another, such as soil and water. Immiscibility **T**he inability of two or more substances or liquids to readily dissolve into one another, such as soil and water. EPA

Impermeable—not easily penetrated. The property of a material or soil that does not allow, or allows only with great difficulty, the movement or passage of water. EPA

Indicator Parameters—chemical parameters, including pH, specific conductance, temperature and dissolved oxygen content, which are used to determine when formation water is entering an observation well. ASTM D5521

Laboratory Duplicate—PAIRED analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement. Maxxam

Laboratory QC Standard—a blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery. Maxxam

Laboratory Spiked Blank—a blank matrix to which a known amount of the analyte has been added. Used to evaluate analyte recovery. Maxxam

Laboratory Method Blank—a blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination. Maxxam

Laboratory Surrogate—a pure or isotopically labelled compound whose behaviour mirrors the analytes of interest. Used to evaluate extraction efficiency. Maxxam

Lithology—mineralogy, grain size, texture, and other physical properties of granular soil, sediment, or rock. EPA

Method Blank—blank sample which undergoes sample processing identical to that carried out for the test samples. Method Blank results are used to assess contamination from the laboratory environment and reagents. Analytical Protocol O. Reg. 153/04

Mini-Piezometer—a non-pumping well, generally of small diameter, for measuring the elevation of a water table and to sample groundwater. Generally shallow and installed manually.

Monitoring well—a well that is constructed by one of a variety of techniques that may serve a variety of purposes: (1) extracting groundwater for physical, chemical, or biological testing; (2) measuring water levels; (3) measuring formation hydraulic parameters; or (4) measuring formation fluid chemical or physical parameters. ASTM D5521

Parameter—parameter to be tested and is synonymous with other terminology such as "contaminant", "target analyte", or "analyte" which may be used in the regulation or other documents related to O.Reg. 153/04. Analytical Protocol O. Reg. 153/04

Permeability—the rate at which liquids pass through soil or other materials in a specified direction.

pH—an expression of the intensity of the basic or acid condition of a liquid; may range from 0 to 14, where 0 is the most acid and 7 is neutral. Natural waters usually have a pH between 6.5 and 8.5. EPA

Polychlorinated Biphenyls—a group of toxic, persistent chemicals used in electrical transformers and capacitors for insulating purposes, and in gas pipeline systems as lubricant. EPA

Potentiometric Surface—*in geohydrology/hydrogeology*, an imaginary surface representing the static head of groundwater. The water table is a particular potentiometric surface. ASTM D5092 DISCUSSION—Where the head varies with depth in the aquifer, a potentiometric surface is meaningful only if it describes the static head along a particular specified surface or stratus in that aquifer. More than one potentiometric surface is required to describe the distribution of head in this case.

Purging—removing stagnant air or water from sampling zone or equipment prior to sample collection. EPA

Quality Assurance (QA)—a system of planned activities intended to provide adequate confidence that quality requirements are being met. QA is one element of the quality system. Analytical Protocol O. Reg. 153/04

Quality Control (QC)—a set of operational techniques and activities intended to ensure that quality requirements are actually being met within known probability limits. Quality control is one part of the quality system. Analytical Protocol O. Reg. 153/04

Reporting Limit (RL)—also detection limit (RDL); concentration at which a single analysis using the methods and matrices listed in the analytical protocol document will consistently detect target analytes when present. The RL must be equal to or greater than the MDL. Analytical Protocol O. Reg. 153/04

Relative Percent Difference (RPD)—difference between two results expressed as a percentage of the average result. RPD =[$(x_1 + x_2)$/ $[(x_1 + x_2)/2]]$ x 100. Analytical Protocol O. Reg. 153/04

Screened Interval—*in well construction*, the interval in a geologic formation where a well is screened, allowing the water to enter the well if a portion of the screened interval is saturated.

Static Water Level—attained by water at equilibrium in a well when no water is being taken from the well O.Reg. 903

Stratigraphy—study of the formation, composition, and sequence of sediments, whether consolidated or not. EPA

Sump—a blank extension of easing beneath the well screen that provides a space for sediment brought into the well during development to accumulate. ASTM D5521

Topography—the physical features of a surface area including relative elevations and the position of natural and man-made (anthropogenic) features. EPA

Travel Blank—QC samples used to identify cross-contamination from sample transport or storage, and used when sampling for volatiles. MFE

Travel Spike—QC samples used to evaluate potential contamination or sample degradation from sample transport or storage, and used when sampling for volatiles.

Water table (groundwater table)—*in geohydrology/hydro-geology*, the surface of a groundwater body at which the water pressure equals atmospheric pressure. ASTM D653 DISCUSSION—Earth material below the groundwater table is saturated with water. It is common practice to determine the water table using a monitoring (observation) well or piezometer, or both.

Weathering—the process of disintegration and decomposition as a consequence of exposure to the atmosphere, to chemical action, and to the action of frost, water, and heat. ASTM D653

Well screen—perforated pipe or tubing, unsealed concrete tiles or other material installed in a well to filter out particulate matter and form the water intake zone O.Reg. 903 —a filtering device that allows groundwater to flow freely into a well from the adjacent formation, while minimizing or eliminating the entrance of fine-grained material into the well. ASTM D5521

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Figures

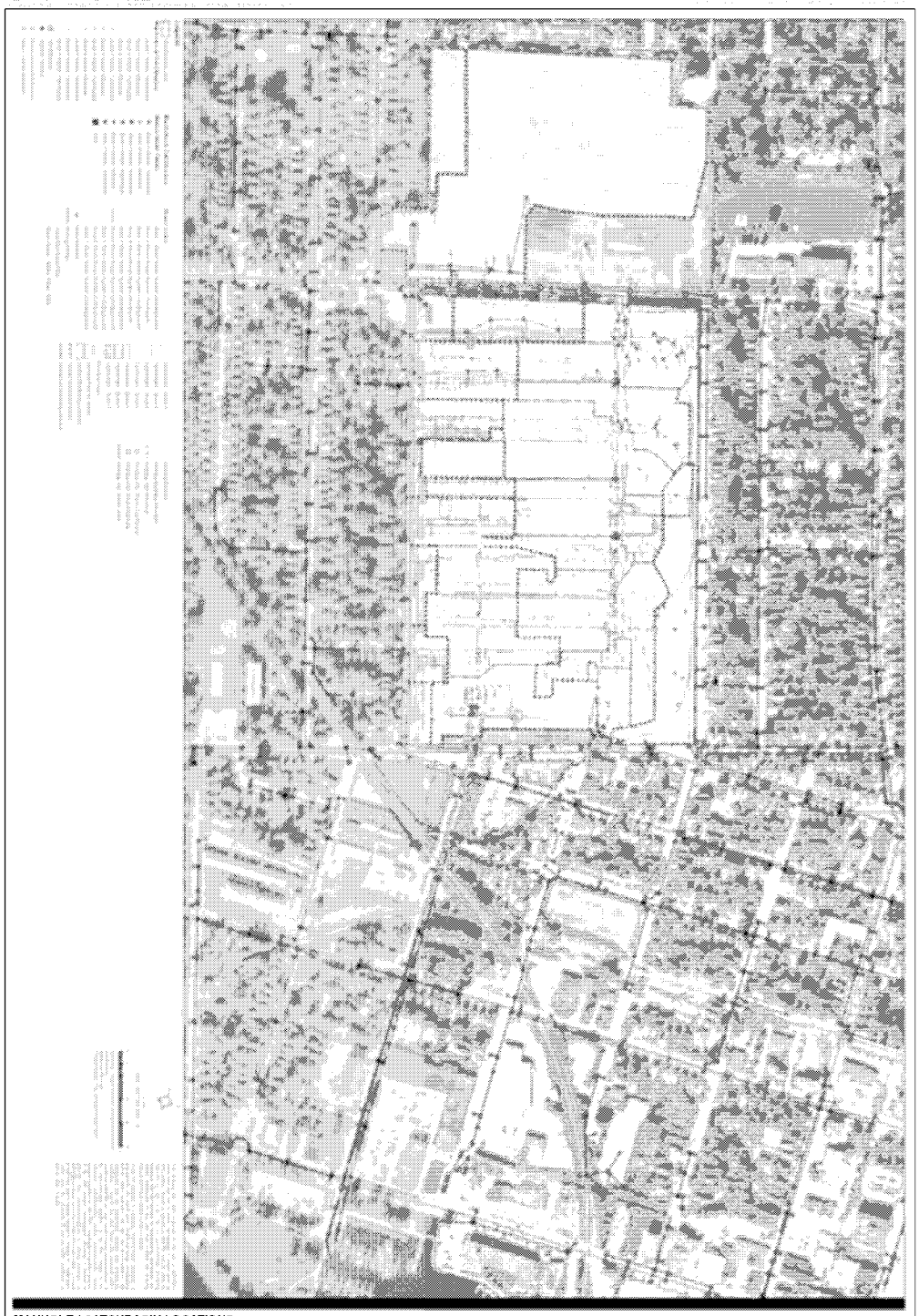
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Figure: 01

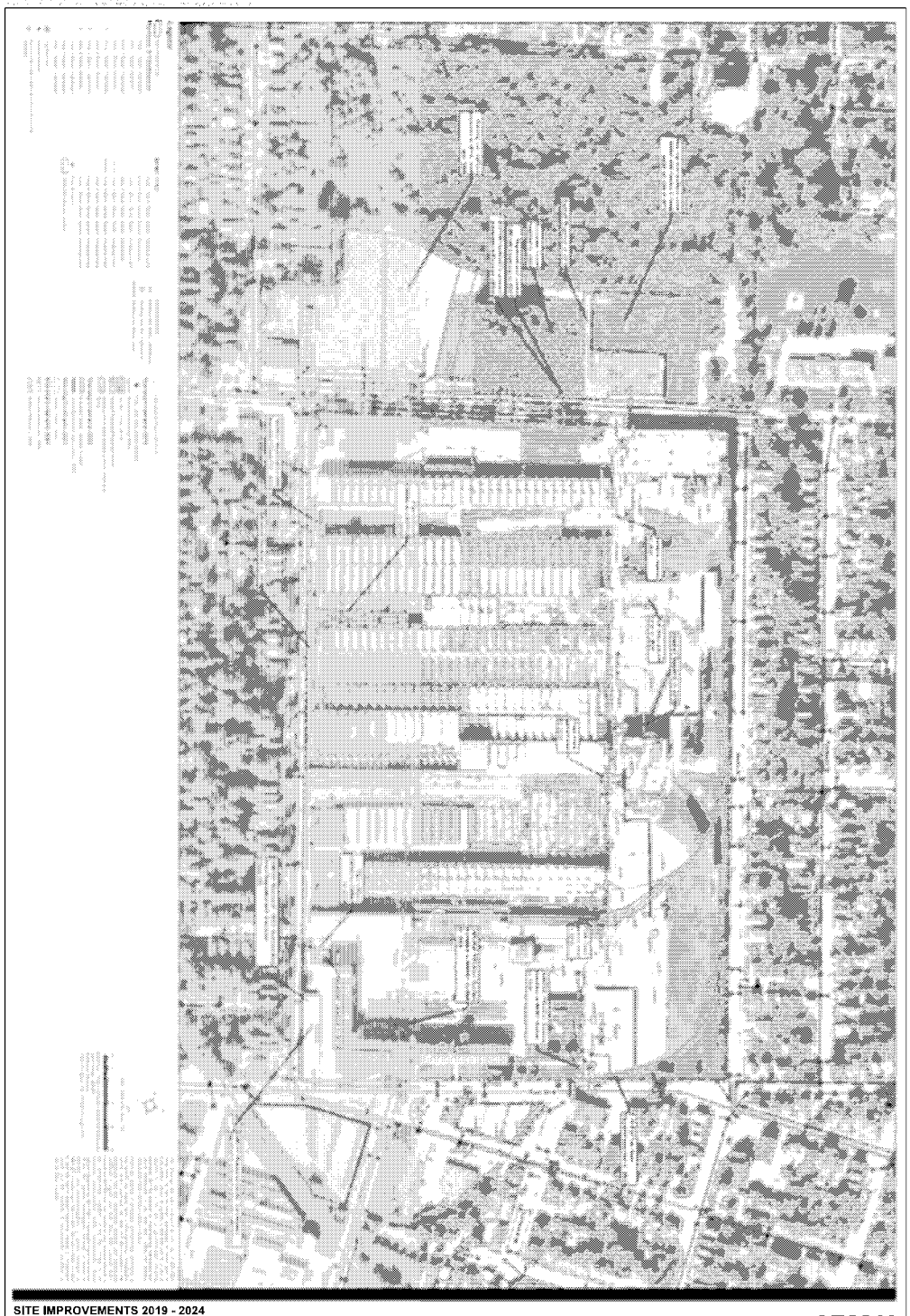
SITE AERIAL PHOTO
GEPR ENERGY CANADA INC. (Peterborough)
Peterborough, Ontario
Project No.: GEPET 031 Date: February 2025



MANHOLE / CATCHBASIN LOCATIONS
GEPR ENERGY CANADA INC., (Peterborough)
Peterborough, Ontario
Project No.: GEPET 031 Date: February 2025

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Figure: 02

000473

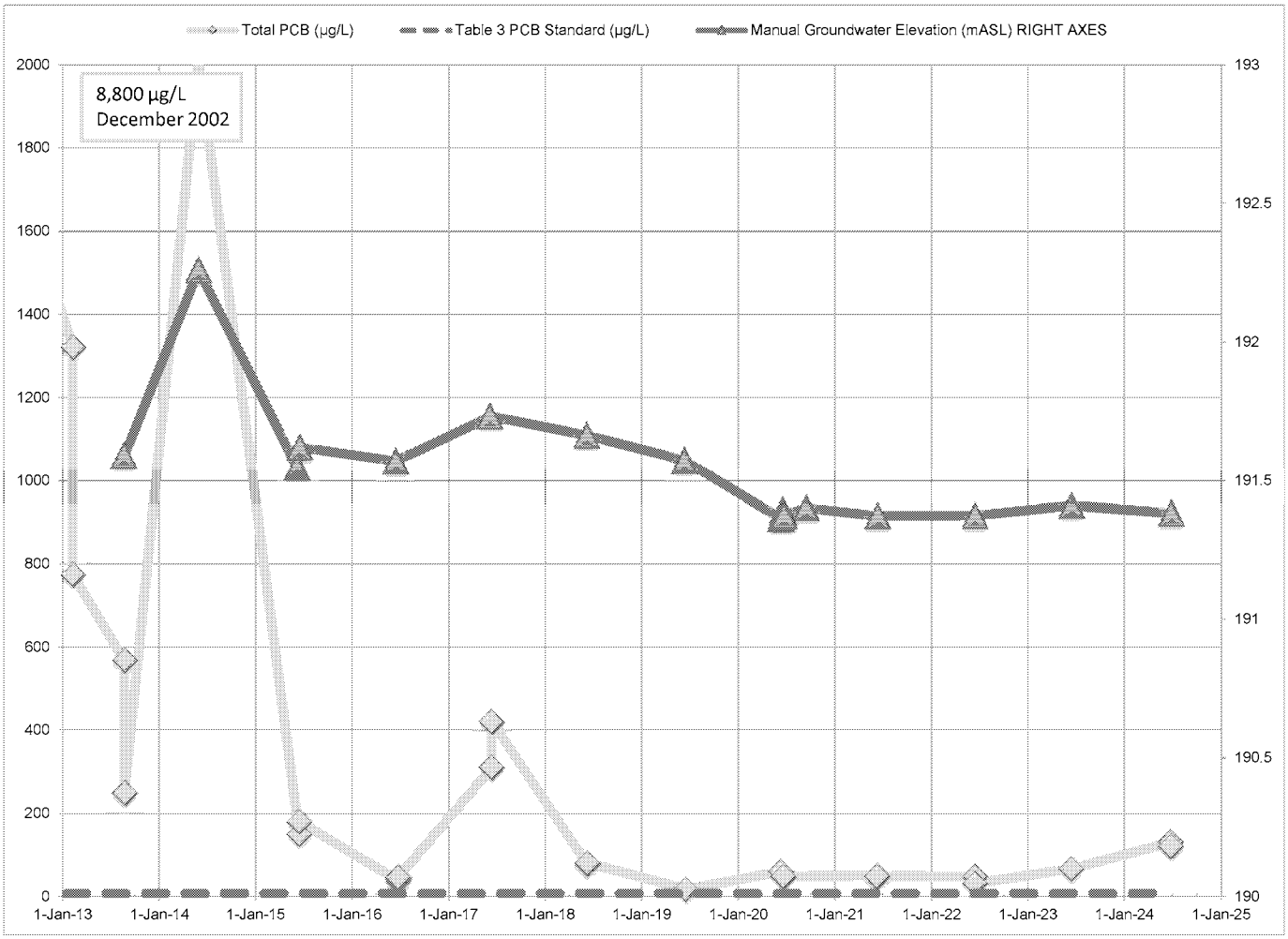


SITE IMPROVEMENTS 2019 - 2024
GEPR ENERGY CANADA INC. (Peterborough)
Peterborough, Ontario
Project No.: GEPET 031 Date: February 2025

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Figure: 03

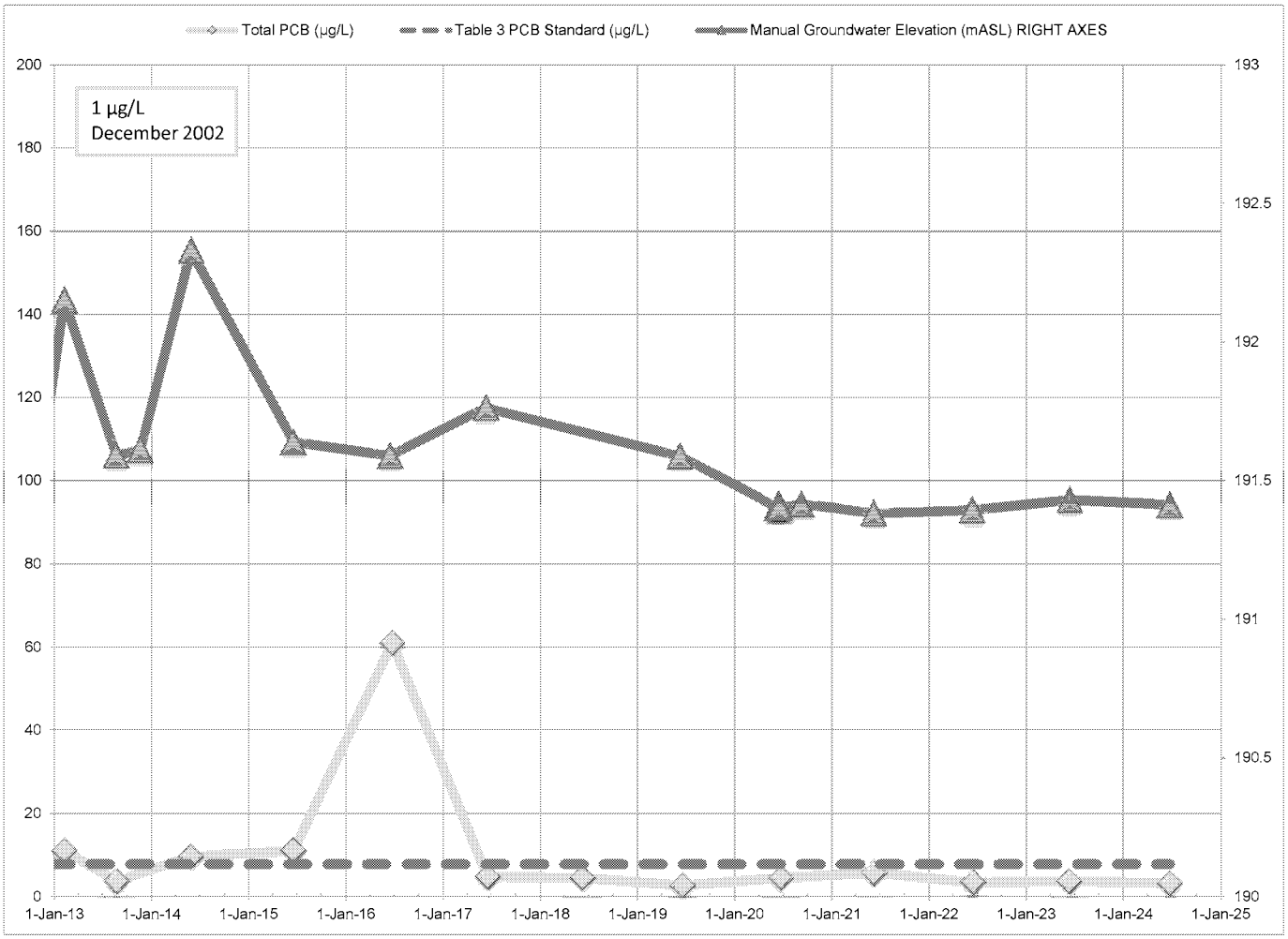
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Figure 4.1 MW25 Total PCB and Groundwater Elevations



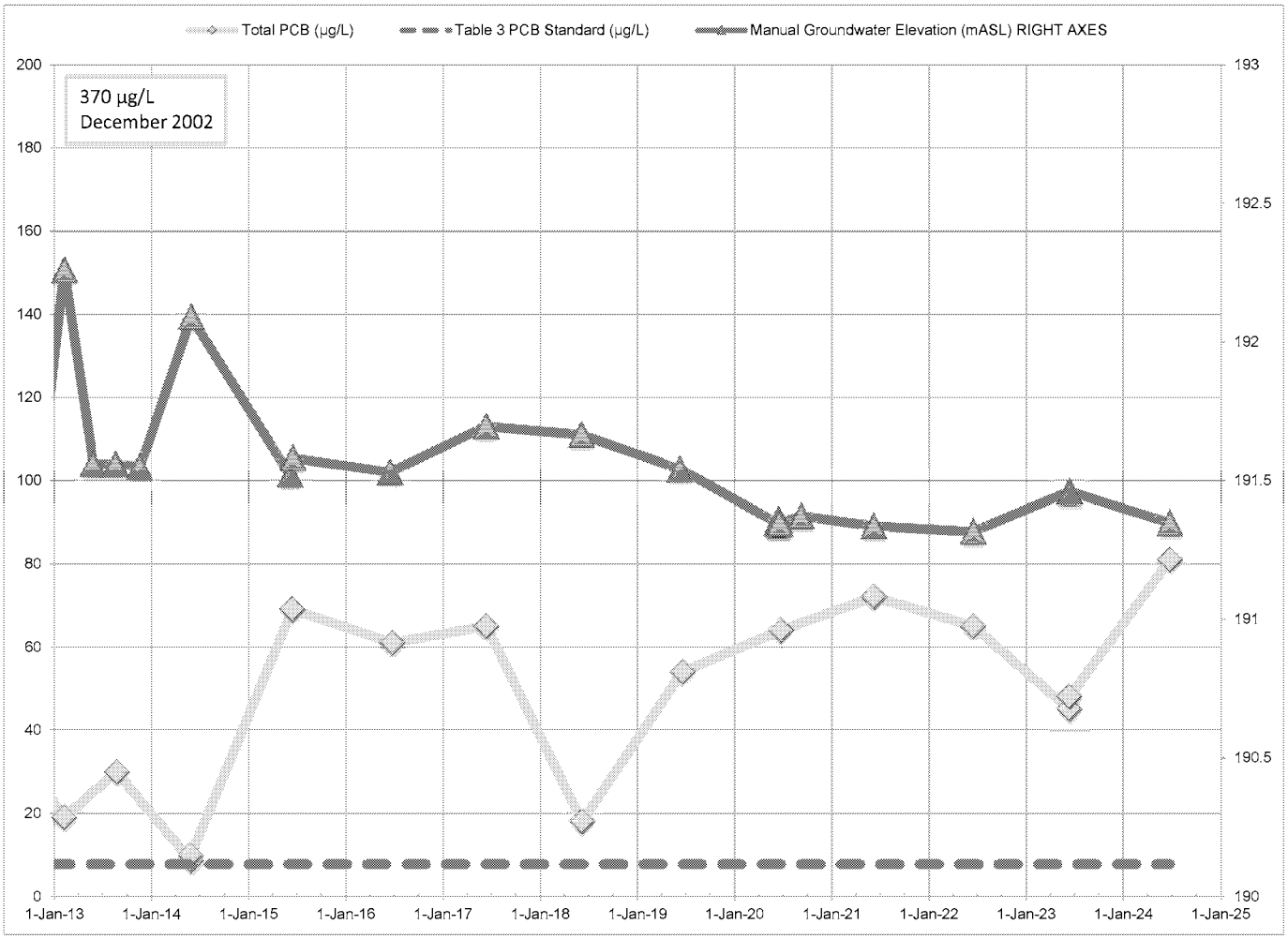
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Figure 4.2 MW26 Total PCB and Groundwater Elevations

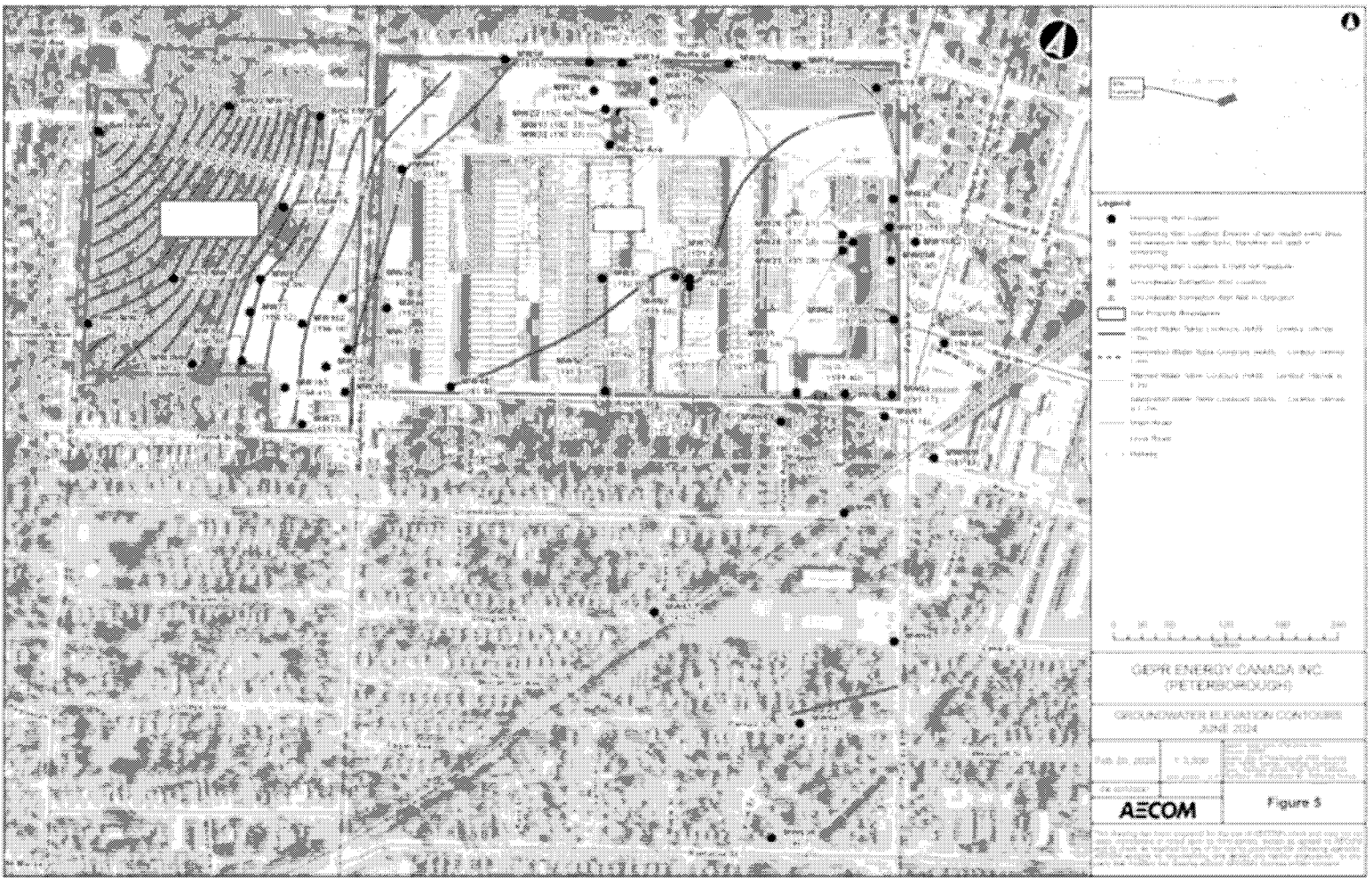


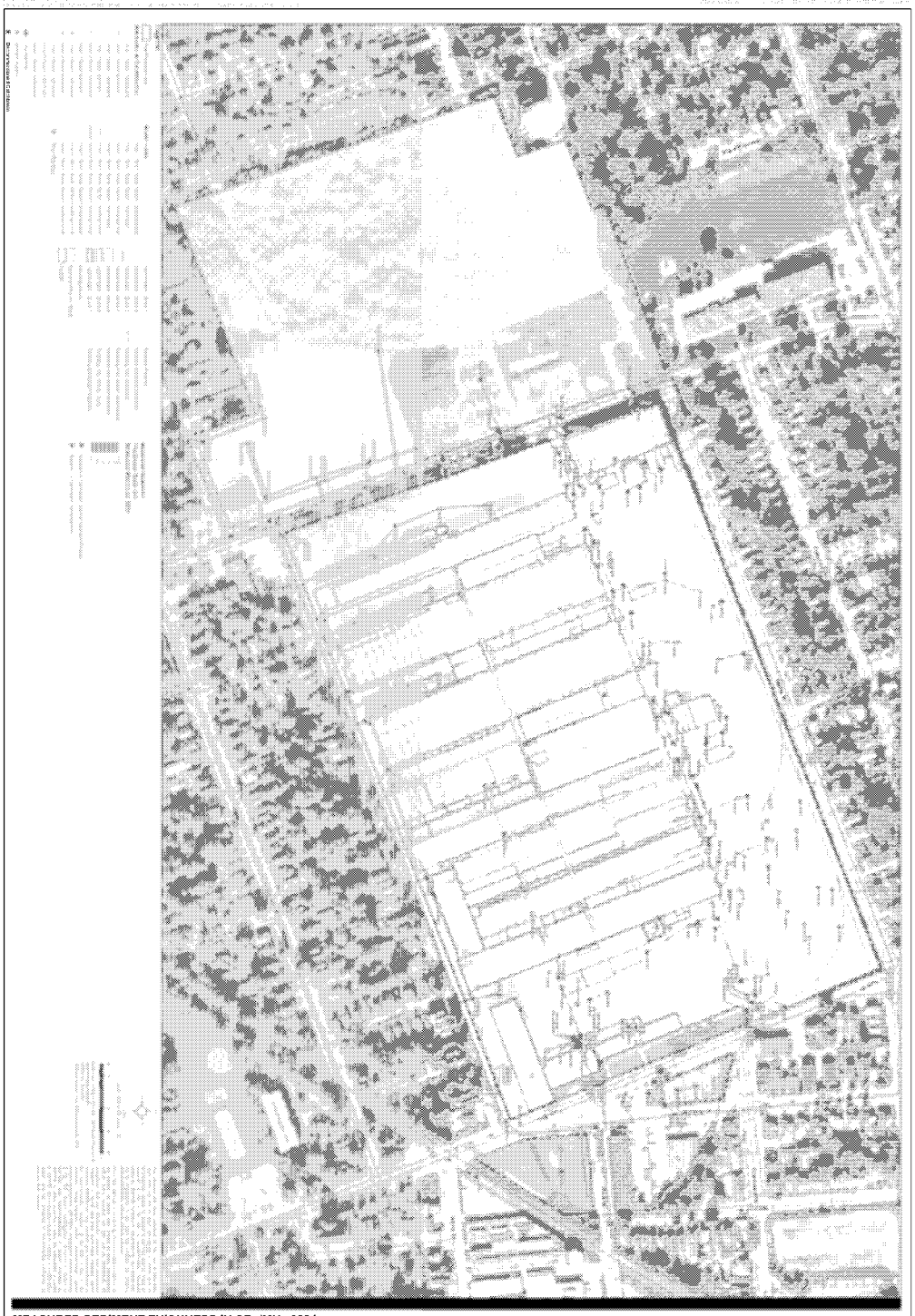
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Figure 4.3 MW28 Total PCB and Groundwater Elevations



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GEPR ENERGY CANADA INC.
(PETERBOROUGH)
GROUNDWATER ELEVATION CONTOURS
JUNE 2024
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Figure 5

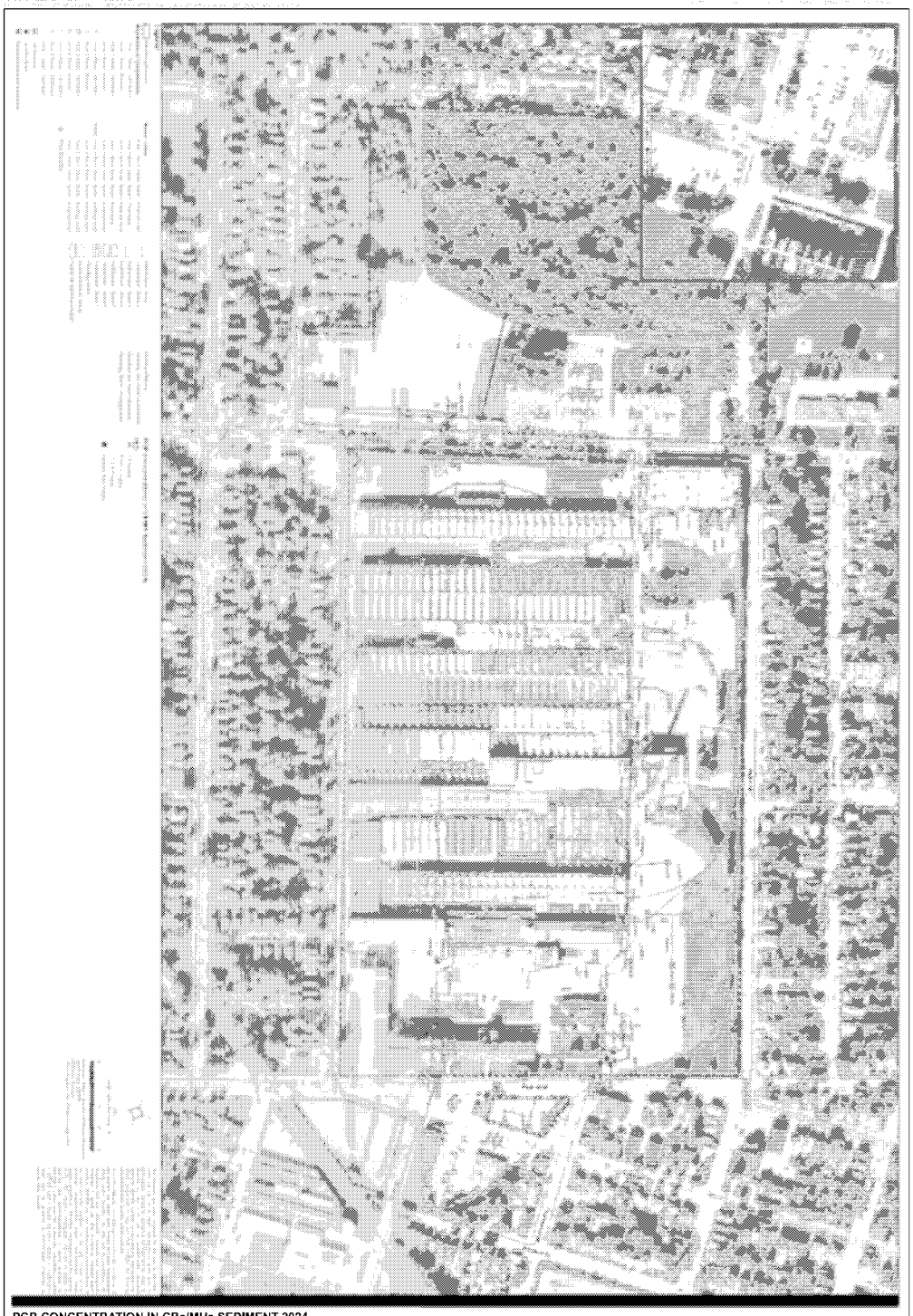


MEASURED SEDIMENT THICKNESS IN CBs/MHs 2024
GEPR ENERGY CANADA INC. (Peterborough)
Peterborough, Ontario
Project No.: GEPET 031 Date: February 2025

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Figure: 06

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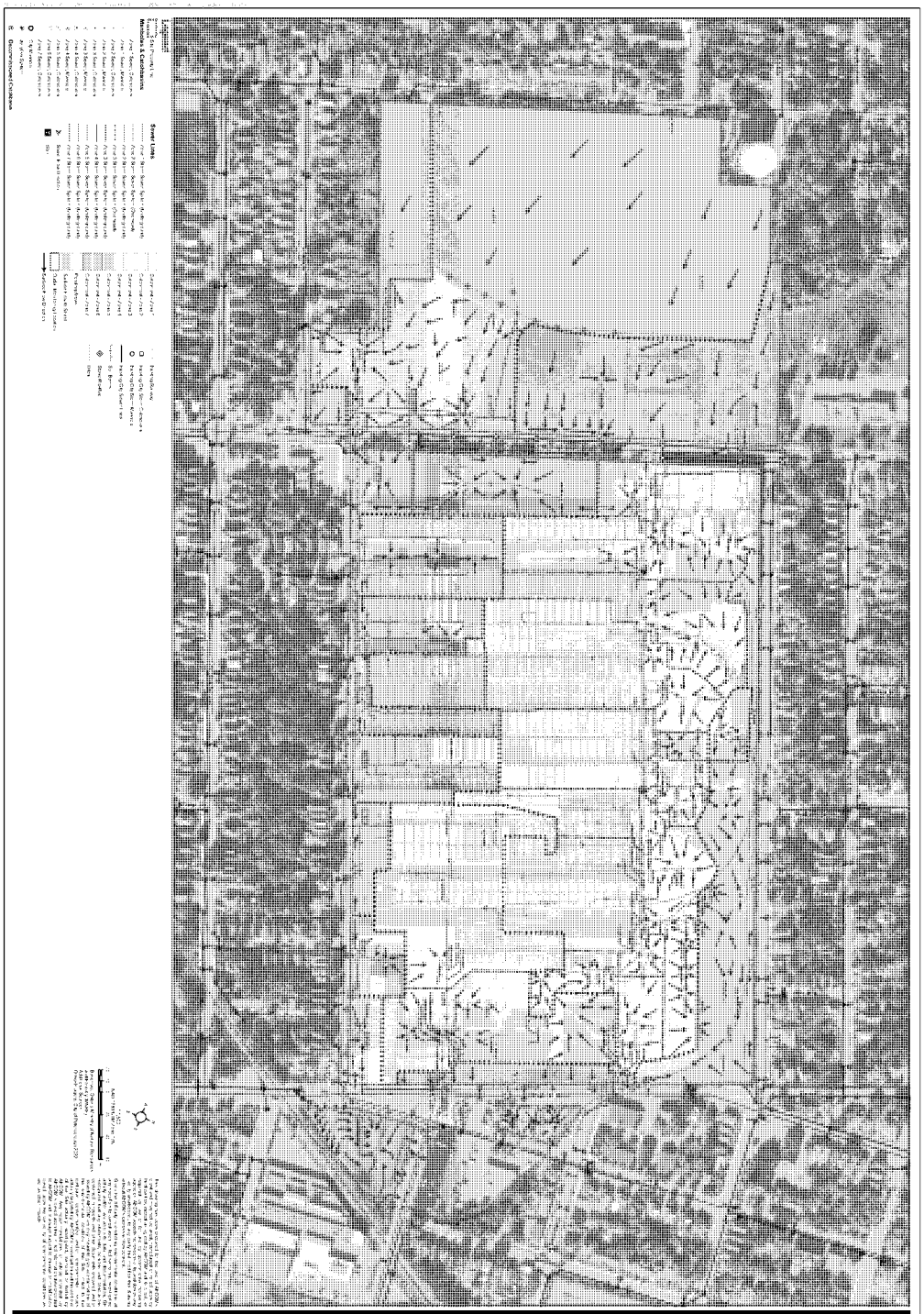


PCB CONCENTRATION IN CBs/MHs SEDIMENT 2024
GEPR ENERGY CANADA INC. (Peterborough)
Peterborough, Ontario
Project No.: GEPET 031 Date: February 2025

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Figure: 07

000480



SURFACE FLOWS
GEPR ENERGY CANADA INC. (Peterborough)
Peterborough, Ontario
Project No.: GEPET 031 Date: February 2025

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Figure: 08

Legend
Site Property Line
Manholes & Catchbasins
Sewer Lines
Flow Direction
Outfall Monitoring Location
Historic Surface Soil PCB Concentrations 2015 - 2024 (µg/g)
NOTE:
Bar Swamp Drive
Bus Terminal
Parking
Bus Terminal
Parking
Bus Terminal
Parking

HISTORIC SUB-SURFACE SOIL PCB CONCENTRATIONS 2015 - 2024
GEPR ENERGY CANADA INC. (Peterborough)
Peterborough, Ontario
Project No.: GEPET 031 Date: February 2025

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Figure: 10

Appendix 7: AECOM Canada ULC, “2024 Soil Vapour Monitoring Report GEPR Peterborough Site GEPR Energy Canada Inc.” (excerpts)

AECOM

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Jennifer.Bush@ge.com

February 27, 2025

Project #
60720641

Subject: 2024 Soil Vapour Monitoring Report – GEPR Peterborough Site

Dear Ms. Bush:

We are pleased to present the results of the 2024 Annual Soil Vapour Monitoring Program conducted in the vicinity of the GEPR Energy Canada Inc. (Peterborough) Site. The soil vapour sampling event covered in this report is part of the ongoing monitoring program developed in consultation with the Ministry of the Environment, Conservation and Parks.

We trust that this report meets your immediate requirements. Please feel free to contact the undersigned if you have any questions.

Sincerely,
AECOM Canada ULC



Marc Mitchell, B.Eng.
Senior Project Manager
Marc.Mitchell@aecom.com

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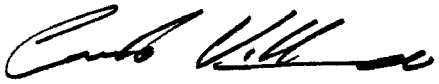
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Quality Information

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Executive Summary

This report was prepared by AECOM Canada ULC (AECOM) to provide the results from the 2024 Soil Vapour Monitoring Program at the GEPR Energy Canada Inc. (GEPR) Peterborough Site in Peterborough, Ontario, which includes the Facility at 107 Park Street North (herein referred to as the "Facility") and the adjacent Monaghan Road Parking Lot (herein referred to as the "Monaghan Road Property"). As part of the 2024 Soil Vapour Monitoring Program, the following activities were undertaken by AECOM for GEPR:

i. Annual groundwater level monitoring both on-site and off-site to the south of the Facility at select GEPR monitoring wells;

ii. Soil vapour sampling during summer months at soil vapour monitoring locations off-site to the south of the Facility; and,

iii. Groundwater monitoring elevations collected hourly by pressure transducers at groundwater monitoring wells MW61, MW70 and MW71.

Findings

i. The GETS continues to provide containment along the south property boundary of the Facility and mitigates off-site migration of TCE in groundwater.

ii. The fine-grained soil lens that extends laterally across the soil vapour study area southeast of the Facility creates a barrier to soil vapours that may emanate from residual concentrations of TCE in shallow groundwater. In the area of GP7-12, the fine-grained soil lens creates a "trap" for TCE vapours from groundwater that does not show any evidence of breaches that may affect the shallower coarse-grained soils and result in a potential vapour intrusion concern. The groundwater levels collected at MW71 in 2024 show that the water table remained below the bottom of the overlying fine-grained soil lens.

iii. The 2024 soil vapour sampling results were generally consistent with the historical data southeast of the Facility. The only soil vapour monitoring location that showed TCE concentrations above its applicable soil vapour screening level was GP7-12. The sample at GP7-12 measures the soil vapour concentrations beneath a fine-grained soil lens that forms a barrier to upward soil vapour migration, as indicated above. The low to non-detect concentrations of TCE in soil vapour at adjacent shallower monitoring locations (GP18-12 and GP21-12) demonstrates that soil vapour at GP7-12 does not permeate the fine-grained soil lens or present an issue for soil vapour intrusion in this area.

iv. Based on our understanding of the hydrogeology and of the vapour intrusion pathways, the 2024 soil vapour sampling results do not appear to pose a potential unacceptable risk due to vapour intrusion to the commercial and/or residential properties in these areas.

Recommendations

AECOM recommends the annual Soil Vapour Monitoring Program continues in 2025 with no changes from the 2024 program, following the same scope and methodology as in the Director's Order Number 1-228916698 (***Appendix C***).

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Appendix B. Analytical Data Verification

Appendix C. Correspondence with MECP

C1. MECP, 2024. Director's Order Number 1-228916698 - Mar 6 2024

List of Acronyms

11DCE..... 1,1-Dichloroethylene or 1,1-Dichloroethene
*c*12DCE..... *cis*-1,2-Dichloroethylene or *cis*-1,2-Dichloroethene
CRA..... formerly Conestoga-Rovers & Associates, now GHD
GE..... General Electric
GETS..... Groundwater Extraction and Treatment System
GP..... Gas Probe
HBIAC..... Health-based indoor air criteria
ITRC..... Interstate Technology Regulatory Council
mASL..... Metre(s) above sea level
mBGS..... Metre(s) below ground surface
mBTOR..... Metre(s) below top of reference point
MECP..... Ministry of the Environment, Conservation and Parks
MGRA..... Modified Generic Risk Assessment
MNA..... Monitored Natural Attenuation
MW..... Monitoring Well
ND..... Not detected
NELAP..... National Environmental Laboratory Accreditation Program
NS..... Not sampled
PDMS..... Polydimethylsiloxane
PID..... Photoionization detector
ppm..... Parts per million
QA/QC..... Quality assurance/quality control
RAP..... Remedial Action Plan
RL..... Laboratory reporting limit
RPD..... Relative Percent Difference
SSRA..... Site-Specific Risk Assessment
TCE..... Trichloroethylene or Trichloroethene
*t*12DCE..... *trans*-1,2-Dichloroethylene or *trans*-1,2-Dichloroethene
VC..... Vinyl chloride
VOC..... Volatile organic compound
WMS..... Waterloo Membrane Sampler™

1. Introduction

The results of 2024 soil vapour monitoring associated with the GEPR Energy Canada Inc. (formerly GE Power Conversion – Motors [GE Canada or GE]) Facility in Peterborough, Ontario are presented in this Report. This Report was prepared by AECOM Canada ULC (AECOM) for GEPR Energy Canada Inc. This annual report includes historical data provided by AECOM and GHD (formerly Conestoga-Rovers & Associates [CRA]).

1.1 Site Location

The Site includes the GEPR Energy Canada Inc. (GEPR) Facility at 107 Park Street North (herein referred to as the "Facility"), the adjacent Monaghan Road Parking Lot (herein referred to as the "Monaghan Road Property") located west of the Facility and two adjacent parking lots located east of the Facility (herein referred to as the "Park Street Property" and the "Rink Street Property"). Groundwater monitoring locations are located both on-site and off-site to the south of the Facility. The soil vapour monitoring locations are located off-site south of the Facility. The Site location is presented on ***Figure 1*** and a Site plan is presented on ***Figure 2***.

The Facility is approximately 20.5 hectares within a complete city block and includes multiple industrial buildings. The Facility is located in an older urban area of Peterborough and neighbouring land use is primarily residential, with some commercial and recreational land use. The Facility is bounded to the north by Wolfe Street, to the east by Park Street North, to the south by Albert Street, and to the west by Monaghan Road.

The Monaghan Road Property is approximately 10.8 hectares in size. The Monaghan Road Property is bounded by Prince of Wales School and associated property to the north, Monaghan Road to the east, Frank Street and private residences fronting Frank Street to the south, and High Street to the west. The majority of the Monaghan Road Property is undeveloped, and the eastern portion has been utilized by GEPR as an employee parking lot. The Monaghan Road Property includes one building that is located at the corner of Frank Street and Monaghan Road and one building located in the northwest corner along High Street.

The Park Street Property is approximately 0.24 hectares in size. The Park Street Property is bounded to the north by Townsend Street, to the west by Park Street North, to the south by a commercial property and to the east by Rubidge Street. The location is currently a paved parking lot.

The Rink Street Property is approximately 0.55 hectares in size. The Rink Street Property is bounded to the north by Rink Street, to the west by Rubidge Street and to the east by a railway line. The location is currently an unpaved parking lot.

1.2 Purpose and Objectives

The purpose of this report is to summarize and present the results of the 2024 Soil Vapour Monitoring Program to assess the presence of trichloroethylene (TCE) in soil vapour in the unsaturated zone.

The objectives of the monitoring programs covered in this report are to:

i. Collect and analyze groundwater levels and soil vapour samples to monitor for changes at and near the Site.
ii. Determine if any modifications to the monitoring programs are warranted.
iii. Fulfill the annual Soil Gas Monitoring Program reporting requirements under the Remedial Action Plan (CRA, 2001) and Director's Order 1-228916698 dated 6th March 2024 (**Appendix C**).

1.3 Background

The Facility was originally built in the late 1880s as a manufacturing facility for GE Canada and has been operating for the manufacturing and assembly of capacitors, small and large motors. As part of maintenance operations carried out at the site, TCE was used as a degreasing agent.

In 1981, environmental investigations were initiated at the Site including the installation, monitoring and sampling of groundwater monitoring wells. Subsequent investigations resulted in the characterization of the subsurface hydrogeological conditions and the delineation of a VOC-impacted area, where TCE and its degradation products are the primary concern.

1.3.1 Remedial Action Plan

Environmental and remedial programs are carried out at, and in the vicinity of, the Site in accordance with the Remedial Action Plan (RAP) for remediating TCE concentrations in groundwater that have historically migrated from the Facility (CRA, 2001). The RAP consists of three primary components:

i. **Groundwater Extraction and Treatment System (GETS):** A system to provide hydraulic containment to mitigate off-site migration of TCE in groundwater.
ii. **MW58 TCE Source Area Investigation/Removal:** Additional investigations and assessment of the MW58 source area, including the removal of separate phase product if present.
iii. **Site-Specific Risk Assessment/Monitored Natural Attenuation (SSRA/MNA):** Completion of a SSRA and assessment of MNA for existing off-site TCE groundwater impacts.

As part of a SSRA accepted by the Ministry of the Environment, Conservation and Parks (MECP or Ministry) in September 2002, a number of soil vapour monitoring locations were installed downgradient from the Facility to evaluate potential environmental concerns to the human population on the vapour intrusion pathway. The SSRA provided site-specific soil vapour criteria for existing off-site VOC impacts to be applied as a remedial objective for off-site MNA remedy implemented in accordance with the RAP.

While the findings of the SSRA showed that the results did not show risks above acceptable levels, GE installed a groundwater extraction and treatment system (GETS) to prevent further migration of the compounds of concern off-site. In accordance with the RAP, a *Perimeter Groundwater Extraction and Treatment System Pilot Study Interim Report* was submitted to the Ministry on August 8, 2003 (CRA, 2003). A *Perimeter Groundwater Extraction and Treatment System Pilot Study Final Report* was submitted to the Ministry on February 26, 2004 (CRA, 2004). The GETS was activated in October 2004.

The GETS continues to provide a hydraulic barrier inhibiting the flow of groundwater beyond the central and eastern portions of the southern property boundary of the Facility, mitigating off-site migration of TCE in groundwater. Related historical off-site impacts in groundwater and soil vapour are mitigated using a risk-based framework of MNA. A description of the GETS and groundwater monitoring programs along with the 2024 groundwater monitoring results are presented under separate cover (AECOM, 2025).

In 2012, under the direction of the Ministry, the historical soil vapour monitoring locations were replaced with a network of 22 soil vapour monitoring locations as shown on ***Figure 2***. In May 2014, GE Canada submitted a written communication to the Ministry to address comments received regarding the 2013 Monitoring Report, and to detail the monitoring activities for the Site in 2015 including the Soil Vapour Monitoring Program. In June 2015, the Ministry provided comments on the 2014 Soil Vapour Monitoring Report. In these comments, the Ministry requested the use of updated health-based indoor air criteria (HBIAC) soil vapour screening levels developed in the 2014 draft

Modified Generic Risk Assessment (MGRA) model and agreed to soil vapour monitoring at a reduced frequency of twice per year (spring and summer).

In July 2015, GE Canada submitted a written communication to the Ministry to address these comments which provided the revised draft soil vapour screening levels and included a recommendation to use Waterloo Membrane Samplers™ (WMSs) at all of the monitoring locations along with parallel Summa canister samples at GP5-12 and GP7-12 only. A response was provided by the Ministry via email on August 24, 2015 agreeing to the use of WMSs along with more validation of WMS samples and more parallel Summa canister samples than proposed. The Ministry requested that several rounds of validation sampling be conducted, and that GP19-12 be added to the parallel sampling program. In February 2016 (AECOM, 2016), AECOM recommended that sampling with WMSs alone at GP19-12 would be conducted in 2016 because the historical data in 2014 and 2015 was consistently below the RL; however, if WMS results in 2016 indicate that concentrations have changed at GP19-12, consideration would be given to include parallel sampling with a Summa canister at this location in 2017. The 2016 sampling results at GP19-12 were below the RL so no change was made to the 2017 sampling program.

In February 2018, the Ministry provided comments on the 2016 Soil Vapour Monitoring Report (memorandum was dated June 13, 2017). The comments and recommendations contained in the memorandum largely focus on the Ministry's interpretation that fine-grained soil (silt/clay) layer that is identified above the screened interval of GP7-12 located off-site to the south of the Facility may be "discontinuous" and allow soil vapours to reach potential receptors above. As the comments from the Ministry were received at the time the 2017 Soil Vapour Monitoring Report was being finalized, AECOM acknowledged the comments and committed to conduct a re-assessment on the available stratigraphy data to better characterize the nature of the clay lens(es) in the area adjacent to GP7-12 (AECOM, 2018).

The assessment was completed and provided to the Ministry in the Memorandum RE: "Re-examination of Stratigraphy and Monitoring Data in the Soil Vapour Monitoring Area, South of the GE Peterborough Facility" (AECOM, 2019 [herein referred to as the "2019 Stratigraphy Memo"]). This memorandum provides a comprehensive review of stratigraphy south of the Facility and concludes that there is no evidence that the fine-grained soil lens is not continuous across the soil vapour monitoring area and that the higher TCE concentration in soil gas at GP7-12 is due to a "trap" that laterally and vertically isolates TCE vapours within a pocket of unsaturated coarse-grained soil between the bottom of the fine-grained soil lens and the water table. The 2019 Stratigraphy Memo and the 2018 Soil Vapour Monitoring Report recommend a transition from a biannual to an annual monitoring program going forward and the elimination of parallel sampling in favour of the more cost-effective WMS method. A Director's Order number GE-PTBO-DO001FA was issued to GE Canada on December 10, 2018, laying out the requirements for Site monitoring programs starting in 2019. As part of the Order, it was acknowledged by the MECP that the Soil Vapour Sampling Program will include two sampling events per year and only the use of WMS methodology in 2019 and going forward. As a result, a change to the frequency of soil gas sampling required under the Director's Order has been requested as indicated below.

In November 2019, AECOM provided a Memorandum RE: "Summary of 2019 Summer Soil Vapour Sampling Results and Request for Changes to the Soil Vapour Program" to the MECP and restated the recommendation to reduce the sampling frequency based on current and historical TCE concentration results. The Ministry's response provided in a memorandum dated 16 April 2020, and received by GE Canada on 17 September 2020, accepted the recommendation to sample once a year, but requested GE to conduct the event in the summer instead of the spring as concentrations of TCE in soil vapour tend to be the highest during that time.

On 1 June 2021, GE requested a formal amendment of the Director's Order in order to implement annual sampling as previously accepted by the Ministry. On 25 June 2021, the Ministry officially amended the Director's Order No. GE-PTBO- DO001FA regarding the soil vapour monitoring requirements. As a result, GE/AECOM has implemented summer-only annual sampling of GP3-12, GP5-12, GP7-12, GP18-12, GP19-12 and GP21-12 beginning in 2021.

In 2024, the Ministry issued a new Director's Order number 1-228916698 (**Appendix C**) and revoked the previous Director's Order GE-PTBO-DO001FA for the purpose of updating various information and requirements.

1.3.2 Geology and Hydrogeology

The stratigraphic and hydrostratigraphic conditions at and in the vicinity of the Site are detailed in the SSRA (CRA, 2002) and further expanded in the 2019 Stratigraphy Memo (AECOM, 2019). The stratigraphic units identified in descending order are:

i. Silty sand and gravel alluvium deposit; and,
ii. Silty clay glaciolacustrine deposit.

Groundwater flow occurs under unconfined conditions within the silty sand and gravel alluvium deposit. The underlying silty clay glacial lacustrine deposit represents the base of the unconfined groundwater flow system and is an aquitard that separates the unconfined groundwater system from deeper groundwater flow systems. Along Park Street North, the sanitary sewer backfill (which is expected to be composed of coarser materials that are of higher hydraulic conductivity compared to the surrounding natural deposits) appears to act as a drain that captures and conveys groundwater southward along the eastern Facility boundary.

As indicated in 2019 Stratigraphy Memo, in the area south of the Facility, a fine-grained soil lens has been identified in the vadose zone above the water table. The fine-grained soil lens is a laterally extensive lens within the alluvium deposits that separates coarse-grained soils and provides a barrier for upward migration of vapours from the water table to shallow coarse-grained soils above the fine-grained soil lens. In the area of GP7-12, the fine-grained soil lens forms a dome-like feature where unsaturated coarse-grained soils are laterally and vertically isolated between the bottom of the fine-grained soil lens and the water table.

2. Monitoring Programs and Methodology

2.1 Groundwater Level Monitoring Program

The groundwater level monitoring program, methodology and variances are discussed under separate cover (AECOM, 2025).

The monitoring well locations are shown on ***Figure 2***. Readings are recorded as depth to water from the top of the monitoring well pipe, as presented in ***Table 1***, along with reference elevations and calculated groundwater elevations. Water level data are also collected using pressure transducer level loggers at monitoring wells MW61, MW70 and MW71. The loggers are set to record water levels at these locations every hour and the hydrographs along with precipitation for 2024 are presented on ***Figure 3.***

2.2 Soil Vapour Sampling Program

In accordance with the amended program for the approved RAP, recommendations from the 2023 Soil Vapour Monitoring Report and the amended Soil Vapour sampling program included as part of the Director's Order (***Appendix C***), monitoring for TCE and degradation products is conducted as indicated in the table below. The soil vapour sampling locations are shown on ***Figure 2***.

Method	Summer
Waterloo Membrane Sampler™	GP3-12, GP5-12, GP7-12, GP18-12, GP19-12, GP21-12

Soil vapour sampling has been conducted by AECOM using Waterloo Membrane Sampler™ (WMS) since 2015 and has continued as the primary soil vapour sampling method since then. The background of the WMS and the sampling methodology details are provided below.

The WMS was developed at the University of Waterloo and utilizes a polydimethylsiloxane (PDMS) membrane across the opening of a vial filled with charcoal sorbent to collect soil vapour. The PDMS membrane controls the uptake rate of volatile organic compounds (VOCs) into the sampler. The WMSs used at the Site incorporate a cap over the membrane with a very small opening, which is known as the "pinhole" version of the WMS. The pinhole WMS has a slower rate of vapour uptake than the conventional model due to the small cross-sectional area of exposed membrane at the pinhole. This version of the sampler is chosen to limit potential starvation effects, which occurs when the concentration of compounds in soil vapour around the sampler is depleted by the sampler faster than they can be replenished by the soil surrounding the well. The WMS is installed inside a soil vapour monitoring well using stainless steel downrigger cable. One end of the cable is connected to a loop on the sampler (the sampler was positioned so the membrane faced downward, and the sorbent material was against the membrane inside the sampler). The cable is suspended from the base of a j-plug installed at the top of the well and cut to a sufficient length so the sampler was positioned in the middle of the screened interval of the well. Where a duplicate sample was taken, two samplers were connected to the cable a few centimeters from each other and positioned in the middle of the screened interval of the well. After the samplers were placed in each well, the well j-plug was tightened, and the samplers were left in place during the sampling period.

The WMS sampling time is approximately 10 days to achieve targeted reporting limits. Sampling notes for the summer sampling event are provided in ***Appendix A***. A duplicate sample was collected at GL7-12, where the duplicate WMS (GP77-12) was hung beside the primary WMS.

Dedicated WMS samplers are provided in sealed packages to AECOM from AGAT Laboratories Ltd. (AGAT) in Mississauga, Ontario. Following removal, the WMS samples are packaged and sent to AGAT under chain of custody. WMS samples are analyzed by AGAT, a laboratory accredited by the Standards Council of Canada (SCC) and the Canadian Association for Laboratory Accreditation (CALA), for selected VOCs: TCE, *cis*-1,2-dichloroethylene (*c*12DCE), *trans*-1,2-dichloroethylene (*t*12DCE), 1,1-dichloroethylene (11DCE), and vinyl chloride (VC). In 2024, WMSs were installed in the soil vapour wells and removed according to the schedule shown below.

Soil Vapour Monitoring Location	Summer 2024 Sampling Event		
	Date WMS Installed	*Date WMS Retrieved*	*Sampling Period in minutes*
GP3-12	Sept 19, 2024	Sept 26, 2024	9915
GP5-12	Sept 19, 2024	Sept 26, 2024	10075
GP7-12	Sept 19, 2024	Sept 26, 2024	11074
GP18-12	Sept 19, 2024	Sept 26, 2024	10008
GP19-12	Sept 19, 2024	Sept 26, 2024	9979
GP21-12	Sept 20, 2024	Sept 26, 2024	8720
GP77-12 (duplicate of GP7-12)	Sept 19, 2024	Sept 26, 2024	10074

2.3 Quality Assurance/Quality Control (QA/QC)

A QA/QC program is used to confirm sample integrity and verify that representative soil vapour samples are collected. The QA/QC program is also used to verify the quality of the laboratory analyses and confirm no laboratory error had influenced the results.

Duplicate samples are collected and submitted to the laboratory for analysis to verify the precision of sampling and analytical procedures. The laboratory also performed and reported the required quality control samples, and their results are summarized as follows:

i. All laboratory method blank results were satisfactory showing no evidence of cross-contamination during analysis.

ii. All laboratory control sample (LCS) results were within the performance standards for the surrogates added by AGAT as part of the VOC analysis.

iii. All laboratory replicate analyses had RPD < 20%. Laboratory replicate analysis measures the laboratory method precision and provides a measure of sample homogeneity.

In addition, field duplicate results are evaluated for analytical precision, field precision and homogeneity by calculating the Relative Percent Difference (RPD), i.e., RPD = [(| sample result – duplicate result |) / mean] x 100. An acceptable RPD is considered to be less or equal than 50% (MECP, 2021). This calculation is only applicable when concentrations are more than ten times the laboratory reporting limit (RL).

The results of the September 2024 sample and duplicate soil vapour results for TCE at GP7-12 had an RPD lower than 50% (see ***Appendix B***).

3. Results and Discussion

The sampling notes, summary of sampling results and the laboratory certificate of the 2024 soil vapour monitoring event is provided in ***Appendix A***.

3.1 Groundwater Elevation Monitoring Program

In June 2024, water levels were collected in accordance with the 2024 Groundwater Level Monitoring Program discussed under separate cover (AECOM, 2025). Groundwater elevations along with depth to groundwater in metres below top of reference point (mBTOR) (which is roughly equivalent to depth in metres below ground surface [mBGS] as all relevant monitoring wells have flush mount casings) are presented in ***Table 1***.

Groundwater elevation contours have been prepared to illustrate groundwater elevations throughout the Site and are presented on ***Figure 4***. Groundwater in the silty sand and gravel alluvium deposit at the Facility flows in a southeasterly direction towards the GETS under unconfined conditions. The GETS effectively depresses the water table along the southeastern Facility boundary and creates inward hydraulic gradients toward the extraction system. This change in groundwater elevation is expected as the groundwater extraction wells continue to be the primary control of TCE migration in groundwater at the Facility.

Hourly groundwater level measurements were collected at the Facility (MW70) as well as off-site southeast of the GETS (MW61 and MW71) using pressures transducers and data loggers during 2024. Data collected from the loggers were converted into groundwater elevations to create hydrographs that depict groundwater levels throughout the year as presented on ***Figure 3***. Data from MW61 for the period of May 2023 to June 2024, and from MW71 for the period of March to September 2024 is not presented due to failures in the pressure transducers. The data logger at MW61 has been repaired and reinstalled in June 2024. The data logger at MW71 has been temporarily removed and sent for assessment and data retrieval. A replacement is expected to be installed early in 2025.

The hydrographs for January to December 2024 show some seasonal fluctuations that follow similar trends with each other along with a slightly higher water table during the spring and summer that is likely associated with higher amounts of precipitation experienced during those times. However, there are no daily fluctuations that would have affected the soil vapour sampling program. Groundwater levels at MW71 in 2024 followed the same general pattern as those observed in previous years. The maximum water level measured at MW71 during 2024 was ~191.32 mASL in June and remained below the bottom of the overlying fine-grained soil lens at GP7-12 at 191.72 mASL. The June 2024 groundwater level at MW71 relative to the fine-grained soil lens is illustrated on ***Figures 8*** and ***9***.

3.2 Soil Vapour Sampling Program

The soil vapour sampling results collected during the September 2024 sampling event, as well as historical data are presented in ***Table 2***. The 2024 soil vapour TCE concentrations are shown on ***Figure 5*** along with the 2024 approximated isopleths of TCE in groundwater along the southeast perimeter to be consistent with previous reports.

As indicated in Section 1.3.1, GEPR continues to mitigate historical off-site soil vapour impacts of TCE within a risk-based framework. Where the vapour intrusion pathway into indoor air is possible, residential and commercial risk-based screening levels for soil vapour from the *Modified Generic Risk Assessment (MGRA) Spreadsheet* Model are used.

AECOM has used the default residential depth values from the 2016 MGRA model to calculate the soil vapour screening levels for all off-site soil vapour monitoring locations as indicated in the table that follows.

Parameter	Soil Vapour Screening Levels (2016 MGRA)	
	Residential ($\mu g/m^3$)	Industrial/Commercial ($\mu g/m^3$)
TCE	13.6	2,670
11DCE	730	144,000
***c*12DCE**	1,560	340,000
***t*12DCE**	626	139,000
VC	6.3	1,090

While it is expected that concentrations of TCE, 11DCE, *c*12DCE, *t*12DCE and VC in off-site groundwater and soil vapour will continue to decrease with time due to natural attenuation, TCE is the only soil vapour parameter that has exceeded the applicable residential or commercial soil vapour screening level in any sample since the installation of the RAP soil vapour monitoring wells in 2012. 11DCE, *c*12DCE, *t*12DCE and VC concentrations in soil vapour have not posed, and are not expected to pose, an unacceptable risk to human health due to vapour intrusion into indoor air. As a result, only TCE results are discussed below.

The 2024 TCE concentrations in soil vapour measured at soil vapour monitoring locations are summarized below and presented on ***Figure 5***. Graphical representations of the historical results showing the maximum concentrations during each monitoring event for each of the six monitoring locations are presented on ***Figures 6.1*** to ***6.6***.

Compound	Soil Vapour Monitoring Location	Screening Level Condition	Soil Vapour Screening Level* ($\mu g/m^3$)	2024 TCE Concentrations ($\mu g/m^3$) September 26, 2024 WMS
TCE	**GP3-12**	Residential	13.6	ND (<3)
	GP5-12	Ind/Com	2,670	20
	GP7-12	Residential	13.6	**46 / 51**
	GP18-12	Residential	13.6	ND (<3)
	GP19-12	Residential	13.6	ND (<3)
	GP21-12	Residential	13.6	ND (<3)

Notes: NS – not sampled
ND – not detected or below the reporting limit shown in brackets
/ - separates field duplicate sample results
** - based on the 2016 MGRA "Approved Model"*
Shaded values are above 2016 soil vapour screening level.

The analytical results in the table above indicate that TCE concentrations in soil vapour during the reporting period were below the applicable screening level, except at GP7-12. The 2024 results are generally consistent with historical results.

In order to provide a better understanding of the sampling results in the surrounding area near GP7-12, two cross-sections as indicated in ***Figure 7*** are presented in ***Figures 8*** and ***9***. The cross-sections present the local scale hydrogeological characteristics relative to the monitored (screened) zones. Based on the 2019 Stratigraphy Memo (AECOM, 2019), AECOM has concluded that the fine-grained soil lens depicted in the cross-sections is laterally extensive across the soil vapour study area and creates a barrier to soil vapours that may emanate from residual concentrations of TCE in shallow groundwater. In the area of GP7-12, the fine-grained soil lens creates a "trap" for TCE vapours from groundwater that does not show any evidence of breaches that may affect the shallower coarse-grained soils and result in a potential vapour intrusion concern.

At GP3-12, GP5-12, GE18-12, GP19-12, and GP21-12, TCE concentrations were below their soil vapour screening levels and do not indicate a potential for unacceptable risk due to vapour intrusion to the commercial and/or residential properties in these areas. While TCE concentrations at GP7-12 exceed the screening level, those concentrations do not appear to pose a potential unacceptable risk due to vapour intrusion since TCE concentrations at shallower adjacent monitoring wells (GP18-12 and GP21-12) are below the screening level. As illustrated in ***Figure 8*** and ***9***, the screen depths relative to the locations of the fine-grained soil lens indicate that the higher soil vapour concentrations at GP7-12 (below the lens) do not permeate upward through the lens and affect the shallower zone at GP18-12, GP19-12 and GP21-12, showing no evidence of soil vapour migration through the shallow fine-grained soil lens.

4. Summary of Findings and Recommendations

4.1 Findings

The following provides a summary of the main findings derived from the 2024 monitoring programs:

i. The GETS continues to provide containment along the south property boundary of the Facility and mitigates off-site migration of TCE in groundwater.

ii. The fine-grained soil lens that extends laterally across the soil vapour study area creates a barrier to soil vapours that may emanate from residual concentrations of TCE in shallow groundwater. In the area of GP7-12, the fine-grained soil lens creates a "trap" for TCE vapours from groundwater that does not show any evidence of breaches that may affect the shallower coarse-grained soils and result in a potential vapour intrusion concern. The groundwater levels collected at MW71 in 2024 show that the water table remained below the bottom of the overlying fine-grained soil lens.

iii. The 2024 soil vapour sampling results were consistent with the historical data southeast of the Facility. The only soil vapour monitoring location that showed TCE concentrations above its applicable soil vapour screening level was GP7-12. The sample at GP7-12 measures the soil vapour concentrations beneath a fine-grain soil lens that forms a barrier to upward soil vapour migration, as indicated above. The low to non-detect concentrations of TCE in soil vapour at adjacent shallower monitoring locations (GP18-12 and GP21-12) demonstrates that soil vapour at GP7-12 does not permeate the fine-grained soil lens.

iv. Based on our understanding of the hydrogeology and of the vapour intrusion pathways, the 2024 soil vapour sampling results do not appear to pose a potential unacceptable risk due to vapour intrusion to the commercial and/or residential properties in these areas.

4.2 Recommendations

AECOM recommends the annual Soil Vapour Monitoring Program continues in 2025 with no changes from the 2024 program, following the same scope and methodology as in the Director's Order Number 1-228916698 (***Appendix C***).

5. Glossary

Blind Duplicate – A second sample is collected at the same time and location in separate containers. Samples are homogenized where possible (i.e., Alternate filling of sample and duplicate for waters and bowl mixing for soils). Samples are submitted to the laboratory without identifying them as duplicates. (Maxxam)

Contour map – A map showing elevations and surface configuration by means of contour lines. (The American Heritage)

Data logger – Also known as Level Loggers. Automated electronic device that can rapidly record data. (ASTM D4050)

Field Blank – A sample of analyte free media (supplied by the laboratory) taken to the site, opened and exposed to the ambient air. (Maxxam)

Grommet – A ring of rubber or plastic or a metal eyelet designed to line a hole to prevent a cable or pipe passed through it from chafing. (Collins)

Homogeneity – Characteristic of a medium in which material properties are identical throughout. (EPA)

Hydraulic Conductivity—The rate at which water can move through a permeable medium. (i.e., the coefficient of permeability.). (EPA)

Hydraulic Gradient – Slope of a water table or potentiometric surface. More specifically, change in the hydraulic head per unit of distance in the direction of the maximum rate of decrease. (EPA)

Hydraulic Head – Pressure at a point in a liquid, expressed in terms of the vertical distance of the point below the surface of the liquid. (ASTM D653)

Magnehelic Gauge – A brand name pressure gauge.

Membrane – Structure, having lateral dimensions much greater than its thickness, through which transfer may occur under a variety of driving forces. (McNaught, A.D., & Wilkinson, A., 1997)

Method Detection Limit (Detection Limit) – The minimum concentration of an analyte that can be identified, measured and reported with 99% confidence that the analyte concentration greater than zero; it is determined from data produced by analyzing a sample in a given matrix containing the analyte. (Analytical Protocol O. Reg. 153/04)

Non - Conservative Tracer – Tracer that tends to be slowed by interaction with the solid matrix (Boulding, R. & Ginn, J., 2004)

Photoionization Detector (PID) – Draws in air and ionizes organic compounds using ultra-violet radiation; charged plates measure proportional current flow due to ionized field. (ASTM D4844)

Precision – A measure of mutual agreement among individual measurements of the same property, usually under prescribed and similar conditions. (EPA)

Purging – Removing stagnant air or water from sampling zone or equipment prior to sample collection. (EPA)

Reportable Detection Limit (RDL) – The lowest concentration that can be reliably measured within specified limits of precision and accuracy during routine laboratory operating conditions. The RDL is generally 1 to 10 times the MDL where regulatory criteria permit. By setting a reporting limit 1 to 10 times the statistical MDL, more confidence is achieved, particularly for low level data. (Maxxam)

Regulator – A device attached to a Summa canister used to restrict flow into the canister to a predetermined volume per unit time.

Riser Pipe – The casing extending from the well screen to or above the ground surface. (ASTM D653)

Sampling Train – Sampling apparatus assembled from various pieces of sampling equipment and components.

Separate (Free) - Phase – Contaminants that remain undiluted as the original bulk liquid in the subsurface. (EPA)

Short - Circuiting – The entry of ambient air into an extraction well through void space without first passing through the pore space within the geologic unit of interest. Short circuiting may occur through utility trenches and incoherent well or surface seals.

Soil Gas – See soil vapour.

Soil Vapour – Refers to the atmosphere present in soil pore spaces. (EPA)

Sorbent – An agent that attracts and retains substances by absorption or adsorption. (Mosby's)

"Stack" Effect – The natural vertical movement of air within a building due to pressure differentials, which are caused by the difference in temperature between the inside and outside of a building. Normal stack effect is more significant during the colder temperatures of the season because of greater temperature differences between the inside and outside of a building. (Terpak, Michael A. 2002)

Summa Canister – Is a stainless steel vessel which has had the internal surfaces treated using a "Summa" process. This process combines an electropolishing step with chemical deactivation to produce a surface that is chemically inert. (EPA)

Surrogate (recovery) – Has chemical characteristics similar to that of the analyte and provides an analytical response which is distinct from the analyte. The surrogate(s) is normally added to the sample prior to sample preparation and used to assess the recovery of analyte(s) carried through the analytical process. (O.Reg. 153/04 Analytical Protocol)

Tedlar Bag – Gas-tight bags constructed of non-reactive material (Tedlar) for the collection and transport of gas/vapour samples. (EPA)

T-fitting – A "T"-shaped pipe fitting with two outlets, one at 90° to the connection to the main line. (McGraw-Hill)

Tracer – An identifiable substance, such as a dye, that is introduced into a system and can be followed through the course of a process, providing information on the pattern of events in the process or on the redistribution of the parts or elements involved. (The American Heritage)

Trip Blank – A sample of analyte free media (supplied by the laboratory) taken to the site and returned to the laboratory unopened. The trip blank is prepared by the laboratory and a duplicate of the trip blank prepared at the same time is retained at the laboratory in a contaminant free location. (Maxxam)

Unsaturated Zone – The zone between land surface and the capillary fringe within which the moisture content is less than saturation and pressure is less than atmospheric. Soil pore spaces also typically contain air or other gases. (EPA)

Vacuum Gauge – A device for measuring pressures below atmospheric pressure. (The American Heritage)

Vapour Intrusion – Migration of a volatile chemical(s) from subsurface soil or water into an overlying or nearby building. (ASTM D7758)

Volatile Organic Compound (VOC) – Any organic compound having, at 20°C, a vapour pressure of 0.01 kPa or more or having a corresponding volatility under the particular conditions of use, which is released into the atmosphere. (O.Reg. 153/04 Analytical Protocol)

Water table – The surface of a groundwater body at which the water pressure equals atmospheric pressure. (ASTM D653)

6. References

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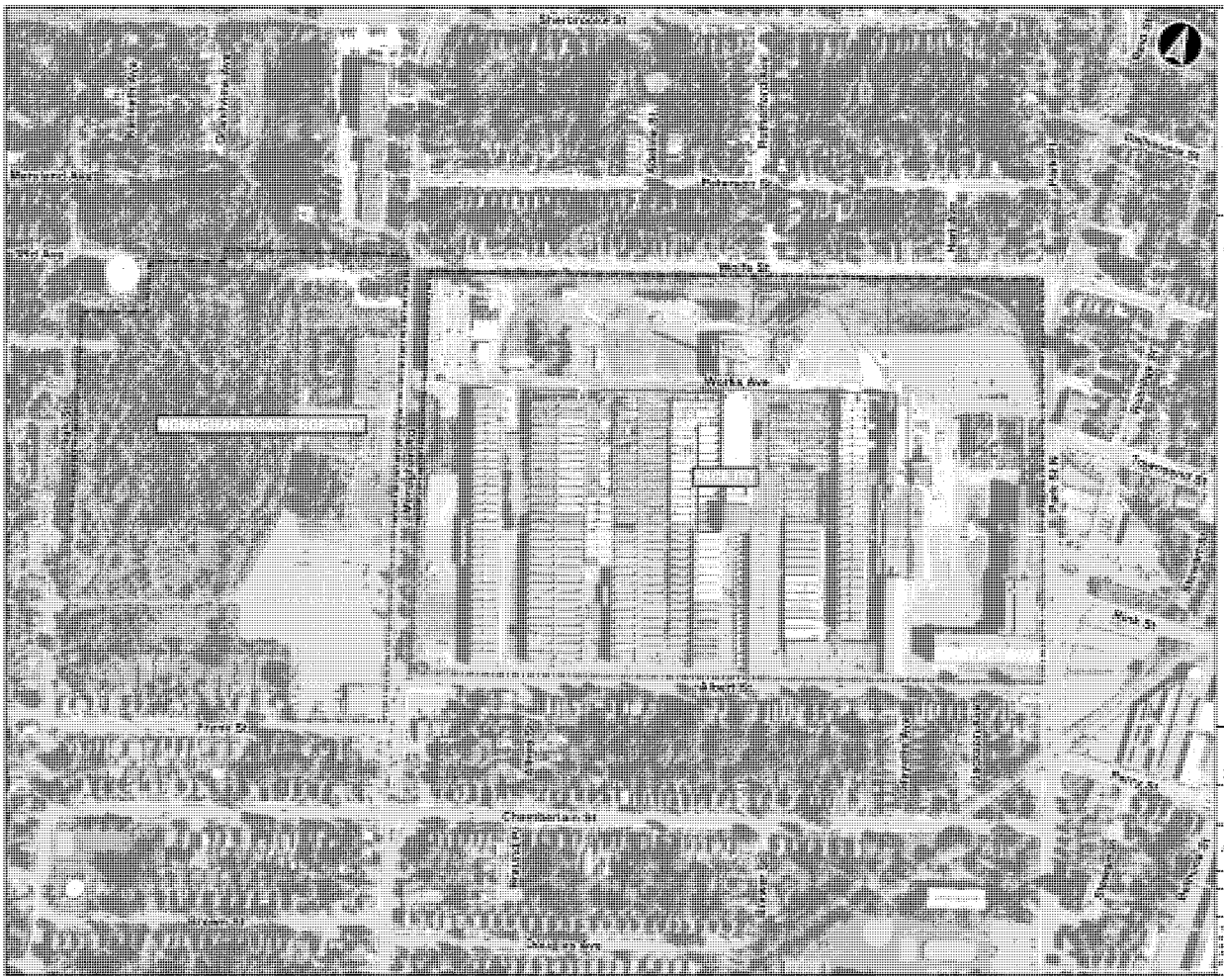
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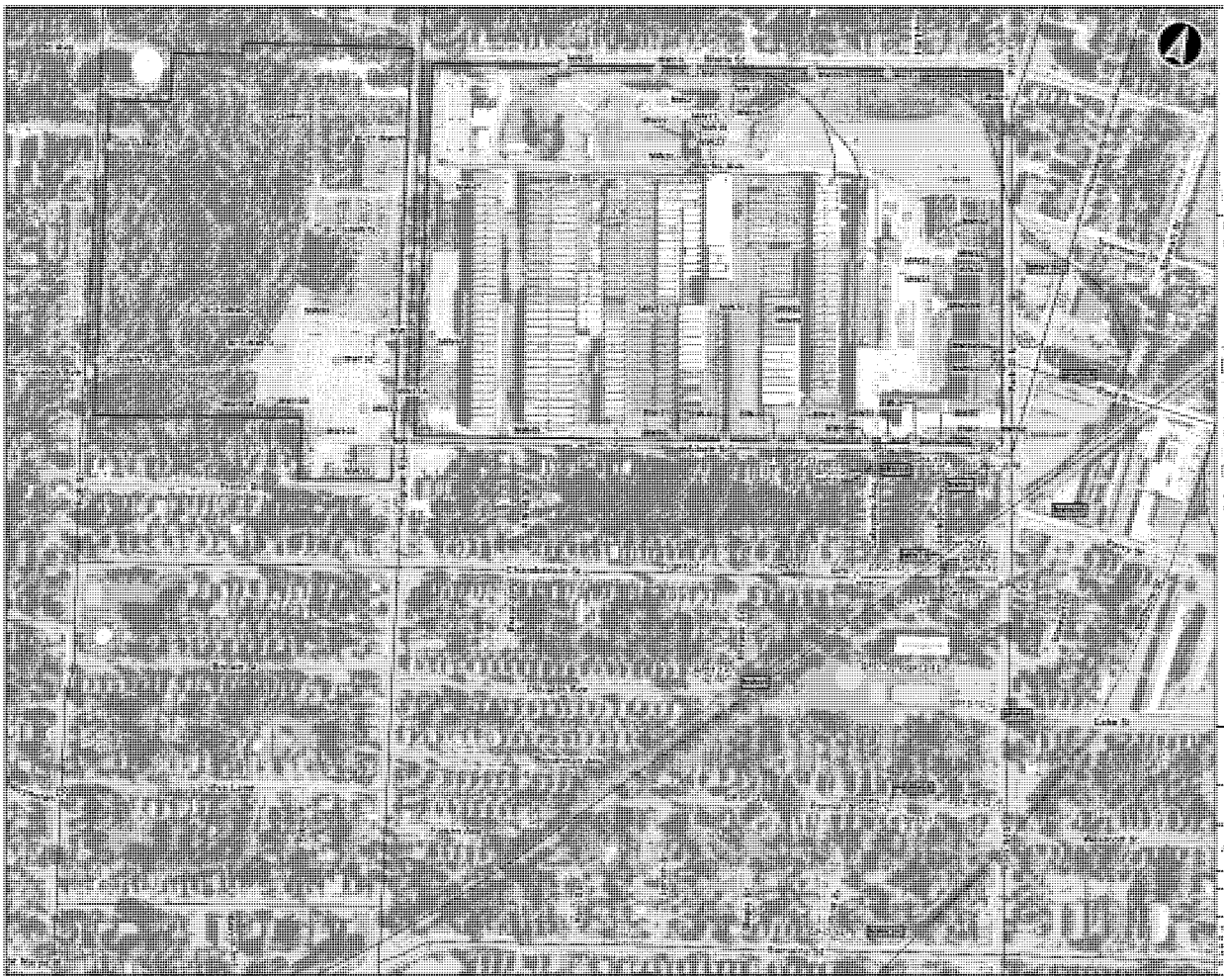
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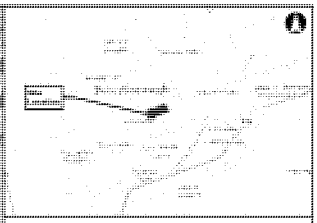
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Figures


Peterborough
Legend
Site Property Boundary
0 25 50 100 150 200
Metres
GEPR ENERGY CANADA INC.
(PETERBOROUGH)
2024 SOIL VAPOUR MONITORING REPORT
SITE AERIAL PHOTO
Jun 07, 2025
1:3,000
AECOM
Figure 1





Legend

Groundwater Level Monitoring Program

- Groundwater Monitoring Well Location
- Historical Groundwater Monitoring Well Location
- Groundwater Extraction Well Location
- 2024 Soil Gas Monitoring Location
- Historical Soil Probe Location
- Perimeter Groundwater Collection System Forcemain
- Site Property Boundary
- Main Road
- Local Road
- Railway

Vapour Monitoring Program*

- TCE and Degradation Products Monitoring Program
- Monitored Natural Attenuation (Event 3 points)

* Unless otherwise noted as potential, sampling programs were the responsibility of Historic Owner Raytheon / Elster Meters

0 30 60 120 180 240

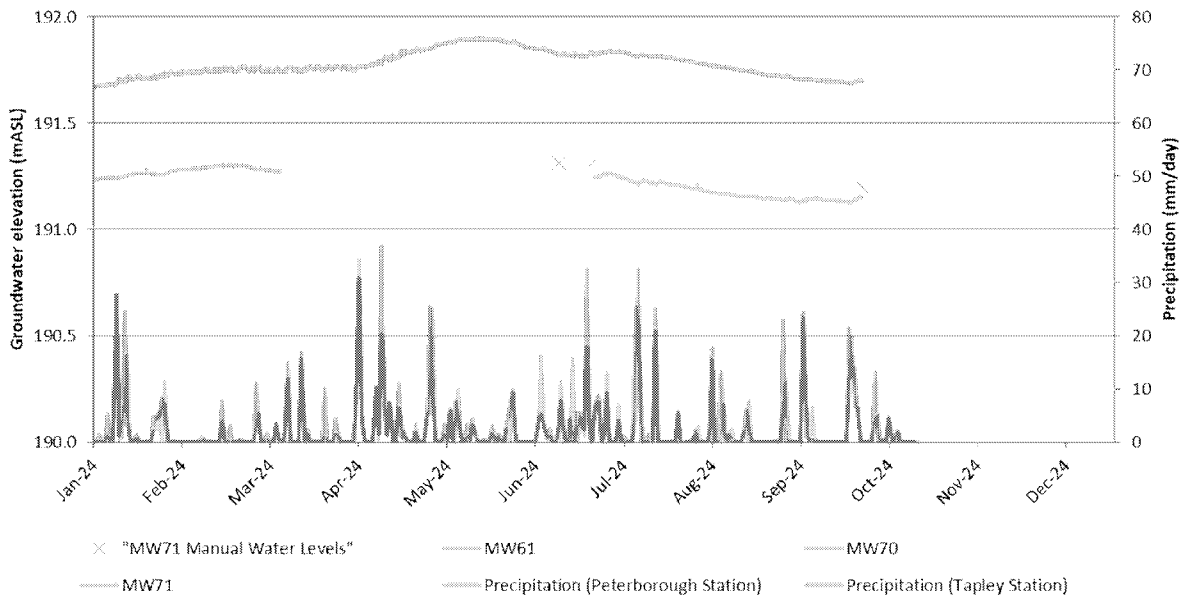
Meters

GEPR ENERGY CANADA INC.
(PETERBOROUGH)
SOIL VAPOUR MONITORING REPORT

SITE PLAN

June 07, 2025	1:3,000	Coordinate System: NAD 1983 CSRS MTM Zone 17N Data Source: Orthophotography 2020, Survey by AECOM, Property Boundary by Stantec
Project No.		
AECOM		Figure 2

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** Data from MW61 for the period between May 19, 2023, and July 2024 could not be recovered due to pressure transducer failure. Logger was removed from the well and sent for assessment. Logger was repaired and reinstalled in June 2024.*

*** Data from MW71 for the period between March 2024 and September 2024 could not be recovered due to pressure transducer failure. Manual measurements during that time have been included to show potential pattern.*

AECOM

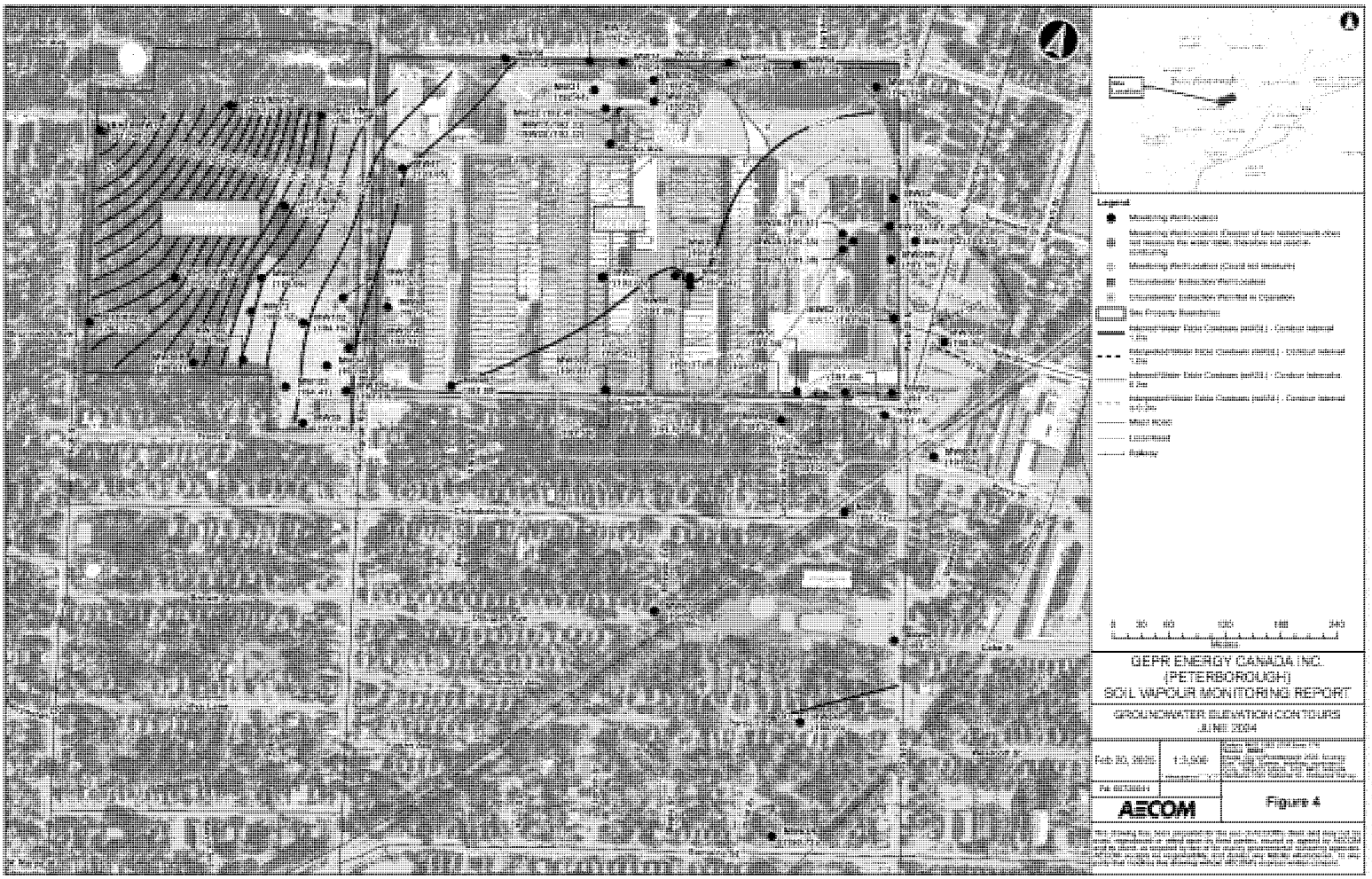
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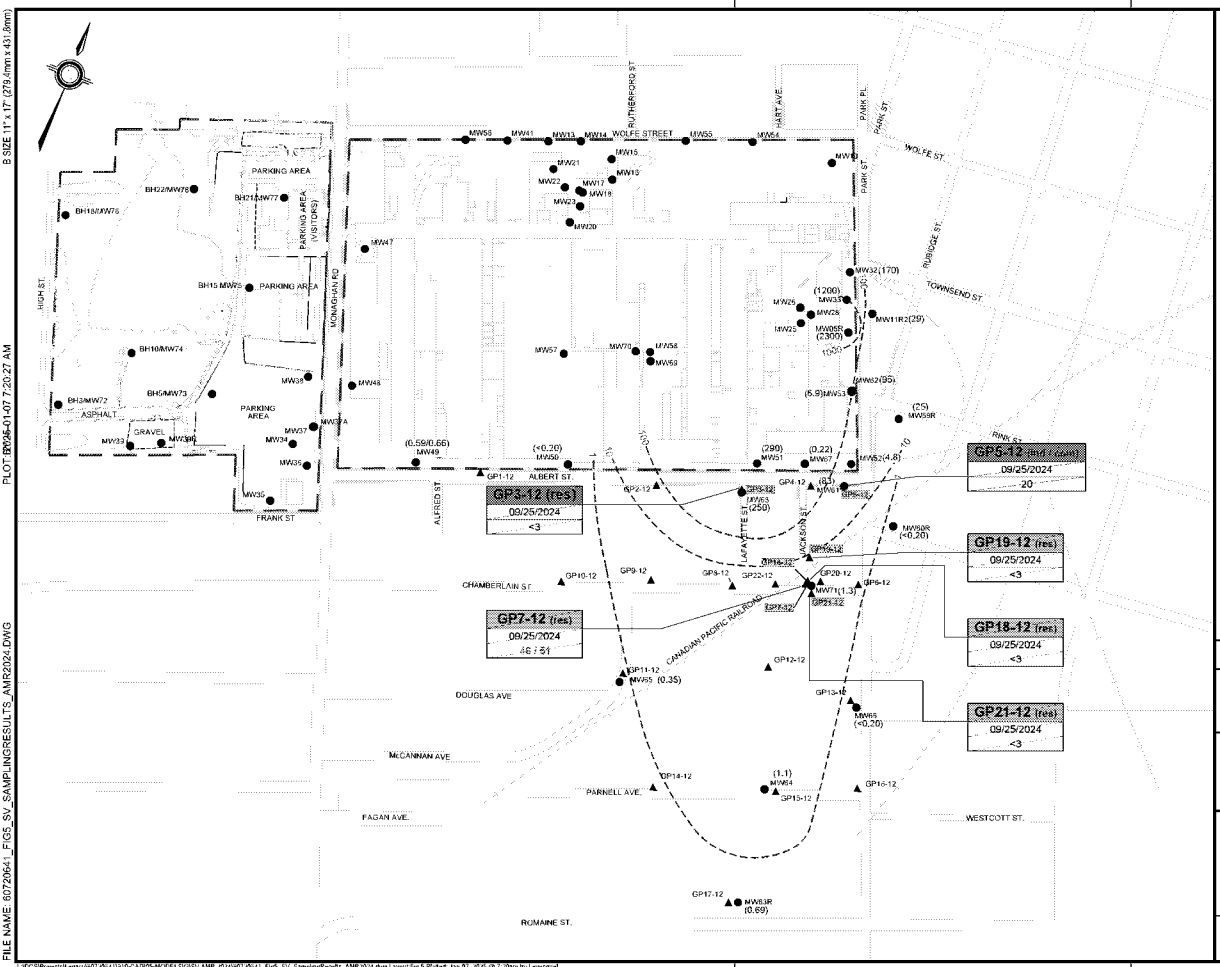
GEPR Energy Canada Inc. (Peterborough)
2024 Annual Soil Vapour Monitoring Report

Figure 3:
Hydrographs

PROJECT NUMBER	DATE
60720641	**October 2024**

Plotted on 19 December 2024


Legend
Monitoring Well Location
Monitoring Well Location (Cluster of two monitoring wells not including the water level monitoring well)
Monitoring Well Location (Could not measure)
Groundwater Extraction Well Location
Groundwater Extraction Well Location (Inactive)
Site Property Boundary
Intermediate Water Contours (m.a.s.l.) - Contour Interval 1.0m
Intermediate Water Contours (m.a.s.l.) - Contour Interval 1.0m
Intermediate Water Contours (m.a.s.l.) - Contour Interval 0.2m
Intermediate Water Contours (m.a.s.l.) - Contour Interval 0.2m
Main Road
Laneway
Railway
0 30 60 120 180 240
Meters
GEPR ENERGY CANADA INC.
(PETERBOROUGH)
SOIL VAPOUR MONITORING REPORT
GROUNDWATER ELEVATION CONTOURS
JUNE 2004
Feb 20, 2005
1:1,000
AECOM
Figure 4



Legend

- SITE PROPERTY BOUNDARY
- FENCE
- MW10 MONITORING WELL LOCATION
- GP5-12 ▲ SOIL GAS MONITORING LOCATION
- 2024 SOIL GAS MONITORING LOCATION
- 10 TCE GROUNDWATER ISOPLETH CONTOUR
- (29) TCE GROUNDWATER CONCENTRATION (µg/L) SPRING 2024

STANDARD

Parameter	Screening Level Condition	Soil Vapour Screening Level * (µg/m³)
Trichloroethylene	Residential	13.6
Trichloroethylene	Industrial / Commercial	2,670

NOTES:

1. NS = NOT SAMPLED
2. < = NOT DETECTED OR BELOW THE REPORTING LIMIT SHOWN
3. / = SEPARATES FIELD DUPLICATE SAMPLE RESULTS
4. * = BASED ON THE 2016 MGRA "APPROVED MODEL"
5. VALUES IN RED ARE ABOVE 2016 SOIL VAPOUR SCREENING LEVEL
6. SCREENING LEVEL CONDITION:
   - res = RESIDENTIAL
   - ind / com = INDUSTRIAL / COMMERCIAL

DO NOT SCALE THIS DOCUMENT.
ALL MEASUREMENTS MUST BE OBTAINED FROM STATED DIMENSIONS.

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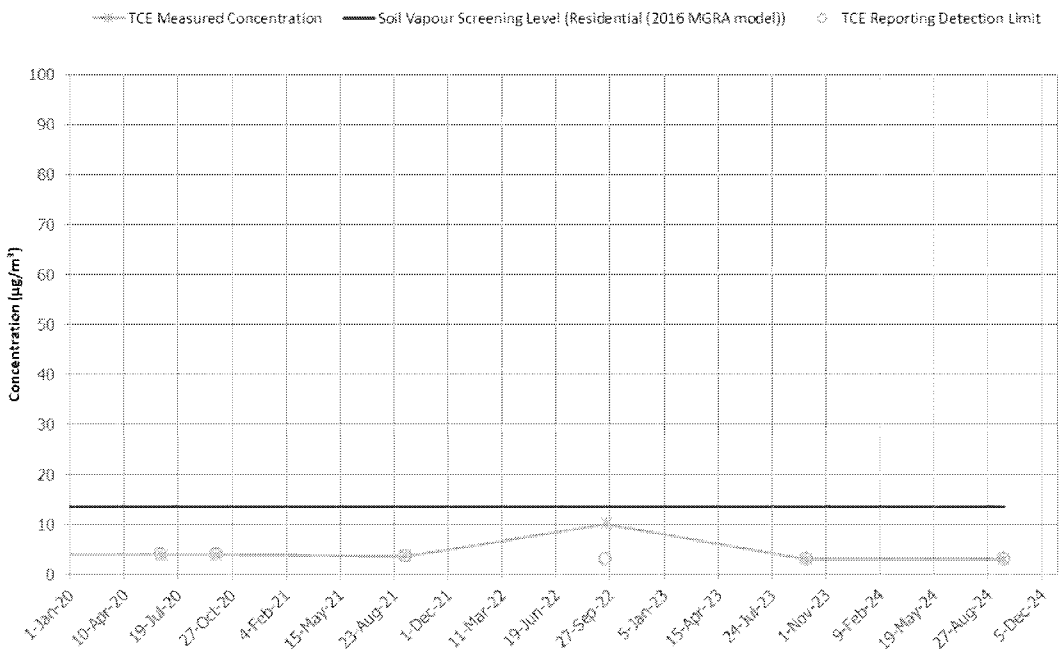
GEPR Energy Canada Inc., (Peterborough)
2024 Soil Vapour Monitoring Report

2024 SOIL VAPOUR SAMPLING RESULTS

PROJECT NUMBER	DATE	FIGURE
60720641	Jan 2025	5

B SIZE 11" x 17" (279.4mm x 431.8mm)
PLOT DATE: 2025-01-07 7:20:27 AM
FILE NAME: 60720641_FIG5_SV_SAMPLINGRESULTS_AMR2024.DWG
L:\DCS\Projects\Legacy\60720641\10-CAD\05-MODELS\GSV AMR 2024\60720641_Fig5_SV_SamplingResults_AMR2024.dwg Layout:Fig 5 Plotted: Jan 07, 2025 @ 7:20am By: Levesquel

GP3-12



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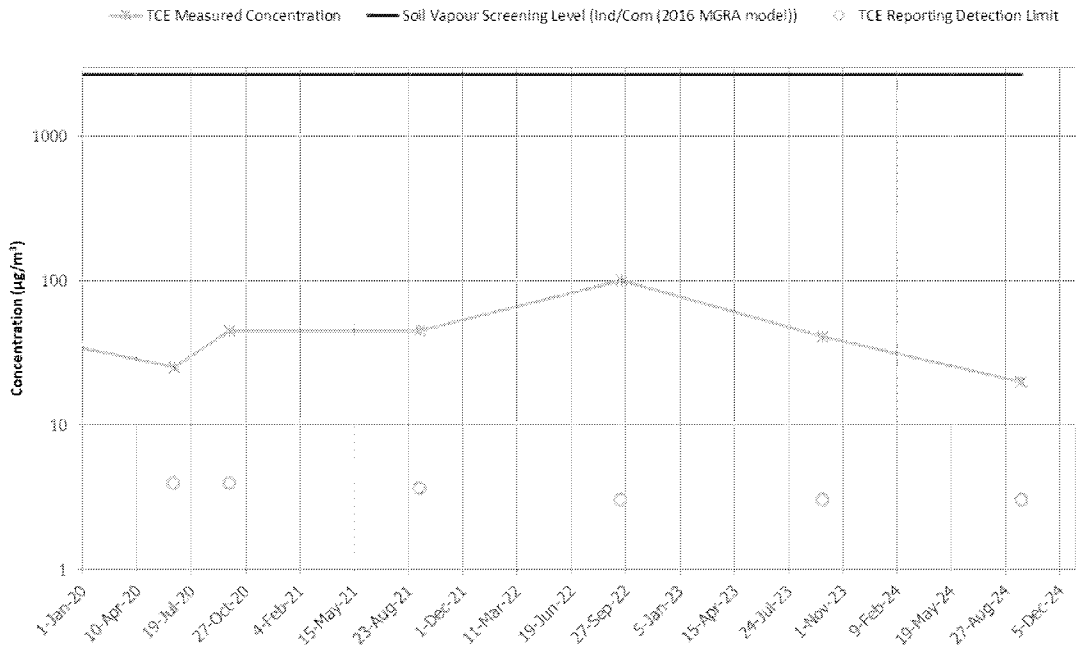
GEPR Energy Canada Inc. (Peterborough)
2024 Annual Soil Vapour Monitoring Report

Figure 6.1:
GP3-12 Historical TCE Concentrations

PROJECT NUMBER	DATE
60720641	**October 2024**

Printed on 28 October 2024

GP5-12



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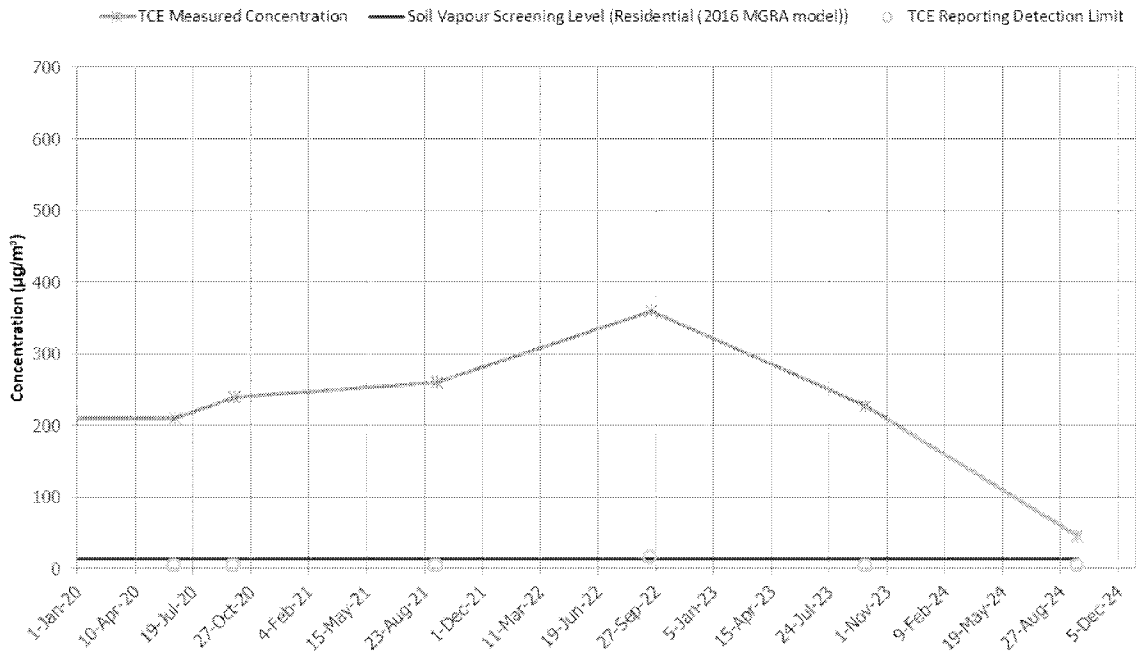
GEPR Energy Canada Inc. (Peterborough)
2024 Annual Soil Vapour Monitoring Report

Figure 6.2:
GP5-12 Historical TCE Concentrations

PROJECT NUMBER	DATE
60720641	**October 2024**

Printed on 28 October 2024

GP7-12



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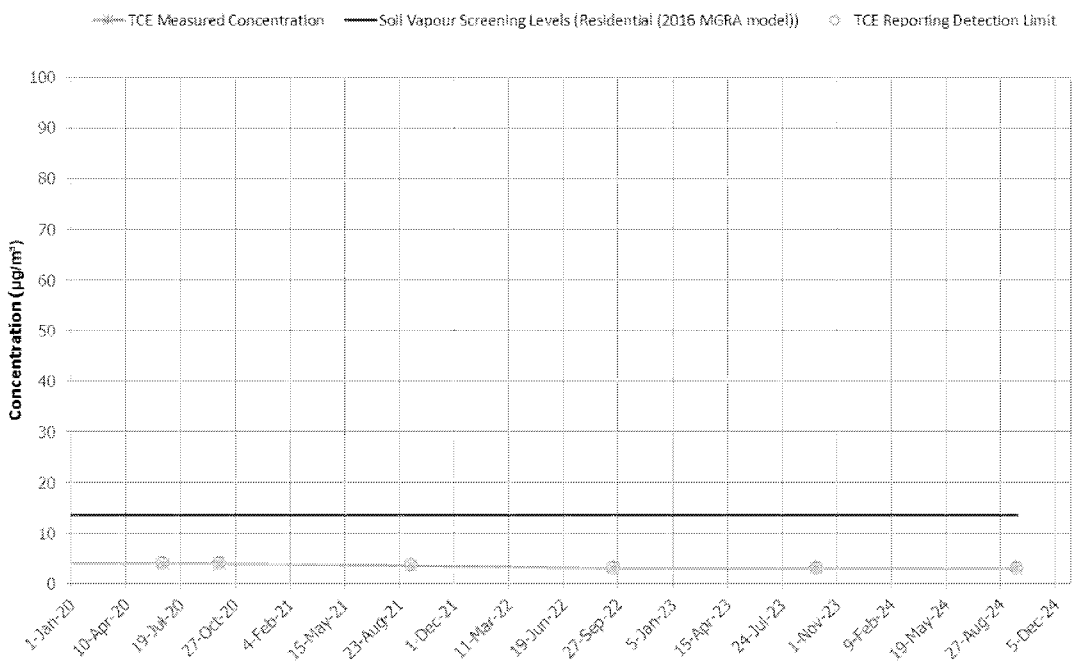
GEPR Energy Canada Inc. (Peterborough)
2024 Annual Soil Vapour Monitoring Report

Figure 6.3:
GP7-12 Historical TCE Concentrations

PROJECT NUMBER	DATE
60720641	**October 2024**

Printed on 29 October 2024

GP18-12



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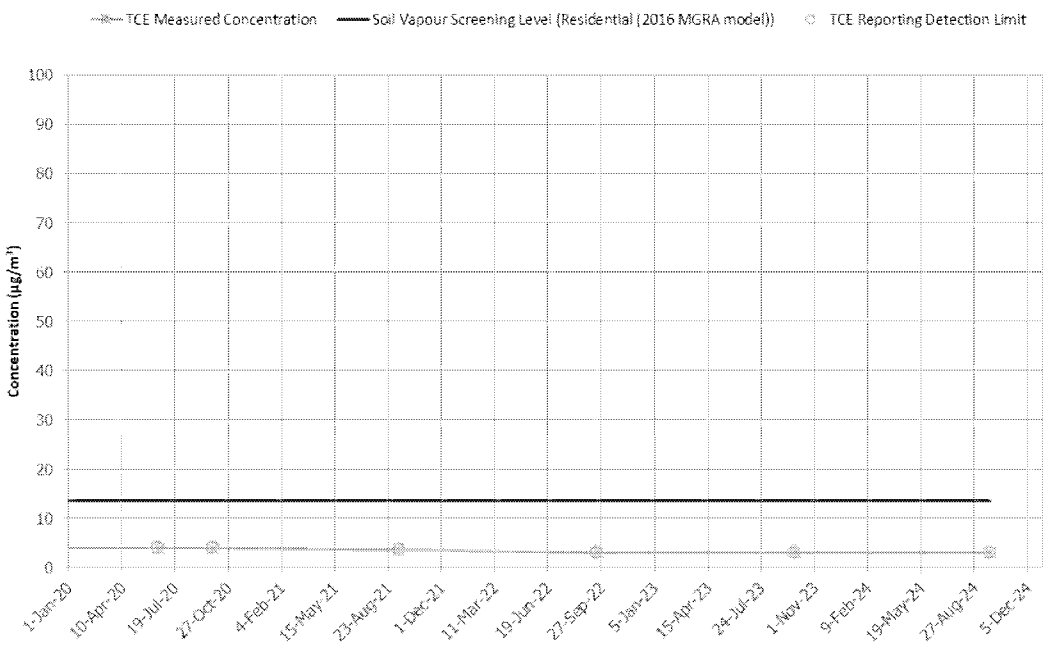
GEPR Energy Canada Inc. (Peterborough)
2024 Annual Soil Vapour Monitoring Report

Figure 6.4:
GP18-12 Historical TCE Concentrations

PROJECT NUMBER	DATE
60720641	**October 2024**

Printed on 28 October 2024

GP19-12



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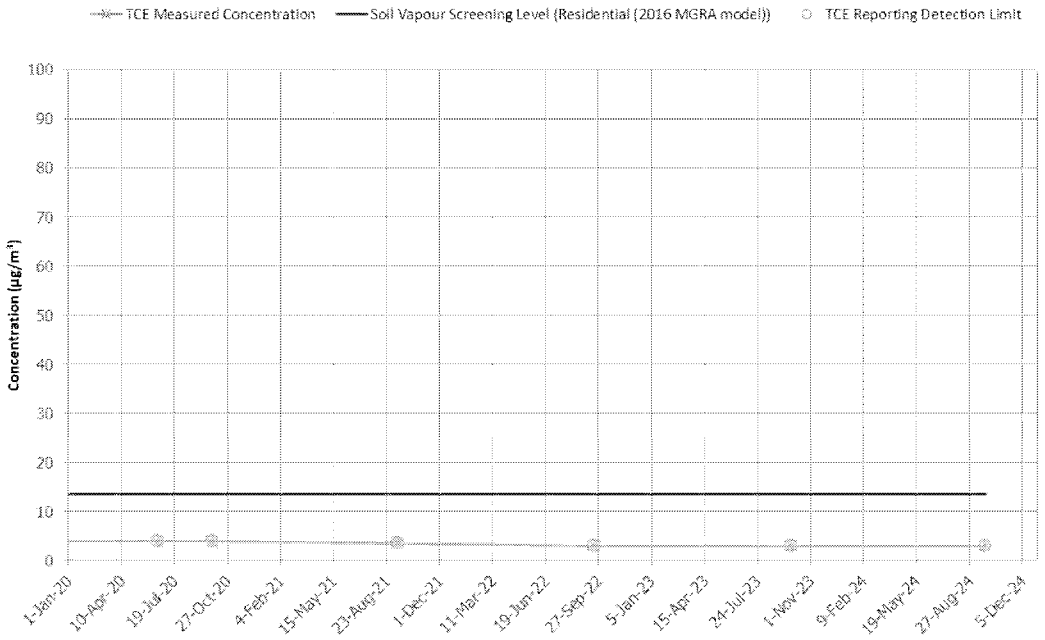
GEPR Energy Canada Inc. (Peterborough)
2024 Annual Soil Vapour Monitoring Report

Figure 6.5:
GP19-12 Historical TCE Concentrations

PROJECT NUMBER	DATE
60720641	**October 2024**

Printed on 29 October 2024

GP21-12



AECOM

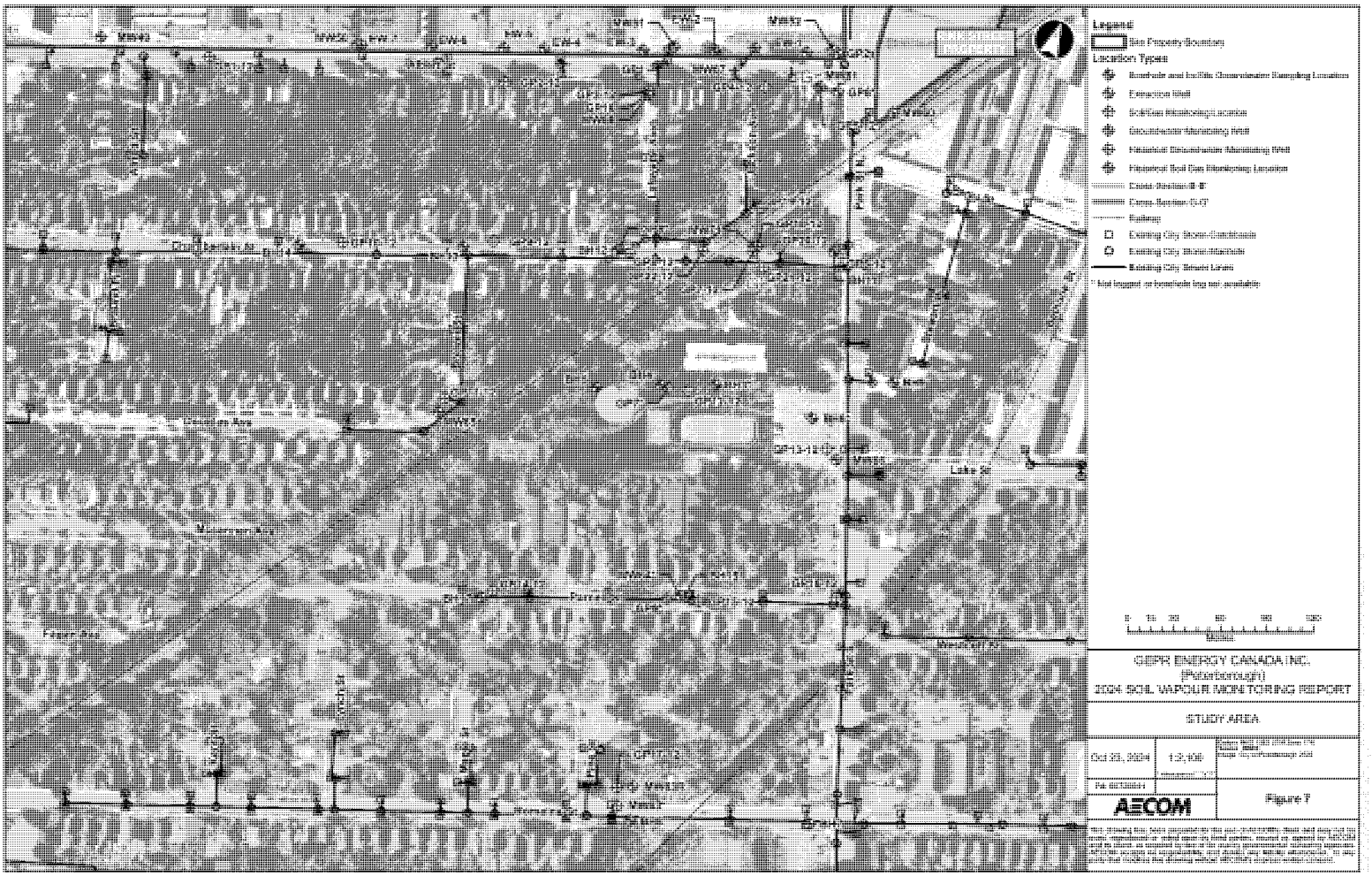
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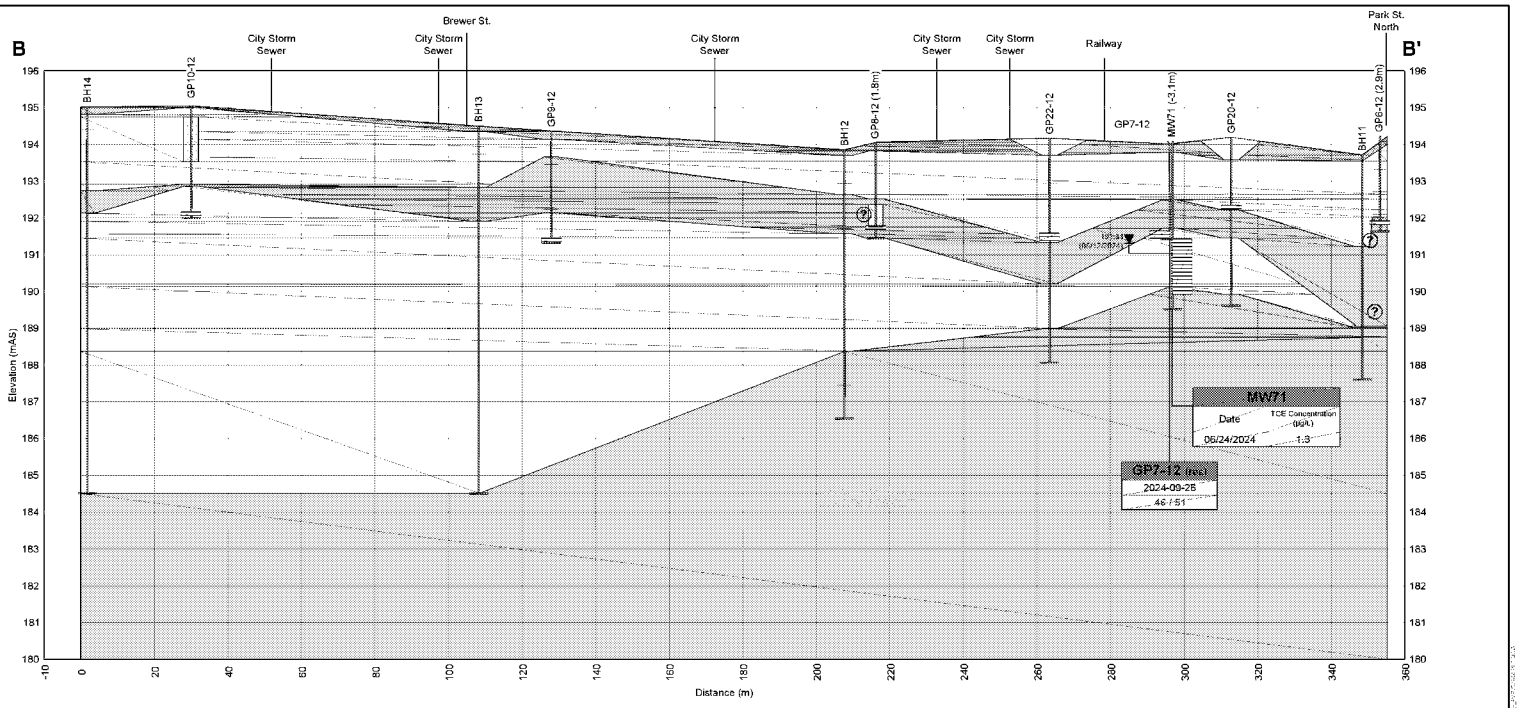
GEPR Energy Canada Inc. (Peterborough)
2024 Annual Soil Vapour Monitoring Report

Figure 6.6:
GP21-12 Historical TCE Concentrations

PROJECT NUMBER	DATE
60720641	**October 2024**

Printed on 28 October 2024


Legend
Site Property Boundary
Location Types
Borehole and Soil/Bio Characterization Sampling Location
Extraction Well
Soil/Bio Monitoring Location
Groundwater Monitoring Well
Piezometer Groundwater Monitoring Well
Perimeter Soil Gas Monitoring Location
Existing City Storm Catchbasin
Existing City Storm Manhole
Existing City Sewer Lines
Not logged or borehole log not available
0 10 20 40 60 80
Metres
CEPR ENERGY CANADA INC.
(Peterborough)
2024 SOIL VAPOUR MONITORING REPORT
STUDY AREA
Oct 31, 2024
1:2,000
AECOM
Figure 7



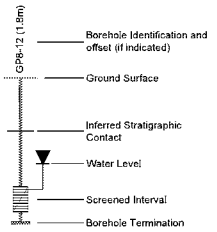
LEGEND

- Asphalt
- Topsoil
- No Recovery
- Fine-Grained Soils (Silts & Clays)
- Coarse-Grained Soils (Sands and Gravels)
- Silty Clay Glacial Lacustrine Deposits [1]
- (?) Stratigraphy between boreholes is inferred and may vary from that shown. Areas marked with this symbol are less certain.

Note(s):

[1] The sample collected for grain size sieve analyses within the ML (silt) layer at GP9-12 is 76% silt, 12% clay, 12% sand. Based on the grain size analysis at GP9-12 and the similar elevation of SM (silty sand) layers at BH13 and BH14, the units are included in the Fine-grained Soils unit.

[2] Extent of the glacial lacustrine deposit as per CRA (May 2013), Soil Vapour Sampling Report, #616661-20, Report Number 29.



STANDARD

Parameter	Screening Level Condition	Soil Vapour Screening Level [*] (µg/m³)
Trichloroethylene	Residential	13.5
Trichloroethylene	Industrial / Commercial	2,670

NOTES:

1. / = SEPARATES FIELD DUPLICATE SAMPLE RESULTS
2. * = BASED ON THE 2016 MGRA "APPROVED MODEL"
3. VALUES IN RED ARE ABOVE 2016 SOIL VAPOUR SCREENING LEVEL
4. SCREENING LEVEL CONDITION:
   - res = RESIDENTIAL
   - ind / com = INDUSTRIAL / COMMERCIAL

Horizontal

Vertical

1 : 10

GEPR ENERGY CANADA INC.
(Peterborough)
2024 SOIL VAPOUR MONITORING REPORT

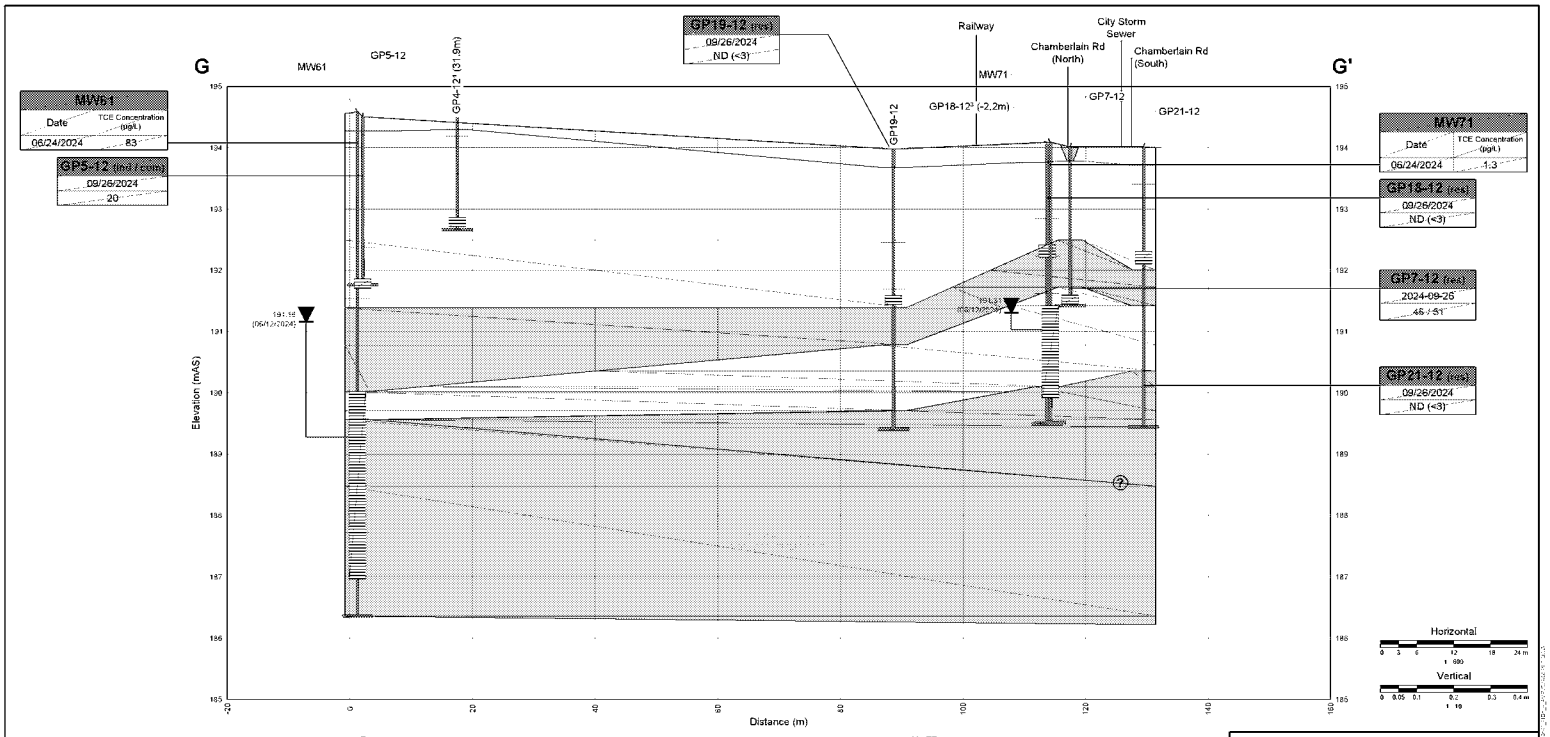
CROSS-SECTION B-B'

Oct 24, 2024	1:1000 *when printed 11"x17"	Datum: NAD 1983 UTM Zone 17N Source: Image:
P# 60720641		

AECOM

FIGURE 8

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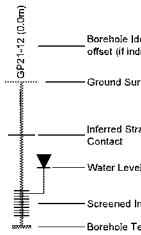


LEGEND

- Asphalt
- Topsoil
- No Recovery
- Fine-Grained Soils (Silts & Clays)
- Coarse-Grained Soils (Sands and Gravels)
- Silty Clay Glacial Lacustrine Deposits [2]
- (?) Stratigraphy between boreholes is inferred and may vary from that shown. Areas marked with this symbol are less certain.

Note(s):

[1] GP4-12 is offset from the cross-section by approximately 32m and the well construction and geology is shown for information only.
[2] Extend of the glacial lacustrine deposit as per CRA (May 2013), Soil Vapour Sampling Report, #016661-20, Report Number 29.
[3] Probe construction information for GP18-12 shown for information only because the location if offset from the cross-section, geology is not shown.



STANDARD

Parameter	Screening Level Condition	Soil Vapour Screening Level * (µg/m³)
Trichloroethylene	Residential	13.6
Trichloroethylene	Industrial / Commercial	2,670

NOTES:

1. NS = NOT SAMPLED
2. ND = NOT DETECTED OR BELOW THE REPORTING LIMIT SHOWN IN BRACKETS
3. / = SEPARATES FIELD DUPLICATE SAMPLE RESULTS
4. * = BASED ON THE 2016 MGRA "APPROVED MODEL"
5. VALUES IN RED ARE ABOVE 2016 SOIL VAPOUR SCREENING LEVEL
6. SCREENING LEVEL CONDITION:
   - res = RESIDENTIAL
   - ind / com = INDUSTRIAL / COMMERCIAL

GEPR ENERGY CANADA INC.
(Peterborough)
2024 SOIL VAPOUR MONITORING REPORT

CROSS-SECTION G-G'

Oct 24, 2024	1:600 *when printed 11"x17"	Datum: NAD 1983 UTM Zone 17N Source: Image:
P# 60720641		

AECOM

FIGURE 9

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Tables

Table 1 - Groundwater Elevation Data

GEPR Energy Canada Inc. (Peterborough)

FROM 2024/01/01 TO 2024/12/31

2024 Soil Vapour Sampling Report

Location	Date yyyy/mm/dd	Reference Elevation (m)	Water Level Depth (m)	Water Level Elevation (m)	Comments
EW-1	2024-06-13	193.97	2.57	191.40	
EW-2	2024-06-13	193.88	2.98	190.90	
EW-3	2024-06-13	193.66	2.35	191.31	
EW-4	2024-06-13	193.79	2.42	191.37	
EW-5	2024-06-13	194.01	2.51	191.50	
EW-6	2024-06-13	193.75	2.33	191.42	
EW-7	2024-06-13	193.83	2.24	191.59	
MW05R	2024-06-12	193.68	2.38	191.30	
MW10	2024-06-12	194.13	1.98	192.15	
MW11R2	2024-06-12	193.48	2.23	191.25	
MW13	2024-06-13	194.33	1.86	192.47	
MW14	2024-06-13	194.36	1.96	192.40	
MW15	2024-06-13	194.64	2.19	192.45	
MW16	2024-06-13	194.74	2.49	192.25	
MW17	2024-06-13	194.49	2.16	192.33	
MW18	2024-06-13	194.57			Not accessible
MW20	2024-06-13	194.42	2.10	192.32	
MW21	2024-06-13	194.60	2.16	192.44	
MW22	2024-06-13	194.50	2.04	192.46	
MW23	2024-06-13	194.22			Not accessible
MW25	2024-06-13	194.75	3.37	191.38	
MW26	2024-06-13	193.94	2.53	191.41	
MW28	2024-06-13	194.06	2.71	191.35	
MW32	2024-06-12	193.98	2.53	191.45	
MW33	2024-06-12	194.00	2.61	191.39	
MW34	2024-06-12	196.01	2.61	193.40	
MW35	2024-06-12	196.35	2.59	193.76	
MW37A	2024-06-12	195.86	2.75	193.11	
MW38	2024-06-12	196.14	2.73	193.41	
MW39R	2024-06-12	199.84	1.23	198.61	
MW47	2024-06-13	194.74	1.69	193.05	
MW48	2024-06-13	194.48	1.77	192.71	
MW49	2024-06-13	194.54	2.55	191.99	
MW50	2024-06-13	194.64	2.83	191.81	
MW51	2024-06-13	194.17	2.83	191.34	
MW52	2024-06-13	194.09	2.92	191.17	
MW53	2024-06-12	193.57	2.01	191.56	
MW54	2024-06-12	194.17	1.88	192.29	
MW55	2024-06-13	194.27	1.88	192.39	
MW56	2024-06-13	194.41	1.29	193.12	
MW57	2024-06-13	194.61	2.56	192.05	
MW58	2024-06-13	194.56	2.52	192.04	
MW59R	2024-06-12	192.72	1.88	190.84	
MW60R	2024-06-12	193.75	2.11	191.64	
MW61	2024-06-12	194.43	3.27	191.16	
MW62	2024-06-12	193.57	2.52	191.05	

Table 1 - Groundwater Elevation Data

GEPR Energy Canada Inc. (Peterborough)

FROM 2024/01/01 TO 2024/12/31

2024 Soil Vapour Sampling Report

Location	Date yyyy/mm/dd	Reference Elevation (m)	Water Level Depth (m)	Water Level Elevation (m)	Comments
MW63R	2024-06-12	192.38	1.65	190.73	
MW64	2024-06-13	193.04	2.11	190.93	
MW65	2024-06-12	194.34	2.84	191.50	
MW66	2024-06-12	193.40	2.08	191.32	
MW67	2024-06-13	194.26	2.95	191.31	
MW68	2024-06-12	194.83	3.31	191.52	
MW69	2024-06-13	194.47	2.67	191.80	
MW70	2024-06-13	194.66	2.83	191.83	
MW71	2024-06-12	194.00	2.69	191.31	
MW72	2024-06-12	205.07	2.35	202.72	
MW73	2024-06-12	198.02	1.90	196.12	
MW74	2024-06-12	203.85	0.98	202.87	
MW75	2024-06-12	199.93	2.41	197.52	
MW76	2024-06-12	224.63	11.14	213.49	
MW77	2024-06-12	199.95	3.18	196.77	
MW78	2024-06-12	208.93	2.21	206.72	
MW99	2024-06-13	197.98	1.92	196.06	
MW100	2024-06-13	197.84	1.98	195.86	
MW102	2024-06-12	196.74	2.58	194.16	
MW103	2024-06-12	196.18	1.77	194.41	
MW104	2024-06-12	195.79	2.69	193.10	

Table 2 - Soil Vapour Analytical Data

GE Power Conversion Motors (Peterborough)

FROM 2014/01/01 TO 2024/12/31

2024 Soil Vapour Sampling Report

Location	Sample Date yyyy/mm/dd	Sample Name	Sample Type	Sampling Method	Dichloroethylene, 1,1-	Dichloroethylene, cis-1,2-	Dichloroethylene, trans-1,2-	Trichloroethylene	Vinyl Chloride
				Units	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3
GP1-12	2014-01-22	SG-016061-012214-PS-014-281	N	S	<0.99	2.79	<0.79	1.8	<0.46
GP2-12	2014-01-22	SG-016061-012214-PS-015-1932	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
GP3-12	2014-01-22	SG-016061-012214-PS-016-1524	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
		SG-016061-012214-PS-017-2485	FD	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2014-06-20	SG-016061-062014-PS-006-1282	N	S	<0.99	<0.75	<0.79	2.2	<0.46
	2014-08-29	SG-016061-082914-NQ-001-379	N	S	<0.99	<0.75	<0.79	2.0	<0.46
	2014-12-04	SG-016061-120414-NQ-005-1030	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
		SG-016061-120414-NQ-006-2514	FD	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2015-01-21	SG-016061-012115-CG-005-1318	N	S	<0.40	<0.40	<0.79	0.89	<0.26
		SG-016061-012115-CG-006-1794	FD	S	<0.40	<0.40	<0.79	0.83	<0.26
	2015-06-15	GP3-12	N	S	<0.79	<0.79	<0.79	4.0	<0.51
	2015-09-12	GP3-12_2015Q3	N	W	<10	<1.8	<4.4	<1.4	<12
	2016-05-13	GP3-12 _2016Q2-W	N	W	<30	<5.4	<13	<3.9	<34
	2016-09-19	GP3-12_2016Q3-W	N	W	<30	<5.4	<13	<4.0	<34
	2017-06-05	GP3-12_2017Q2-W	N	W	<30	<5.4	<13	<3.9	<34
	2017-09-07	GP3-12_2017Q3-W	N	W	<30	<5.5	<13	<4.0	<34
	2018-06-11	GP3-12_2018Q2	N	W	<30	<5.4	<13	<3.9	<34
	2018-09-17	GP3-12_2018Q3	N	W	<30	<5.4	<13	<3.9	<34
	2019-06-21	GP3-12	N	W	<30	<5.4	<13	<4.0	<34
	2019-09-30	GP3-12_2019Q3	N	W	<30	<5.4	<13	<4.0	<34
	2020-06-18	GP3-12	N	W	<30	<5.4	<13	<3.9	<34
	2020-09-28	GP3-12	N	W	<30	<5.4	<13	<3.9	<34
	2021-09-13	GP3-12_2021	N	W	<28	<5.0	<12	<3.6	<31
	2022-09-19	GP3-12-2022Q3	N	W	<5	<4	<4	10	<10
	2023-09-25	GP3-12_2023Q3	N	W	<6	<5	<5	<3	<13
	2024-09-26	GP3-12_2024Q3	N	W	<13	<6	<9	<3	<50
GP4-12	2014-01-22	SG-016061-012214-PS-018-2056	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
GP5-12	2014-01-22	SG-016061-012214-PS-020-2246	N	S	<0.99	<0.75	<0.79	6.8	<0.46
	2014-06-20	SG-016061-062014-PS-007-1423	N	S	<0.99	<0.75	<0.79	27.9	<0.46
	2014-08-29	SG-016061-082914-NQ-002-2243	N	S	<0.99	<0.75	<0.79	45.6	<0.46
		SG-016061-082914-NQ-003-1195	FD	S	<0.99	<0.75	<0.79	44.5	<0.46
	2014-12-04	SG-016061-120414-NQ-007-1277	N	S	<0.99	<0.75	<0.79	16.5	<0.46
	2015-01-21	SG-016061-012115-CG-008-276	N	S	<0.40	<0.40	<0.79	7.96	<0.26
	2015-06-15	GP5-12	N	S	<0.40	<0.40	<0.40	38.2	<0.26
	2015-09-21	GP5-12_2015Q3	N	S	<0.40	<0.40	<0.79	39.5	<0.26
		GP5-12LR_2015Q3	LR	S	<0.40	<0.40	<0.79	37.5	<0.26
	2015-09-21	GP5-12_2015Q3-W	N	W	<9.8	<1.8	<4.3	7.2	<11
	2016-05-13	GP5-12/1378	N	S	<0.40	<0.40	<0.40	18.1	<0.26
	2016-05-13	GP5-12_2016Q2-W	N	W	<31	<5.5	<13	14	<34
	2016-09-19	GP5-12/388_2016Q3-S	N	S	<0.40	<0.40	<0.79	72.5	<0.26

N = Normal sample
FD = Field duplicate sample
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S = Summa Canister

< indicates less than method detection limit
- indicates not analyzed

Table 2 - Soil Vapour Analytical Data

GE Power Conversion Motors (Peterborough)

FROM 2014/01/01 TO 2024/12/31

2024 Soil Vapour Sampling Report

Location	Sample Date yyyy/mm/dd	Sample Name	Sample Type	Sampling Method	Dichloroethylene, 1,1-	Dichloroethylene, cis-1,2-	Dichloroethylene, trans-1,2-	Trichloroethylene	Vinyl Chloride
				Units	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3
GP5-12	2016-09-19	GP5-12_2016Q3-W	N	W	<30	<5.4	<13	33	<34
	2017-06-05	GP5-12_2017Q2-W	N	W	<30	<5.4	<13	21	<34
	2017-06-06	GP5-12_2017Q2-S/1889	N	S	<0.40	<0.40	<0.40	27.1	<0.26
	2017-09-07	GP5-12/1517	N	S	<0.40	<0.40	<0.79	43.8	<0.26
	2017-09-07	GP5-12_2017Q3-W	N	W	<30	<5.5	<13	46	<34
	2018-06-11	GP5-12_2018Q2-S	N	S	<0.40	<0.40	<0.79	23.0	<0.26
	2018-06-11	GP5-12_2018Q2	N	W	<30	<5.4	<13	23	<34
	2018-09-17	GP5-12_2018Q3-S	N	S	<0.99	8.77	<2.0	51.2	1.35
		GP5-12_2018Q3-S-LR	LR	S	<0.99	9.09	<2.0	51.8	1.41
	2018-09-17	GP5-12_2018Q3	N	W	<30	<5.4	<13	53	<34
	2019-06-21	GP5-12	N	W	<30	<5.4	<13	26	<34
	2019-09-30	GP5-12_2019Q3	N	W	<30	<5.4	<13	40	<34
	2020-06-18	GP5-12	N	W	<30	<5.4	<13	25	<34
	2020-09-28	GP5-12	N	W	<30	<5.4	<13	45	<34
	2021-09-13	GP5-12_2021	N	W	<28	<5.0	<12	45	<31
	2022-09-19	GP5-12-2022Q3	N	W	<5	<4	<4	100	<10
	2023-09-25	GP5-12_2023Q3	N	W	<6	<5	<5	41	<13
	2024-09-26	GP5-12_2024Q3	N	W	<13	<6	<9	20	<50
GP6-12	2014-01-21	SG-016061-012114-PS-008-2544-1	N	S	-	-	<0.79	<1.6	-
		SG-016061-012114-PS-008-2544-2	N	S	<0.99	<0.75	-	-	<0.46
GP7-12	2014-01-21	SG-016061-012114-PS-012-1901	N	S	<0.99	8.67	<0.79	102	<0.46
	2014-06-20	SG-016061-062014-PS-004-210	N	S	<0.99	70.7	1.85	288	<0.46
	2014-08-29	SG-016061-082914-NQ-006-1386	N	S	<0.99	249	5.16	540	<0.46
	2014-12-04	SG-016061-120414-NQ-002-1361	N	S	<0.99	120	3.43	161	<0.46
	2015-01-21	SG-016061-012115-CG-001-1905	N	S	<0.40	90.6	2.54	71.8	<0.26
	2015-06-15	GP7-12	N	S	<1.6	189	<1.6	445	<1.0
		GP77-12	FD	S	<1.6	183	<1.6	430	<1.0
	2015-09-21	GP7-12_2015Q3	N	S	<0.40	397	8.55	521	<0.26
		GP77-12_2015Q3	FD	S	<0.40	406	8.72	522	<0.26
	2015-09-21	GP7-12_2015Q3-W	N	W	<9.8	150	<4.3	160	<11
		GP77-12_2015Q3-W	FD	W	<9.8	95	<4.3	93	<11
	2016-05-13	GP7-12/208	N	S	<0.40	210	6.63	302	<0.26
		GP77-12/1441	FD	S	<0.40	208	5.89	303	<0.26
	2016-05-13	GP7-12_2016Q2-W	N	W	<30	89	<13	97	<34
		GP77-12_2016Q2-W	FD	W	<30	150	<13	190	<34
	2016-09-19	GP7-12/247_2016Q3-S	N	S	<0.40	394	10.5	619	<0.26
		GP77-12/2060_2016Q3-S	FD	S	<0.40	410	10.6	682	<0.26
	2016-09-19	GP7-12_2016Q3-W	N	W	<30	200	<13	390	<33
		GP77-12_2016Q3-W	FD	W	<30	240	<13	380	<33

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Table 2 - Soil Vapour Analytical Data

GE Power Conversion Motors (Peterborough)

FROM 2014/01/01 TO 2024/12/31

2024 Soil Vapour Sampling Report

Location	Sample Date yyyy/mm/dd	Sample Name	Sample Type	Sampling Method	Dichloroethylene, 1,1-	Dichloroethylene, cis-1,2-	Dichloroethylene, trans-1,2-	Trichloroethylene	Vinyl Chloride
				Units	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3
GP7-12	2017-06-05	GP7-12_2017Q2-W	N	W	<30	160	<13	130	<34
		GP77-12_2017Q2-W	FD	W	<30	110	<13	86	<34
	2017-06-06	GP7-12_2017Q2-S/355	N	S	<0.40	223	6.84	354	<0.26
		GP77-12_2017Q2-S/1212	FD	S	<0.40	223	6.99	354	<0.26
	2017-09-07	GP7-12/3024	N	S	<0.40	362	9.38	623	<0.26
		GP77-12/228	FD	S	<0.40	362	8.96	647	<0.26
	2017-09-07	GP7-12_2017Q3-W	N	W	<30	300	<13	490	<34
		GP77-12_2017Q3-W	FD	W	<30	270	<13	420	<34
	2018-06-11	GP7-12_2018Q2-S	N	S	<0.40	773	13.6	406	<0.77
		GP7-12_2018Q2-S-LR	LR	S	<0.40	699	12.4	350	<0.77
		GP77-12_2018Q2-S	FD	S	<0.40	722	13.3	387	<0.77
	2018-06-11	GP7-12_2018Q2	N	W	<30	470	<13	200	<33
		GP77-12_2018Q2	FD	W	<30	530	<13	250	<33
	2018-09-17	GP7-12_2018Q3-S	N	S	<0.87	526	10.0	622	<0.56
		GP77-12_2018Q3-S	FD	S	<0.87	511	9.9	594	<0.56
	2018-09-17	GP7-12_2018Q3	N	W	<30	370	<13	360	<33
		GP77-12_2018Q3	FD	W	<30	530	14	610	<33
	2019-06-21	GP7-12	N	W	<30	110	<13	100	<34
		GP77-12	FD	W	<30	100	<13	90	<34
	2019-09-30	GP7-12_2019Q3	N	W	<30	110	<13	210	<34
		GP77-12	FD	W	<30	65	<13	110	<34
	2020-06-18	GP7-12	N	W	<30	180	<13	210	<34
		GP77-12	FD	W	<30	120	<13	110	<34
	2020-09-28	GP7-12	N	W	<30	120	<13	240	<34
	2021-09-13	GP7-12_2021	N	W	<28	69	<12	260	<31
		GP77-12_2021	FD	W	<28	50	<12	170	<31
	2022-09-19	GP7-12-2022Q3	N	W	<5	240	<4	359	<10
		GP77-12-2022Q3	FD	W	<5	160	<4	220	<10
	2023-09-25	GP7-12_2023Q3	N	W	<6	96	<5	227	<13
		GP77-12_2023Q3	FD	W	<6	67	<5	121	<13
	2024-09-26	GP7-12_2024Q3	N	W	<13	20	<9	46	<50
		GP77-12_2024Q3	FD	W	<13	21	<9	51	<50
GP8-12	2014-01-21	SG-016061-012114-PS-005-1270	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
		SG-016061-012114-PS-006-1522-1	FD	S	<0.99	-	<0.79	-	-
		SG-016061-012114-PS-006-1522-2	FD	S	-	<0.75	-	<1.6	<0.46
GP9-12	2014-01-21	SG-016061-012114-PS-004-1257	N	S	<7.6	<5.8	<6.1	<12	<3.5
GP10-12	2014-01-22	SG-016061-012214-PS-021-1891	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
GP12-12	2014-01-21	SG-016061-012114-PS-003-1167	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
GP14-12	2014-01-21	SG-016061-012114-PS-002-1761	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
GP17-12	2014-01-21	SG-016061-012114-PS-001-228	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
GP18-12	2014-01-21	SG-016061-012114-PS-011-1285	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2014-06-20	SG-016061-062014-PS-002-1288	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
		SG-016061-062014-PS-003-2568	FD	S	<0.99	<0.75	<0.79	<1.6	<0.46

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Table 2 - Soil Vapour Analytical Data

GE Power Conversion Motors (Peterborough)

FROM 2014/01/01 TO 2024/12/31

2024 Soil Vapour Sampling Report

Location	Sample Date yyyy/mm/dd	Sample Name	Sample Type	Sampling Method	Dichloroethylene, 1,1-	Dichloroethylene, cis-1,2-	Dichloroethylene, trans-1,2-	Trichloroethylene	Vinyl Chloride
				Units	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3
GP18-12	2014-08-29	SG-016061-082914-NQ-007-1259	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2014-12-04	SG-016061-120414-NQ-003-1454	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2015-01-21	SG-016061-012115-CG-003-392	N	S	<0.40	<0.40	<0.79	<0.54	<0.26
	2015-06-16	GP18-12	N	S	<0.79	<0.79	<0.79	<1.1	<0.51
	2015-09-12	GP18-12_2015Q3	N	W	<9.7	<1.8	<4.3	<1.3	<11
	2016-05-13	GP18-12_2016Q2-W	N	W	<30	<5.4	<13	<3.9	<34
	2016-09-19	GP18-12_2016Q3-W	N	W	<30	<5.3	<13	<3.9	<33
	2017-06-05	GP18-12_2017Q2-W	N	W	<30	<5.4	<13	<3.9	<34
	2017-09-07	GP18-12_2017Q3-W	N	W	<30	<5.4	<13	<3.9	<34
	2018-06-11	GP18-12_2018Q2	N	W	<30	<5.3	<13	<3.9	<33
	2018-09-17	GP18-12_2018Q3	N	W	<30	<5.3	<13	<3.9	<33
	2019-06-21	GP18-12	N	W	<30	<5.4	<13	<3.9	<34
	2019-09-30	GP18-12_2019Q3	N	W	<30	<5.4	<13	<4.0	<34
	2020-06-18	GP18-12	N	W	<30	<5.4	<13	<3.9	<34
	2020-09-28	GP18-12	N	W	<30	<5.4	<13	<3.9	<34
	2021-09-13	GP18-12_2021	N	W	<28	<5.0	<12	<3.6	<31
	2022-09-19	GP18-12-2022Q3	N	W	<5	<4	<4	<3	<10
	2023-09-25	GP18-12_2023Q3	N	W	<6	<5	<5	<3	<13
	2024-09-26	GP18-12_2024Q3	N	W	<13	<6	<9	<3	<50
GP19-12	2014-01-21	SG-016061-012114-PS-013-1217	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2014-06-20	SG-016061-062014-PS-005-1799	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2014-08-29	SG-016061-082914-NQ-004-1754	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2014-12-04	SG-016061-120414-NQ-004-257	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2015-01-21	SG-016061-012115-CG-002-1417	N	S	<0.40	<0.40	<0.79	<0.54	<0.26
	2015-06-15	GP19-12	N	S	<0.40	<0.40	<0.40	<0.54	<0.26
		GP19-12LR	LR	S	<0.40	<0.40	<0.40	<0.54	<0.26
	2015-09-21	GP19-12	N	W	<10	<1.8	<4.4	<1.4	<12
	2016-05-13	GP19-12_2016Q2-W	N	W	<30	<5.4	<13	<4.0	<34
	2016-09-19	GP19-12_2016Q3-W	N	W	<30	<5.3	<13	<3.9	<33
	2017-06-05	GP19-12_2017Q2-W	N	W	<30	<5.4	<13	<3.9	<34
	2017-09-07	GP19-12_2017Q3-W	N	W	<30	<5.3	<13	<3.9	<33
	2018-06-11	GP19-12_2018Q2	N	W	<29	<5.3	<12	<3.8	<33
	2018-09-17	GP19-12_2018Q3	N	W	<30	<5.3	<13	<3.9	<33
	2019-06-21	GP19-12	N	W	<30	<5.4	<13	<3.9	<34
	2019-09-30	GP19-12_2019Q3	N	W	<30	<5.4	<13	<4.0	<34
	2020-06-18	GP19-12	N	W	<30	<5.4	<13	<3.9	<34
	2020-09-28	GP19-12	N	W	<30	<5.4	<13	<3.9	<34
	2021-09-13	GP19-12_2021	N	W	<28	<5.0	<12	<3.6	<31
	2022-09-19	GP19-12-2022Q3	N	W	<5	<4	<4	<3	<10

N = Normal sample
FD = Field duplicate sample
LR = Lab duplicate sample

W = Waterloo Membrane Sampler
S = Summa Canister

< indicates less than method detection limit
- indicates not analyzed

Table 2 - Soil Vapour Analytical Data

GE Power Conversion Motors (Peterborough)

FROM 2014/01/01 TO 2024/12/31

2024 Soil Vapour Sampling Report

Location	Sample Date yyyy/mm/dd	Sample Name	Sample Type	Sampling Method	Dichloroethylene, 1,1-	Dichloroethylene, cis-1,2-	Dichloroethylene, trans-1,2-	Trichloroethylene	Vinyl Chloride
				Units	ug/m3	ug/m3	ug/m3	ug/m3	ug/m3
GP19-12	2023-09-25	GP19-12_2023Q3	N	W	<6	<5	<5	<3	<13
	2024-09-26	GP19-12_2024Q3	N	W	<13	<6	<9	<3	<50
GP21-12	2014-01-21	SG-016061-012114-PS-007-277	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2014-06-20	SG-016061-062014-PS-001-1356	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2014-08-29	SG-016061-082914-NQ-005-1366	N	S	<0.99	<0.75	<0.79	<1.6	<0.46
	2014-12-04	SG-016061-120414-NQ-001-1793	N	S	<5.3	<4.0	<4.2	<8.5	<2.4
	2015-01-21	SG-016061-012115-CG-004-1448	N	S	<0.40	<0.40	<0.79	<0.54	<0.26
	2015-06-16	GP21-12	N	S	<0.79	<0.79	<0.79	<1.1	<0.51
	2015-09-12	GP21-12_2015Q3	N	W	<9.7	<1.8	<4.3	<1.3	<11
	2016-05-13	GP21-12_2016Q2-W	N	W	<30	<5.4	<13	<3.9	<34
	2016-09-19	GP21-12_2016Q3-W	N	W	<30	<5.3	<13	<3.9	<33
	2017-06-05	GP21-12_2017Q2-W	N	W	<30	<5.4	<13	<3.9	<34
	2017-09-07	GP21-12_2017Q3-W	N	W	<30	<5.4	<13	<3.9	<33
	2018-06-11	GP21-12_2018Q2	N	W	<30	<5.3	<13	<3.9	<33
	2018-09-17	GP21-12_2018Q3	N	W	<30	<5.3	<12	<3.9	<33
	2019-06-21	GP21-12	N	W	<30	<5.4	<13	<4.0	<34
	2019-09-30	GP21-12_2019Q3	N	W	<30	<5.4	<13	<4.0	<34
	2020-06-18	GP21-12	N	W	<30	<5.4	<13	<3.9	<34
	2020-09-28	GP21-12	N	W	<30	<5.4	<13	<3.9	<34
	2021-09-13	GP21-12_2021	N	W	<28	<5.0	<12	<3.6	<31
	2022-09-19	GP21-12-2022Q3	N	W	<5	<4	<4	<3	<10
	2023-09-25	GP21-12_2023Q3	N	W	<6	<5	<5	<3	<13
	2024-09-26	GP21-12_2024Q3	N	W	<13	<6	<9	<3	<50
GP22-12	2014-01-21	SG-016061-012114-PS-010-1304	N	S	<3.5	<2.6	<2.8	<5.6	<1.6

N = Normal sample
FD = Field duplicate sample
LR = Lab duplicate sample

W = Waterloo Membrane Sampler
S = Summa Canister

< indicates less than method detection limit
- indicates not analyzed

Appendix 8: GEPR Energy Canada Inc., “ECA Application Form GE Vernova Peterborough”

Ontario

Ministry of the Environment, Conservation and Parks

Environmental Compliance Approval Application

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Ontario

Ministry of the Environment, Conservation and Parks

Environmental Compliance Approval Application

General Information and Instructions

General Information

Information requested in this form is collected under the authority of the *Environmental Protection Act* (EPA), *Ontario Water Resources Act* (OWRA) and Environmental Bill of Rights (EBR), and will be used to evaluate applications for Environmental Compliance Approvals (ECAs) issued under Part II.1 of the EPA. This application form should not be used for mobile PCB destruction facilities.

For all questions related to preparing or submitting this form or about the Ministry's collection of information related to applying for an ECA, contact:

Client Services and Permissions Branch
135 St. Clair Ave. West, 1st Floor
Toronto Ontario M4V 1P5
Telephone outside Toronto 1-800-461-6290 or in Toronto 416-314-8001.

The Ministry offers environmental permissions services online, and we strongly encourage online submissions for ECA applications. You can apply, track application progress and complete payments online. For more information on setting up an account so that you can apply online please visit: https://www.ontario.ca/page/environmental-compliance-approval

Instructions for submitting your ECA application:

1. Applicants are responsible for ensuring that they complete the most recent application form (available in PDF format) available at https://www.ontario.ca/page/environmental-compliance-approval. For information about required supporting documentation and technical requirements, you may contact the Client Services and Permissions Branch (the address and phone number are provided in the General Information on this page). As well, you can get this information from your local District Office of the Ministry of the Environment, Conservation and Parks, and online at the link above.
2. A complete application consists of:
   - a completed and signed application form;
   - all required supporting documents and technical requirements identified in:
     i. this form,
     ii. Ministry guidance, the Applications for Environmental Compliance Approvals regulation (Ontario Regulation 255/11),
     iii. and payment of the application fee (in Canadian funds) by certified cheque or money order made payable to the Minister of Finance, or credit card payment (for payments up to $10,000).

     The Ministry may return or refuse incomplete applications to the applicant. The Director may require additional information of any application initially accepted as complete.
3. How to submit:
   - No payment required – email the application form and supporting documents to ECA.Submission@ontario.ca
   - Payment required – see Section 8 for instructions

   Do not mail a paper copy of the application submission to our branch
4. For Waste Disposal Sites the applicant must also send a copy of the application without the fee to the Clerk's office of the local municipality (both upper and lower tier) in which the facility/proposed facility is located unless the application is for a revocation or an amendment that is environmentally insignificant or the applicant is a municipality. **Do not** send any payment information to the municipality.

Information contained in this application form (excluding Section 8, payment information) is not considered confidential and will be made available to the public upon request. Information submitted as supporting information may be claimed as confidential under Section 6.10 of this application form but will be subject to the *Freedom of Information and Protection of Privacy Act* (FIPPA) and the *Environmental Bill of Rights* (EBR). If you do not claim confidentiality at the time of submitting the information, the Ministry may make the information available to the public without further notice to the applicant.

It is an offence under the EPA and OWRA to provide false or misleading information in this application and/or accompanying documents.

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Complete the sections as shown below.

- Section 1: Applicant Information
- Section 2: Project Information
- Section 3: Regulatory Requirements
- Section 4: Site Information
- Section 5: Facility Information
- Section 6: Supporting Documentation and Technical Requirements
- Section 7: Authorization
- Section 8: Payment Information

Fields marked with an asterisk (*) are mandatory.

1. Applicant Information

1.1 Applicant Information

Applicant Type *

☑ Corporation ☐ Individual ☐ Federal Government ☐ Municipal Government

☐ Partnership ☐ Provincial Government ☐ Sole Proprietor

☐ Other (specify)

Applicant Name (Legal name of individual or organization as evidenced by legal documents) *

GEPR Energy Canada Inc.

☑ Select if Business Name same as Applicant Name

Business Name *

GEPR Energy Canada Inc.

Business Number *	Business Website Address
732665401	www.gevernova.com

Primary North American Industry Classification System (NAICS) Code *

541330

Other NAICS Code

562910

Separate list attached?

☐ Yes ☑ No

Business Activity Description

Engineering services through an administrative building, and one water treatment system with an air stripper.

✓ Completion Status (1.1 Applicant Information)

1.2 Applicant Physical Address

Address Type? *

☑ Civic Address ☐ Survey Address

Civic Address

Unit Number	Street Number *	Street Name *
	107	Park Street North

Survey Address

Enter Lot and Concession or Part and Reference Plan

Lot	Concession	Part	Reference Plan

Municipality/Unorganized Township *		County/District		
Peterborough				
Province/State *		Country *		Postal/Zip Code *
Ontario		Canada		K9J 3V6
Telephone Number *	Fax Number	Mobile Number	Email Address *	
705-748-8486 ext.			john.jankowski@gevernova.com	

Geo Reference

Description of location	Map Datum	Zone	Accuracy Estimate	Geo-Referencing Method	UTM Easting	UTM Northing
Southwest corner of property	NAD83	17	5 m	Google Earth	712,888.19	4,907,934.49
Physical location of front door or main entrance	NAD83	17	5 m	Google Earth	713,280.74	4,908,158.23

✓ Completion Status (1.2 Applicant Physical Address)

1.3 Applicant Mailing Address

☑ Select if same as Physical Address

Unit Number	Street Number *	Street Name *	
	107	Park Street North	
Delivery Designator	Delivery Identifier	Postal Station	

Municipality/Unorganized Township *		County/District		
Peterborough				
Province/State *		Country *		Postal/Zip Code *
Ontario		Canada		K9J 3V6
Telephone Number *	Fax Number	Mobile Number	Email Address *	
705-748-8486 ext.			john.jankowski@gevernova.com	

✓ Completion Status (1.3 Applicant Mailing Address)

Fields marked with an asterisk (*) are mandatory.

2. Project Information

2.1 Project Name and Description

Project Name *

GEPR Peterborough - ECA Renewal

Project Description Executive Summary *

GEPR Energy Canada Inc. (GEV) is requesting to renew the Site wide ECA with Limited Operational Flexibility (LOF) for their facility located at 107 Park Street North, in Peterborough, Ontario. As of 2019, the GE manufacturing operations at the site ceased. GE continues to operate a water treatment system and natural gas-fired comfort heating equipment. The water treatment system and comfort heating equipment are expected to operate 24 hours per day, 7 days per week, 52 weeks per year. The significant contaminants of concern at the Facility include air emissions of nitrogen oxides, trichloroethylene and noise emissions from on-site sources.

Supplemental Application Information (select information button for required information for this field) *

The equipment approved under the current ECA and added through the subsequent Annual Written Summaries is in operation. Some additional comfort heating units have been added to the emission inventory and are currently in operation. The Peterborough MECP District Office has been notified prior to the submission of the ECA application and a copy of the application has been sent for their records.

✓ Completion Status (2.1 Project Name and Description)

2.2 Application Type

Type *

- ☐ New ECA
- ☐ Technical Amendment to existing ECA (including extending the cessation or expiry date of an existing ECA that is not expired)
- ☐ Revocation of existing ECA
- ☐ Administrative amendment to existing ECA
- ☑ Application for renewal of operational flexibility or limited operational flexibility
- ☐ Consolidation of existing ECAs

Is this application for the addition of a new project type to the site or a new municipal waste category/class code to the waste management systems or a new sewage facility type? *

☐ Yes ☑ No

Is this application for Transfer of Review? *

☐ Yes ☑ No

✓ Completion Status (2.2 Application Type)

2.3 Project Type

Project Type (Select all that apply) *	Operational Flexibility?	Pilot Project?
☑ Air - Stationary	☑	☐
☐ Air - Mobile	☐	☐
☑ Noise	☑	☐
☐ Vibration	☐	☐
☐ Waste Disposal Site - Landfill site	N/A	☐
☐ Waste Disposal Site - Transfer site	☐	☐
☐ Waste Disposal Site - Processing site	☐	☐
☐ Waste Disposal Site - Composting site	☐	☐
☐ Waste Disposal Site - Thermal Treatment site	☐	☐
☐ Waste Disposal Site - Hauled Sewage Disposal Site	N/A	☐
☐ Waste Disposal Site - Processed Organic Waste (Biosolids) Land Application Site	N/A	☐
☐ Sewage - Industrial	☐	☐
☐ Sewage - Municipal	☐	☐
☐ Sewage - Private	☐	☐
☐ Waste Management System - General Waste Management System	N/A	☐
☐ Waste Management System - Hauled Sewage (Septage)	N/A	☐
☐ Waste Management System - Processed Organic Waste for transport to an agricultural or non-agricultural site for storage or land application	N/A	☐
☐ Waste Management System - Mobile Waste Processing	N/A	☐
☐ Cleanup of contaminated sites - Mobile	N/A	☐
☐ Cleanup of contaminated sites - Site specific	N/A	☐

✓ Completion Status (2.3 Project Type)

2.4 Approval Information

Reason for Application / Application initiated by *

- ☑ Applicant
- ☐ Condition of existing approval
- ☐ Inspection Report (attach copy)
- ☐ ECA Review Notice from Director (EPA s20.4)
- ☐ Other (specify)
- ☐ S. 20.18 Order (attach copy)
- ☐ Provincial Officer Order (attach copy)
- ☐ Extend the cessation date or expiry date of an existing ECA
- ☐ ECA Review Required by Regulation (EPA s20.4)

Current Environmental Compliance Approvals that may be changed or amended by this application: ☐ N/A

Environmental Compliance Approval Number *	Date of Issuance (yyyy/mm/dd) *	Cessation/Expiry Date (yyyy/mm/dd)
7836-9HDRYN	2014/03/24	

Separate list attached?

☐ Yes ☐ No

Other proposed Environmental Compliance Approvals related to this project: ☑ N/A

Project Type	Ministry Reference Number (if applicable)	Have Submitted	Have not Submitted
		☐	☐

Separate list attached?

☐ Yes ☐ No

✓ Completion Status (2.4 Approval Information)

2.5 Other Approval/Permits for Facility

List all other instruments (approvals or permits) issued by the Ministry of the Environment, Conservation and Parks or applied for under the *Environmental Protection Act*, *Environmental Assessment Act*, *Ontario Water Resources Act* and *Safe Drinking Water Act, 2002* and any Environmental Activity and Sector Registrations that are relevant to this application. ☐N/A

Instrument Type	Instrument Number/ Application Reference Number	Approval or Application Date (yyyy/mm/dd)	Cessation/Expiry Date (yyyy/mm/dd)
Permit to Take Water, Groundwater	6551-BCWQSV	2019/06/07	2029/06/07
ECA Stormwater	8032-BEJNAK	2019/09/30	
Director's Order	1-228916698	2024/03/06	
Director's Instructions, PCB Storage Sit	30513A001	2013/12/23	

Separate list attached?

☐ Yes ☑ No

List all other instruments (approvals or permits) issued by an agency, municipality or another ministry that are relevant to this application. ☐ N/A

Issuing Agency	Approval or Permit Name	Approval or Permit Number	Issued Date (yyyy/mm/dd)
City of Peterborough	Slug Discharge Permit, GETS	n/a	2002/05/12

Separate list attached?

☐ Yes ☑ No

✓ Completion Status (2.5 Other Approval/Permits for Facility)

2.6 Technical Contacts

Technical Contact 1

Area of Responsibility (Select all that apply) *

☑ Air ☐ Noise/Vibration ☐ Sewage ☐ Waste

Name of Technical Contact

Last Name *	First Name *
Arsenault	Danielle

Company *
AECOM Canada ULC

Address Information

☐ Select if same as Applicant Mailing Address

Civic Address

Unit Number	Street Number *	Street Name *
201	45	Goderich Road

Delivery Designator	Delivery Identifier	Postal Station

Municipality/Unorganized Township *	County/District
Hamilton	

Province/State *	Country *	Postal/Zip Code *
Ontario	Canada	L8E 4W8

Telephone Number *	Fax Number	Mobile Number	Email Address *
905-538-3021 ext.		289-527-2686	danielle.arsenault@aecom.com

Technical Contact 2

Area of Responsibility (Select all that apply) *

☐ Air ☑ Noise/Vibration ☐ Sewage ☐ Waste

Name of Technical Contact

Last Name *	First Name *
Joseph	Jo-Daria

Company *
AECOM Canada ULC

Address Information

☐ Select if same as Applicant Mailing Address

Civic Address

Unit Number	Street Number *	Street Name *
1000	5090	Explorer Drive

Delivery Designator	Delivery Identifier	Postal Station

Municipality/Unorganized Township *	County/District
Mississauga	

Province/State *	Country *	Postal/Zip Code *
Ontario	Canada	L4W 4X6

Telephone Number *	Fax Number	Mobile Number	Email Address *
905-238-0007 ext.		905-302-1283	joseph.jodaria@aecom.com

✓ Completion Status (2.6 Technical Contacts)

Fields marked with an asterisk (*) are mandatory.

3. Regulatory Requirements

3.1 Environmental Bill of Rights (EBR) Requirements

Is this an application for a classified instrument identified in Section 5 of O. Reg. 681/94, under the Environmental Bill of Rights, 1993 (EBR)? *

☑ Yes ☐ No

If yes, an exception to the requirement to post a proposal notice on the Environmental Registry may apply. These exceptions are set out in the EBR. If you believe an exception may apply to your proposal, please identify which circumstance may be applicable and provide the appropriate supporting information. The information you provide is for background purposes; the Ministry will evaluate the information and determine whether an exception does in fact apply. *

☐ This proposal has been considered in a substantially equivalent process of public participation. (EBR, 1993, s.30.). Please provide a description of any processes of public participation that you engaged in, that were substantially equivalent to the process required under the EBR, in respect of the environmentally significant aspects of the ECA application, including:

- The type of public participation
- How, where and when the process of public participation was conducted
- The number of participants
- The type of comments received
- Actions you took as a result of the comments
- Whether ministry staff were involved in the process

Please also include documentation verifying the process of public participation.

Was the public participation process carried out in fulfillment of the requirements related to an approval under the *Planning Act*?

☐ Yes ☐ No

If yes, was the *Planning Act* approval related to a plan of subdivision?

☐ Yes ☐ No

☐ This proposal is for an emergency situation. (EBR, 1993, s. 29.). Please provide details about why a delay that would result from posting a proposal for the ECA on the Environmental Registry would result in (a) danger to the health or safety of any person; (b) harm or serious risk of harm to the environment; or (c) injury or damage or serious risk of injury or damage to any property

☐ This proposal is for an amendment to or revocation of an existing Environmental Compliance Approval that is not environmentally significant. (EBR, 1993, s. 22 (3).) Please provide details about why the effect of the amendment or revocation on the environment is insignificant.

☐ This proposal has been subject to or exempted from Environmental Assessment Act (EAA) Requirements or considered in a decision of a tribunal. (EBR, 1993, s. 32.) Please provide a description of why the ECA would be a step toward implementing an undertaking or other project that is (a) subject to, or exempted from, a decision made under the EAA; or (b) approved by a decision made by a tribunal after affording an opportunity for public participation.

☑ Check here if you do not believe any of the above circumstances apply to your proposal.

✓ Completion Status (3.1 Environmental Bill of Rights (EBR) Requirements)

3.2 *Environmental Assessment Act* (EAA) Requirements

Is the proposed undertaking subject to the requirements of the EAA? *

☐ Yes ☑ No

If yes, please select one of the following:

☐ The proposed undertaking has fulfilled the requirements of the EAA through the completion of a Class EA process

Name of Class EA _____

Schedule/Group/Category (if applicable) _____

If applicable, please submit a copy of the proof of completion (for example, Notice of Completion).

Was a section 16 order (previously named a Part II Order), under the EAA requested, considered (e.g. Notice of Proposed Order) and/or made on/for the undertaking?

☐ Yes ☐ No

If yes, please submit a copy of the relevant documentation.

☐ The proposed undertaking has fulfilled all of the requirements for the EAA through:

Select all that apply:

☐ completion of an Environmental Screening Process pursuant to O. Reg. 101/07 of the EAA

☐ completion of an Environmental Screening Process pursuant to O. Reg. 116/01 of the EAA

Was the undertaking subject of an elevation request(s)?

☐ Yes ☐ No

If yes, please submit a copy of the Director's decision letter. If an appeal was made to the Director's decision, please also submit a copy of the Minister's decision letter.

☐ completion of an Environmental Screening Process pursuant to O. Reg. 231/08 of the EAA

Was the undertaking subject of an objection(s)?

☐ Yes ☐ No

If yes, please submit a copy of the Minister's decision letter.

☐ The proposed undertaking has fulfilled the requirements of the EAA through the completion of an individual Environmental Assessment.
Please submit a copy of the signed Notice of Approval.

Was the undertaking exempted from the requirements of the EAA?

☐ Yes ☐ No

The proposed undertaking has fulfilled the requirements of the EAA through an exemption provided under:

Select one of the following

☐ Section _____ of Ontario Regulation No. _____ or

☐ Declaration/Exemption Order Number _____

If Regulation, Declaration Order or Exemption Order does not refer directly to this undertaking, please provide supporting documentation to explain why it applies to this facility

✓ Completion Status (3.2 *Environmental Assessment Act* (EAA) Requirements)

3.3 Consultation/Notification

Indigenous Consultation:

Is the proposed project/activity on Crown land or does/would it alter access to Crown land? *	☐ Yes ☑ No
Is the proposed project/activity in an open or forested area where hunting, trapping or plant gathering could occur? *	☐ Yes ☑ No
Does the proposed project/activity involve the clearing of forested land? *	☐ Yes ☑ No
Could the proposed project/activity impact a water body (e.g., direct discharge) or alter access to a water body? *	☐ Yes ☑ No

Could the proposed project/activity impact cultural heritage or archaeological resources, or access to them? * ☐ Yes ☑ No

Is the proposed project/activity adjacent or close to a First Nation Reserve? * ☐ Yes ☑ No

Is the applicant aware of any concerns from Indigenous communities about this proposed project/activity? * ☐ Yes ☑ No

Were there conditions placed, or direction provided, in another (or previous) permit or approval for consultation in relation to this project/activity? * ☐ Yes ☑ No

Based on the online Guide to Applying for an Environmental Compliance Approval, or direction provided by the Ministry or another agency, are Indigenous consultation activities likely required as part of this application process? * ☐ Yes ☑ No

If Yes to the question above, please describe the consultation/notification activities undertaken for this application or as part of another process (e.g., EAA) in relation to the proposed project/activity, including a summary of the notification/ consultation, First Nation and Métis communities contacted, key issues raised and how they were addressed, any changes to the project as a result of these activities, and any planned consultation/notification activities in the future.

Please attach supporting documents (e.g., record of consultation, delegation letter and/or direction provided by the Crown, materials provided to communities, meeting notes and agendas, correspondence with communities as appropriate).

If the applicant has determined that consultation with First Nation and Métis communities is not likely required for the proposed project/activity, please provide a rationale why: *

The closest First Nation reserve is the Curve Lake First Nation Indian Reserve No. 35 and is located more than 15 km from the Facility. The air and noise emissions from the Facility were modeled and no impacts are expected at this location.

Other Consultation/Notification: Show Information

Has the applicant had a ministry pre-application consultation in relation to the proposed project? *

☐ Yes ☑ No

If this application is for a waste disposal site (including for a Hauled Sewage Disposal Site), have the neighbour notification requirements been completed?

☐ Yes ☐ No

If yes, please attach a Public Consultation/Notification Report that includes the notice and list of recipients.

If no, please select the reason for not undertaking neighbour notification:

☐ Application is for an administrative amendment

☐ other , please explain

Are there any other consultation/notification activities that have been undertaken to fulfill requirements by other legislation or through voluntary efforts? *

☐ Yes ☑ No

If yes, please:

1. describe the consultation/notification activities below; and
2. attach documents describing each of these consultation\notification activities, any changes to the project as a result of these activities and any planned consultation/notification activities in the future.

✓ Completion Status (3.3 Consultation/Notification)

Fields marked with an asterisk (*) are mandatory.

4. Site Information

4.1 Site Address or Storage Location

Will the vehicles or equipment be stored at more than one location?

☐ Yes ☐ No

(If yes, please enter all vehicle or equipment storage locations below and attach separate list, as necessary.)

☑ Select if same as Applicant Physical Address

Address Type? *

☑ Civic Address ☐ Survey Address

Primary Civic Address

Unit Number	Street Number *	Street Name *
	107	Park Street North

Additional Civic Addresses

Unit Number	Street Number	Street Name

Separate list attached?

☐ Yes ☐ No

Primary Survey Address

Enter Lot and Concession or Part and Reference Plan

Lot	Concession	Part	Reference Plan

Additional Survey Address

Enter Lot and Concession or Part and Reference Plan

Lot	Concession	Part	Reference Plan

Separate list attached?

☐ Yes ☐ No

Municipality/Unorganized Township *	County/District	
Peterborough		
Province/State *	**Country ***	**Postal/Zip Code ***
Ontario	Canada	K9J 3V6

Non-address Information (includes any additional information to clarify the physical location)

Geo Reference (required)

☐ Select if same as Applicant Physical Geo Reference

Description of location	Map Datum *	Zone *	Accuracy Estimate *	Geo-Referencing Method *	UTM Easting *	UTM Northing *
Southwest corner of property	NAD83	17	+/- 5 m	Google Earth	712,888.19	4,907,934.49
Physical location of front door or main entrance	NAD83	17	+/- 5 m	Google Earth	713,160.80	4,908,234.45

✓ Completion Status (4.1 Site Address or Storage Location)

4.2 Site or Storage Location Information

Site Name *

GE Vernova - Peterborough

Days and Hours of Operation *	Ministry of the Environment District Office *
7 days/week; 24 hours/day	Peterborough District Office

Is the site (property) that is the subject of this application owned by the applicant? *

☑ Yes ☐ No

If no, please include the owner's name, address and a signed document indicating that the applicant has the authority to install and operate the proposed activity, or store vehicles or equipment on the land.

Is the applicant the operating authority of the site that is the subject of this application? *

☑ Yes ☐ No

If no, please include the operating authority name, address and phone number.

Is the site located in an area of development control as defined by the *Niagara Escarpment Planning and Development Act* (NEPDA)? *

☐ Yes ☑ No

If yes, please attach a copy of the NEPDA permit for proposed activity.

Is the site within an area covered by the Oak Ridges Moraine Conservation Plan? *

☐ Yes ☑ No

If yes, please attach proof of municipal planning approval for the proposed activity/work (for example, zoning by-law, letter from municipality, etc.).

✓ Completion Status (4.2 Site or Storage Location Information)

4.3 Site Zoning and Classification ☐ N/A

Current Land Use *	Official Plan Designation *	Current Zoning (Please attach zoning map, if available.) *
Industrial	Special District 59	SP.59

Adjacent Land Use (select all that apply) *

☑ Industrial ☐ Agricultural ☐ Commercial ☐ Recreational ☐ Residential

☑ Other (specify) * Public Service

Adjacent Land Zoning *

R.1, R.2, R.3, C.1, SP.59, SP.268,PS.2

Does the current zoning permit the proposed activity? *

☑ Yes ☐ No

Does the applicant have correspondence from the municipality to confirm that the current zoning of the property permits the proposed use? *

☐ Yes ☑ No If yes, please attach correspondence from the municipality.

Does the official plan designation support the proposed activity? *

☑ Yes ☐ No

✓ Completion Status (4.3 Site Zoning and Classification)

4.4 Point of Entry into Ontario ☐ N/A

(for waste management system vehicles that are stored at an address outside of Ontario)

City in closest proximity to the point of entry

Description of Point of Entry

✓ Completion Status (4.4 Point of Entry into Ontario)

4.5 Source Protection/Drinking Water Threats (sewage or waste disposal site applications only) ☐ N/A

Check the source protection area(s) where the activity is/will be located

☐ Ausable Bayfield	☐ Cataraqui Region	☐ Catfish Creek
☐ Central Lake Ontario	☐ Credit Valley	☐ Crowe Valley
☐ Essex	☐ Ganaraska	☐ Grand River
☐ Grey Sauble	☐ Halton	☐ Hamilton
☐ Kawartha-Haliburton	☐ Kettle Creek	☐ Long Point
☐ Lakehead	☐ Lake Simcoe and Couchiching/Black River	☐ Lower Trent
☐ Lower Thames Valley	☐ Maitland Valley	☐ Mattagami
☐ Mississippi Valley	☐ Niagara	☐ North Bay Mattawa
☐ Northern Bruce Peninsula	☐ Nottawasaga Valley	☐ Rideau Valley
☐ Raisin Region	☐ South Nation	☐ Saugeen Valley
☐ Sault Ste. Marie	☐ Severn Sound	☐ Sudbury
☐ St. Clair Region	☐ Toronto and Region	☐ Otonabee-Peterborough
☐ Outside a source protection area	☐ Quinte	☐ Upper Thames River

Is the proposed activity located or planned to be located in a vulnerable area identified in a local assessment report source protection plan under the *Clean Water Act, 2006*?

☐ Yes ☐ No

If yes, what is/are the vulnerable area(s)/zone(s)?

☐ Wellhead Protection Areas ☐ Surface Water Intake Protection Zones ☐ Highly Vulnerable Aquifers

☐ Significant Groundwater Recharge Areas ☐ Issue Contributing Areas

Is the activity being applied for identified as a significant drinking water threat in the assessment report for the local source protection area?

☐ Yes ☐ No

✓ Completion Status (4.5 Source Protection/Drinking Water Threats)

4.6 Receiver of Effluent Discharge (sewage applications only) ☐ N/A

Intermediate Receiver Name

Watershed Name

Type of Receiver

☐ Surface Water ☐ Groundwater ☐ Other (specify) _____

Has the facility received local Conservation Authority clearance? (for stormwater management facility discharging to the natural environment)

☐ Yes ☐ No

If yes, please include a copy of the Conservation Authority clearance.

Final Receivers ☐ N/A

If the proposed activity will discharge sewage to any of the following critical receivers, please identify the receiver(s):

☐ Lake Simcoe ☐ Rideau River ☐ Detroit River

☐ Great Lakes ☐ Rouge River ☐ Bay of Quinte

☐ Other (specify) _____

Is the receiver a Policy 2 receiver?

☐ Yes ☐ No

Does the applicant have a Policy 2 deviation approval from the directors?

☐ Yes ☐ No

If yes, please attach a copy of the Director's approval.

✓ Completion Status (4.6 Receiver of Effluent Discharge)

4.7 Site Physical and Distance Parameters (Hauled Sewage Disposal Site and Processed Organic Waste Land Application Site applications only) ☐ N/A

Total Site Area (hectares)	Total Usable Area (hectares)

Soil T-Time

What is the estimated soil T-time within the usable area of the site based on field percolation tests or equivalent method? (e.g. grain size analyses). Use the check boxes below for your answer (more than one box can be checked) and provide a copy of the soil evaluation/analysis along with this application.

☐ T-time < 1 minute per cm ☐ T-time > 1 minute per cm and < 50 minutes per cm ☐ T-time > 50 minutes per cm

Soil Permeability

Provide an estimate of the soil permeability within the usable area of the site based on field percolation tests or equivalent method (e.g. grain size analyses). Use the check boxes below for your answer (more than one box can be checked) and provide a copy of the soil evaluation/ analysis along with this application.

☐ Slow ☐ Moderate ☐ Moderately Rapid ☐ Rapid

Average Slope

Provide an estimate of the slope of the land within the usable area of the site. Use the check boxes below for your answer (more than one box can be checked).

☐ 0-3% (Flat) ☐ 3-6% (Gentle Slope) ☐ 6-9% (Moderate Slope) ☐ >9% (Steep Slope)

Is the land within the usable area tile drained?

☐ Yes ☐ No

Distance to Sensitive Features

Please identify whether the distance from the edge of any portion of the site where hauled sewage or processed organic waste will be spread/stored or where hauled sewage will otherwise be deposited (e.g. in a dewatering trench, lagoon, storage) or land applied is:

Within 30 metres of the closest public roadway?

☐ Yes ☐ No

Within 200 metres of the closest surface water body?

☐ Yes ☐ No

Within 90 metres of the closest house on-site?

☐ Yes ☐ No ☐ N/A

Within 90 metres of the closest house off-site?

☐ Yes ☐ No

Within 450 metres of the closest residential area (i.e. cluster of 3 or more houses)?

☐ Yes ☐ No

Within 450 metres of the closest commercial, recreational or institutional use, and locations at which people regularly congregate?

☐ Yes ☐ No

Distance to Local Treatment Facilities

Is there a private or municipal sewage treatment plant that accepts hauled sewage located within 50km of this site?

☐ Yes ☐ No ☐ N/A

Is there any other type of private or municipal facility (e.g. biodigester) that accepts and treats hauled sewage located within 50km of this site?

☐ Yes ☐ No ☐ N/A

✓ Completion Status (4.7 Site Physical and Distance Parameters)

Fields marked with an asterisk (*) are mandatory.

5. Facility Information

5.1 Air

Show Information

5.1.1 Summary of Equipment that Discharges Contaminants to the Air

Select Type of Equipment	Number of Pieces of Equipment
☑ Combustion equipment that uses natural gas, propane, no. 2 oil, landfill gas or sewage treatment gas for fuel for the purpose of providing comfort heating or emergency power, producing hot water or steam, or heating material in a system that does not discharge to the atmosphere (Total Heat input of all units: ≤ 50,000,000 kJ/hr)	[redacted]
☐ Storage tanks	N/A
☐ Welding operations that use a maximum of 10 kilograms of welding rod per hour	N/A
☐ Combustion equipment that uses waste-derived fuel for the purpose of providing comfort heating, burning ≤ 15 litres per hour	
☐ Heat cleaning ovens used for parts cleaning and associated parts washers or degreasing equipment, other than solvent degreasing equipment	
☐ Cooling towers	
☐ Equipment used to control emissions of contaminants, other than a fume incinerator	
☐ Laboratory fume hoods	
☐ Paint spray booths and associated equipment that have a design capacity of up to 8 litres per hour of paint	
☐ Grain dryers	
☑ Any other equipment not listed above with a flow rate of less than or equal to 1.5 m^3/second	[redacted]
☐ Any other equipment not listed above with a flow rate of greater than 1.5 m^3/second	
☐ Equipment that is subject to an Environmental Compliance Approval, and from which there is no proposed increase in the discharge of any contaminant that was previously reviewed by the Director.	N/A

✓ Completion Status (5.1.1 Summary of Equipment that Discharges Contaminants to the Air)

5.1.2 Emission Summary and Dispersion Modelling (ESDM) Report

Is the review of an existing, approved ESDM required as part of this proposed application? *

☑ Yes ☐ No

If yes, identify the number of emission sources described in the existing ESDM Report that emit contaminants in common with the sources forming the subject of the application (if none, enter zero). *

[redacted]

Have all of these emission sources been described in an ESDM Report that was previously reviewed as part of an application for an existing Environmental Compliance Approval? *

☑ Yes ☐ No

✓ Completion Status (5.1.2 ESDM Report)

Does s. 20 (Schedule 3) of O. Reg. 419/05 apply to the facility? *

☑ Yes

☐ Does not apply. Please indicate reason _____

Has an instrument under O. Reg. 419/05 been issued? *

☐ Yes ☑ No

If yes, what type(s) of instruments (including any notices, orders or approvals) has (have) been issued? (select all that apply)

- ☐ ss. 4(2) Adjacent Properties
- ☐ ss. 7(1) Specified Dispersion Models
- ☐ ss. 8(2) Negligible Sources
- ☐ ss. 10(2) Operating Conditions
- ☐ ss. 11(2) Refined Emission Rates
- ☐ ss. 13.1 Value of Dispersion Modeling Parameters
- ☐ ss. 13(1) Meteorological Data
- ☐ ss. 14(6) Area of Modelling Coverage
- ☐ ss. 20(4) Speed-up Request
- ☐ ss. 20(5) Speed-up Order
- ☐ s. 35 Site-specific Standard
- ☐ ss. 35(14) Site-specific Standard Order
- ☐ ss. 39(3) Technical Standard Registration (Industry Standard)
- ☐ ss. 39(4) Technical Standard Registration (Equipment Standard)
- ☐ Other (list all that have been issued) _____

Is an instrument under O. Reg. 419/05 being requested as part of this application? *

☑ Yes ☐ No

If yes, what type(s) of notice, order or approval is (are) being requested?

- ☑ ss. 7(1) Specified Dispersion Models
- ☐ ss. 8(2) Negligible Sources
- ☐ ss. 10(2) Operating Conditions
- ☐ ss. 11(2) Refined Emission Rates
- ☐ ss. 13(1) Meteorological Data
- ☐ ss. 14(6) Area of Modelling Coverage
- ☐ ss. 20(4) Speed-up Request
- ☐ s. 32 Request for a Site-specific Standard Order
- ☐ ss. 39(1)(a) Application for Technical Standard Registration (Industry Standard)
- ☐ ss. 39(1)(b) Application for Technical Standard Registration (Equipment Standard)
- ☐ Other (list all that have been issued) _____

Please attach the form(s) requesting the notice(s) and/or order(s) and any additional supporting information.

Has an s. 30 Upper Risk Threshold (Schedule 6) been exceeded? *

☐ Yes ☑ No

If yes, please include additional supporting information.

Is the facility located in a multi-tenant building? *

☐ Yes ☑ No

If yes, additional information may be requested.

Are all of the contaminants to which the application relates represented in the Ministry of the Environment, Conservation and Parks publication titled "Summary of Standards and Guidelines to support Ontario Regulation 419: Air Pollution - Local Air Quality" or have they been screened out based on the publication titled "Jurisdictional Screening Level (JSL) List - A Screening Tool for Ontario Regulation 419"? *

☑ Yes ☐ No

(If no, please attach Supporting Information for a Maximum Ground Level Concentration Acceptability Request for Compounds with no Ministry POI Limit - Supplement to Application for Approval, EPA S. 9).

✔ Completion Status (5.1.3 O. Reg. 419/05 Requirements)

✓ Completion Status (5.1.3 O. Reg. 419/05 Requirements)

✓ Completion Status (5.1 Air)

5.2 Noise

5.2.1 Noise Assessment

Show Information

Has an Acoustic Assessment Report (AAR) been completed in relation to the proposed project/activity? *

☑ Yes ☐ No

If yes, please attach the Acoustic Assessment Report

Does the AAR show that applicable limits are met? *

☑ Yes ☐ No

If no, please attach the Acoustic Assessment Report including the Noise Abatement Action Plan

If no, is the application eligible for Primary or Secondary Noise Screening?

☐ Yes ☐ No

Note that if the proposed activity is not eligible for either of the screenings, an AAR must be submitted.

If yes, is the proposed activity eligible for the Primary Noise Screening?

☐ Yes ☐ No

If yes, is the actual separation distance between the facility and the nearest noise sensitive point of reception (POR) greater than the minimum required separation distance calculated from the Primary Noise Screening?

☐ Yes ☐ No

If yes, please attach the Primary Noise Screening form and supporting documentation.
Note that if the Primary Noise Screening is not successful then the applicant may attempt to proceed with the Secondary Noise Screening.

If no, does the Secondary Noise Screening Form show that the applicable sound level limits are met?

☐ Yes ☐ No

If yes, please attach the Secondary Noise Screening Form and supporting documentation.
Note that if meeting the applicable sound level limits cannot be demonstrated, then an AAR must be submitted.

✓ Completion Status (5.2.1 Noise Assessment)

5.2.2 Equipment Subject to Noise Review

	Description *	Number of Pieces of Equipment *
☐	Arc Furnaces	
☐	Asphalt Plants	
☐	Blow-down Devices	
☐	Co-Generation Facilities	
☐	Crushing Operations	
☐	Flares	
☐	Gas Turbines	
☐	Pressure Blowers or Large Induced Draft Fans (flow rate > 47 m^3/second or static pressure > 1.25 kilopascals)	
☐	Any other equipment not listed above that has not previously been reviewed by the Director in connection with an application for an Environmental Compliance Approval with respect to the facility	
☑	Any other equipment not listed above that is identical to equipment for which a noise assessment was previously reviewed by the Director in connection with an application for an Environmental Compliance Approval with respect to the facility	[redacted]

✓ Completion Status (5.2.2 Equipment Subject to Noise Review)

✓ Completion Status (5.2 Noise)

5.3 Sewage Works Show Information

5.4 Waste Disposal Site (Including a Hauled Sewage Disposal Site or a Processed Organic Waste (Biosolids) Land Application Site)

5.5 Waste Management Systems (Except Mobile Waste Processing)

5.6 Waste Management System - Mobile Waste Processing

5.7 Cleanup of Contaminated Sites

6. Supporting Documentation and Technical Requirements

6.1 General

Note**: Information contained in this application form (excluding Section 8, payment information) is not considered confidential and will be made available to the public upon request. If the applicant is of the view that any part of the supporting information to this application is confidential on the grounds that such information constitutes a trade secret or scientific, technical, commercial, financial or labour relations information, please make this known in the table below by selecting the appropriate checkbox and providing the explanation for confidentiality in Section 6.10. The Ministry may request a redacted copy of this document for public viewing. Although the applicant may identify the supporting information as confidential, the information is subject to the FIPPA and EBR. If you do not claim confidentiality at the time of submitting the information (i.e. select the appropriate checkbox in the table below), the Ministry may make the information available to the public without further notice to the applicant.

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Proof of legal name	Optional	☑ Yes ☐ No		☐
Enhanced EBR description	N/A	☐ Yes ☐ No		☐
Provincial Officer Notice	N/A	☐ Yes ☐ No		☐
Inspection Report	N/A	☐ Yes ☐ No		☐
Detailed project and process description	Required	☑ Yes ☐ No		☐
Pre-application Consultation Record	N/A	☐ Yes ☐ No		☐
Legal Survey(s)	N/A	☐ Yes ☐ No		☐
Site Plan(s)	Required	☑ Yes ☐ No		☐
Scaled area location plan(s) with geo-referencing points identified	Required	☑ Yes ☐ No		☐
Documentation in support of EBR Exception	Required	☐ Yes ☑ No	N/A	☐
Proof of Compliance with EAA Requirements	N/A	☐ Yes ☐ No		☐
Proof of Consultation/Notification	N/A	☐ Yes ☐ No		☐
Financial Assurance Estimate	Optional	☐ Yes ☑ No	N/A	☐
Name, address and consent of land/ site owner for the installation and operation of the proposed activity or storage location of equipment or vehicle	N/A	☐ Yes ☐ No		☐
Name, address and phone number of the Operating Authority	N/A	☐ Yes ☐ No		☐
Copy of NEPDA Permit	N/A	☐ Yes ☐ No		☐
Copy/Proof of Municipal Planning Approval (ORMCA, general)	N/A	☐ Yes ☐ No		☐
Municipal Zoning Confirmation Letter	N/A	☐ Yes ☐ No		☐
Zoning map	Required	☑ Yes ☐ No		☐
Conservation Authority Clearance	N/A	☐ Yes ☐ No		☐
Director's approval for Policy 2 Deviation	N/A	☐ Yes ☐ No		☐
Application Fee	Required	☑ Yes ☐ No		☐

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Other (please describe)	Optional	☐ Yes ☐ No		☐

✓ Completion Status (6.1 General)

6.2 Air

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Emission Summary and Dispersion Modelling (ESDM) Report prepared in accordance with s. 22 and of O. Reg. 419/05 (including signed checklist)	Required	☑ Yes ☐ No		☐
Electronic copy of the Dispersion Modelling input and output files prepared in accordance with s. 26 of O. Reg. 419/05	Required	☑ Yes ☐ No		☐
Supporting Information for a Maximum Ground Level Concentration Acceptability Request for Compounds with no Ministry POI Limit - Supplement to Application for Approval, EPA S. 9	N/A	☐ Yes ☐ No		☐
Copies of forms requesting O. Reg. 419/05 instruments and supporting documentation	N/A	☐ Yes ☐ No		☐
Other (please describe)	Optional	☐ Yes ☐ No		☐

✓ Completion Status (6.2 Air)

6.3 Noise and Vibration

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Primary Noise Screening	N/A	☐ Yes ☐ No		☐
Secondary Noise Screening	N/A	☐ Yes ☐ No		☐
Acoustic Assessment Report including signed checklist (AAR)	Required	☑ Yes ☐ No		☐
Vibration Assessment Report	N/A	☐ Yes ☐ No		☐
Noise Abatement Action Plan	N/A	☐ Yes ☐ No		☐
Other (please describe)	Optional	☐ Yes ☐ No		☐

✓ Completion Status (6.3 Noise and Vibration)

6.4 Sewage Works

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Signed Municipal Responsibility Agreement	N/A	☐ Yes ☐ No		☐
Detailed description of the proposed activities/works	N/A	☐ Yes ☐ No		☐
Notice of Completion for the Environmental Study Report (ESR)	Optional	☐ Yes ☑ No	Sewage works not applicable to this application	☐
Design Brief	N/A	☐ Yes ☐ No		☐
Preliminary Engineering Report	Optional	☐ Yes ☑ No	Sewage works not applicable to this application	☐
Final Plans	N/A	☐ Yes ☐ No		☐
Engineering Drawings and Specifications	N/A	☐ Yes ☐ No		☐
Sewage quantity and quality characteristics	N/A	☐ Yes ☐ No		☐
Stormwater Management Report	N/A	☐ Yes ☐ No		☐
Stormwater Management Plan	N/A	☐ Yes ☐ No		☐
Hydrogeological Assessment with proof of concurrence from the Ministry's Regional technical support section	N/A	☐ Yes ☐ No		☐
Environmental Impact Analysis	Optional	☐ Yes ☑ No	Sewage works not applicable to this application	☐
Final effluent criteria accepted with proof of concurrence from the Ministry's Regional Technical Support Section	N/A	☐ Yes ☐ No		☐
Sewage Works Operational Flexibility Requirements - Engineer's Report	N/A	☐ Yes ☐ No		☐
Sewage Works Operational Flexibility Requirements - Declarations	N/A	☐ Yes ☐ No		☐
Pipe Design Data Form	N/A	☐ Yes ☐ No		☐
Other (please describe)	Optional	☐ Yes ☐ No		☐

✓ Completion Status (6.4 Sewage)

6.5 Waste Disposal Sites

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Design and Operations Report	N/A	☐ Yes ☐ No		☐
Stormwater Management Report	Optional	☐ Yes ☑ No	Waste disposal sites not applicable to this application	☐

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Hydrogeological Assessment with proof of concurrence from the Ministry's Regional technical support section	N/A	☐ Yes ☐ No		☐
Assessment of Physical and Water Use Conditions	Optional	☐ Yes ☑ No	Waste disposal sites not applicable to this application	☐
Waste Operational Flexibility Requirements - Engineer's Report	N/A	☐ Yes ☐ No		☐
Waste Operational Flexibility Requirements - Declarations	N/A	☐ Yes ☐ No		☐
Copy of notification to adjacent landowners	N/A	☐ Yes ☐ No		☐
Other (please describe)	Optional	☐ Yes ☐ No		☐
Hauled Sewage Disposal Sites - Additional Supporting Documentation				
Soil Evaluation / Analysis	N/A	☐ Yes ☐ No		☐
Local Groundwater Conditions Report (e.g. well water records, data to support inferred groundwater flow, groundwater monitoring data, hydrogeological assessment with proof of concurrence from the Ministry's regional technical support section)	N/A	☐ Yes ☐ No		☐
Surface Water Assessment Report (e.g. surface water monitoring data, description of aquatic habitat, surface water users, existing stressors, description of proposed measures to minimize risks)	N/A	☐ Yes ☐ No		☐
Map showing location of the site in relation to local features	N/A	☐ Yes ☐ No		☐
Processed Organic Waste (Biosolids) Land Application Sites - Additional Supporting Documentation				
Soil Evaluation / Analysis	N/A	☐ Yes ☐ No		☐
Processed Organic Waste Analysis	N/A	☐ Yes ☐ No		☐
Overview of Beneficial Use and Risk Management Measures	N/A	☐ Yes ☐ No		☐
Map showing location of the site in relation to local features	N/A	☐ Yes ☐ No		☐

✓ Completion Status (6.5 Waste Disposal Sites)

6.6 Waste Management Systems

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Proof of vehicle and/or equipment ownerships	N/A	☐ Yes ☐ No		☐
Complete Fleet List (list of all vehicles, trailers and equipment used)	N/A	☐ Yes ☐ No		☐

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Copy of the Liability Insurance for all vehicles for which insurance is required	N/A	☐ Yes ☐ No		☐
Copy of the storage tank design	N/A	☐ Yes ☐ No		☐
Copy of commercial vessel licence	N/A	☐ Yes ☐ No		☐
Description of the physical location where the vehicles transporting biomedical waste are being disinfected	Optional	☐ Yes ☑ No	Waste management systems not applicable to this application	☐
Drivers Training Manual (for PCB/ Biomedical Waste)	Optional	☐ Yes ☑ No	Waste management systems not applicable to this application	☐
A copy of the applicant's Operation Plan including detailed packaging and biomedical waste handling methods	Optional	☐ Yes ☑ No	Waste management systems not applicable to this application	☐
Contingency and Emergency Procedures Plan (for PCB/ Biomedical Waste/Hauled Sewage (Septage))	Optional	☐ Yes ☑ No	Waste management systems not applicable to this application	☐
Other (please describe)	Optional	☐ Yes ☐ No		☐

✓ Completion Status (6.6 Waste Management Systems)

6.7 Mobile Waste Processing ☐ N/A

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Design and Operations Report - Mobile Waste Processing of General Waste	N/A	☐ Yes ☐ No		☐
Design and Operations Report - Mobile Waste Processing of Liquid Waste	N/A	☐ Yes ☐ No		☐
Other (please describe)	Optional	☐ Yes ☐ No		☐

✓ Completion Status (6.7 Mobile Waste Processing)

6.8 Cleanup of Contaminated Sites ☐ N/A

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Design Report for Cleanup of Contaminated Sites	N/A	☐ Yes ☐ No		☐

Attachment	Required, Optional or N/A	Attached?	If no, provide explanation, (include referenced attachment if more space is required for rationale)	Confidential/ Not Suitable for Public Viewing
Other (please describe)	Optional	☐ Yes ☐ No		☐

✓ Completion Status (6.8 Cleanup of Contaminated Sites)

6.9 Other Attachments ☐ N/A

Title	Reference	Confidential/ Not Suitable for Public Viewing
		☐

Is there an attachment of an additional list of attachments?

☐ Yes ☐ No

If there is not enough space to list all of the attachments included in this application package, please include an additional listing of these attachments.

✓ Completion Status (6.9 Other Attachments)

6.10 Confidentiality / Not Suitable for Public Viewing

Note** Although the applicant may identify the supporting information as confidential, the information is subject to the FIPPA and EBR.

For each attachment selected in tables 6.1 to 6.9 as having confidential information, provide an explanation for confidentiality / why the attachment(s), or information within the attachment(s) is not suitable for public viewing.

Please provide a redacted copy of this document(s) that can be used for public viewing.

Attachment containing confidential information (i.e. Name of document)	Explanation for Confidentiality	Redacted Copy Attached?	Explanation is Confidential/Not Suitable for Public Viewing
		☐ Yes ☐ No	☐

✓ Completion Status (6.10 Confidentiality / Not Suitable for Public Viewing)

Attachments

File Name	Size (MB)	Selected File
		☐
Total		

Please note: The collection of personal information in this application is necessary to administer the Ministry's approvals program, which is authorized pursuant to the *Environmental Protection Act* and the *Ontario Water Resources Act*. The personal information collected in this application will be used to administer the program, including for the purposes of the Ministry's compliance and enforcement activities under the aforementioned acts, and for the purposes of making information in respect of Environmental Compliance Approvals available to the public with the exception of payment information. Questions about the collection of the information can be directed to a Client Service Representative, Client Services and Permissions Branch, 135 St. Clair Avenue West, 1st Floor, Toronto ON M4V 1P5; Telephone outside Toronto 1-800-461-6290 or in Toronto 416-314-8001 or Fax 416-314-8452.

7. Authorization

7.1 Statement of the Applicant

I am authorized to prepare and submit this application and to make this certification. I have reviewed the complete application and I have made all inquiries that are necessary to declare to the best of my knowledge, information and belief:

- The information contained in this application is complete and accurate.
- The Technical Contact(s) identified in this application has/have been authorized to prepare certain technical material, and act on behalf of the applicant to discuss this application with the Ministry of the Environment, Conservation and Parks and to provide additional information about this application to the Ministry on request.
- The information provided to the Technical Contact(s) in relation to this application is complete and accurate.

☑ By checking this each of the undersigned acknowledge that in providing their name on the applicable line below in electronic form will constitute a signature for the purposes of the *Electronic Commerce Act, 2000*, S.O. 2000, c. 17. *

Name of Signing Authority (Please print) *
John Jankowski

Title *
Site Operations Leader

Telephone Number	ext.	Mobile Number	Fax Number
705-748-7579		705-875-0085	705-748-7621

Email Address
john.jankowski@gevernova.com

Signature (hard copy submission must be signed)	Date (yyyy/mm/dd) *
	2026/02/05

✓ Completion Status (7.1 Statement of the Applicant)

7.2 Statement of the Municipality ☐ N/A

I, the undersigned hereby declare on behalf of the Municipality, that the Municipality has no objection to the construction of the works in the Municipality.

☐ By checking this each of the undersigned acknowledge that in providing their name on the applicable line below in electronic form will constitute a signature for the purposes of the *Electronic Commerce Act, 2000*, S.O. 2000, c. 17.

Name (Please print)

Title	Name of Municipality

Signature (hard copy submission must be signed)	Date (yyyy/mm/dd)

✓ Completion Status (7.2 Statement of the Municipality)

7.3 Statement of Technical Contacts

Technical Contact 1

I have been authorized by the applicant to prepare the technical materials for the area(s) of responsibility identified in section 2.6 that are included in the application. I have reviewed those technical materials and I have made all inquiries that are necessary to declare to the best of my knowledge, information and belief:

- The technical materials contained in this application in respect of the area(s) of responsibility identified in section 2.6 are complete and accurate.
- I have the relevant education and experience necessary to provide this certification.

☑ By checking this each of the undersigned acknowledge that in providing their name on the applicable line below in electronic form will constitute a signature for the purposes of the *Electronic Commerce Act, 2000*, S.O. 2000, c. 17. *

Name of Technical Contact (Please print) *	
Danielle Arsenault	
Signature (hard copy submission must be signed)	Date (yyyy/mm/dd) * 2026/02/05

Technical Contact 2

I have been authorized by the applicant to prepare the technical materials for the area(s) of responsibility identified in section 2.6 that are included in the application. I have reviewed those technical materials and I have made all inquiries that are necessary to declare to the best of my knowledge, information and belief:

- The technical materials contained in this application in respect of the area(s) of responsibility identified in section 2.6 are complete and accurate.
- I have the relevant education and experience necessary to provide this certification.

☑ By checking this each of the undersigned acknowledge that in providing their name on the applicable line below in electronic form will constitute a signature for the purposes of the *Electronic Commerce Act, 2000*, S.O. 2000, c. 17. *

Name of Technical Contact (Please print) *	
Joseph Jo-Daria	
Signature (hard copy submission must be signed)	Date (yyyy/mm/dd) * 2026/02/05

✓ Completion Status (7.3 Statement of Technical Contacts)

8. Payment Information - Application for an Environmental Compliance Approval

Payment Options *

The information collected in this section of the form is considered confidential and will only be used to process the application fee. All fees should be paid in Canadian funds.

☐ **Pay online** (under $10,000)

- Ensure the application form is complete before paying your application fee online.
- The application form and supporting documents (attached in Section 6) will be automatically emailed (up to 13 MB of data) to the Client Services and Permissions Branch after payment has been confirmed.
- If your submission is greater than 13 MB, do not attach the supporting documents, send us a link to download your files by emailing ECA.submission@ontario.ca.

☐ **Certified cheque** (payable to the Minister of Finance)

☐ **Money order** (payable to the Minister of Finance)

If payment by **certified cheque or money order**, email the application package to ECA.submission@ontario.ca.
Wait for the Ministry to provide the reference number, then complete the Application Summary Page below (include the reference number), staple the cheque / money order to the page, and mail it to the Client Services and Permissions Branch.

Mailing Address

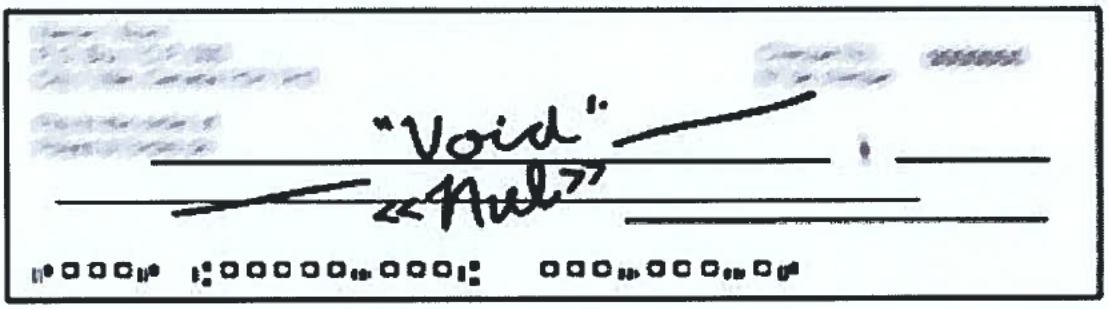
Client Services and Permissions Branch
Ministry of the Environment, Conservation and Parks
135 St. Clair Ave W, 1st Floor
Toronto ON M4V 1P5

If this form has been completed by hand, the fee calculations must be completed and attached separately. The supplemental fee calculations do not need to be included if this form has been completed electronically.

If this form has been completed electronically, the fees for this application have been calculated based on the information provided. The Ministry may require additional information during the review of the application that could impact the total fee required.

✓ Completion Status (8 Payment Information)

If paying by certified cheque or money order, please attach it here.



Application Summary

Reference Number	Payment Received ($)	Date (yyyy/mm/dd)	Initials

Applicant Name
GEPR Energy Canada Inc.

Project Name
GEPR Peterborough - ECA Renewal

Project Description Executive Summary
GEPR Energy Canada Inc. (GEV) is requesting to renew the Site wide ECA with Limited Operational Flexibility (LOF) for their facility located at 107 Park Street North, in Peterborough, Ontario. As of 2019, the GE manufacturing operations at the site ceased. GE continues to operate a water treatment system and natural gas-fired comfort heating equipment. The water treatment system and comfort heating equipment are expected to operate 24 hours per day, 7 days per week, 52 weeks per year. The significant contaminants of concern at the Facility include air emissions of nitrogen oxides, trichloroethylene and noise emissions from on-site sources.

Supplemental Application Information
The equipment approved under the current ECA and added through the subsequent Annual Written Summaries is in operation. Some additional comfort heating units have been added to the emission inventory and are currently in operation. The Peterborough MECP District Office has been notified prior to the submission of the ECA application and a copy of the application has been sent for their records.

Application Status

Section	Completed?	
1. Application Information	☑ Yes	☐ No
2. Project Information	☑ Yes	☐ No
3. Regulatory Requirements	☑ Yes	☐ No
4. Site Information	☑ Yes	☐ No
5. Facility Information	☑ Yes	☐ No
6. Supporting Documentation	☑ Yes	☐ No
7. Authorization	☑ Yes	☐ No
8. Payment Information	☐ Yes	☒ No

Fee Summary

Activity	Amount ($)
Administrative Processing	$200.00
Review of EPA s. 9 activities	$4,750.00
Review of EPA s. 27 activities	$0.00
Review of OWRA s. 53 activities	$0.00
Total Fee	$4,950.00

The Ministry may request additional fees upon review of this application.
If this form is submitted in print version only and the smart calculation feature is not used, please attach the fee calculation separately.

Appendix 9: GEPR Energy Canada Inc., “Acoustic Assessment Report 107 Park Street North, Peterborough, Ontario”

Acoustic Assessment Report

107 Park Street North, Peterborough, Ontario

GEPR Energy Canada Inc.

Project Number: 60746233

March 2026

Delivering a better world

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada ULC ("AECOM") for the benefit of the Client ("Client") in accordance with the agreement between AECOM and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");
- represents AECOM's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to AECOM which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

AECOM shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. AECOM accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

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This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

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Quality Information

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Revision History

Rev #	Revision Date	Revised By:	Revision Description
0	March 5, 2026	Joseph Jo-Daria	Original Document

Distribution List

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Appendix C: Sound Power Calcs
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1. Introduction

AECOM Canada Ltd. was retained by GEPR Energy Canada Inc. (GEPR) to prepare an Acoustic Assessment Report (AAR) for the facility located at 107 Park Street North in Peterborough Ontario (the Facility). This report has been prepared in accordance with all applicable Ministry of the Environment, Conservation and Change (MECP) noise guidelines. The Facility currently operates under Amended Environmental Compliance Approval (air-noise) 7836-9HDRYN issued on March 24, 2014. This AAR is to support an amendment application for the Limited Operational Flexibility (LOF) in the current approval.

For the current Amended ECA No. 7836-9HDRYN, compliance was previously assessed as a combined facility of both GEPR and BWXT Nuclear Energy Canada Inc. [redacted] The GEPR operations occur at 107 Park Street North and the BWXT operations occur at 1160 Monaghan Road in Peterborough, Ontario. Since GEPR and BWXT are separate entities with independent operations, GEPR requests for the current application, that the GEPR and BWXT facilities are assessed for compliance independently; thus, GEPR will only assess their own operations and equipment emissions on the extent of the 107 Park Street North property controlled and occupied by GEPR, including the planned installation and operation of a new groundwater extraction and treatment system (GETS). The new GETS unit is intended to replace the existing GETS equipment, serving the same function, and is planned to be installed at a future date.

The purpose of this AAR is to evaluate the overall noise emissions with respect to the noise level limits set out by the applicable MECP noise guidelines for operations on the extent of the 107 Park Street North property controlled and occupied by GEPR. The AAR evaluates two operation scenarios where:

1. Existing Operation: All current and relevant operations with the inclusion of the new GETS unit will be assessed; and
2. Future Operation: Most of the GEPR buildings are assumed to be demolished, leaving only Buildings 2, 2A, 8A and 30 and the GETS unit in operation. The unit is modelled in the same location as Scenario 1. This represents a conservative assessment since any relocation of the GETS will be equidistant to or farther from the property line than the current GETS location.

BWXT is expected to prepare its own AAR to solely consider its own noise emissions on the extent of the 1160 Monaghan Road property controlled and occupied by BWXT.

The Facility is not a significant source of vibration; therefore, a vibration assessment was not completed.

A plan showing the subject site including facility building identification numbers is shown on **Figure 1**, and a site location plan with receptor locations is provided as **Figure 2**. A general Facility layout is also provided as **Figure 2**. Relevant zoning maps are provided in **Appendix A**.

2. Facility Description

As of 2019, the GEPR manufacturing operations at the site ceased. [redacted] a groundwater extraction and treatment system with an air stripper. The comfort heating equipment and groundwater treatment system are expected to operate 24 hours per day, 7 days per week, and 52 weeks per year.

As mentioned in **Section 1,** most buildings within the GEPR site will be demolished aside from Buildings 2, 2A, 8A and 30, however the groundwater extraction and treatment system with an air stripper will remain.

The Facility is surrounded by lands zoned for residential uses, with commercial/industrial zoned lands to the east and west of the Facility.

3. Points of Reception

Locations were identified as being representative of the worst case noise sensitive Points of Reception (POR) surrounding the Facility in the 2016 AAR. However, these locations were updated to reflect the updated worst case noise emissions from the Facility. This update was necessary as noise propagation from the Facility is not uniform in all directions; correspondingly, receptors were located in the worst case locations surrounding the Facility.

As noted in NPC-300, and further discussed in **Section 4**, noise from stationary noise sources are required to be assessed at both Plane of Window, and Outdoor locations. For each residential location, both the Plane of Window (POW), and Outdoor Point of Reception (OPR) locations have been assessed as applicable. In the majority of locations, the OPR is shielded from the Facility by the main building on the property; in these cases only the POW was assessed as it was the worst case. The assessed locations are summarized **Table 1** and shown on **Figure 2**.

Table 1: Noise Sensitive Points of Reception

POR ID	POR Description	Horizontal Distance to Facility Property Line (m)	Assessment Height Above Ground (m)	Location
R01_POW	1 Storey Residential Building	162	1.5	1178 Monaghan Road
R02_POW	2 Storey Residential Building	22	4.5	544 Wolfe Street
R03_POW	1 Storey Residential Building	17	1.5	520 Wolfe Street
R04_POW	Storey Residential Building	24	4.5	149 Rutherford Avenue
R04_OPR	Side yard	20	1.5	
R05_POW	Storey Residential Building	21	4.5	147 Hart Avenue
R05_OPR	Side yard	17	1.5	
R06_POW	Storey Residential Building	18	4.5	481 Albert Street
R07_POW	Storey Residential Building	21	4.5	513 Albert Street
R08_POW	1 Storey Residential Building	19	1.5	531 Albert Street
R09_POW	3 Storey Residential Building	21	7.5	122 Park Street North
R10_POW	1 Storey Residential Building	219	1.5	634 Frank Street
R11_POW	Storey Residential Building	25	4.5	53 Alfred Street
R11_OPR	Backyard	45	1.5	

4. Assessment Standards

The noise from this Facility is generated by stationary noise sources (i.e. sources of sound which are normally operated within the property lines of a facility). The subject area is defined as Class 2 urban, as per MECP Publication NPC-300. This publication describes a Class 2 Area as "an area with an acoustical environment that has qualities representative of both Class 1 and Class 3 Areas" with "sound levels characteristic of Class 1 during daytime (07:00 to 19:00, or to 23:00)" and "low evening and night background sound level defined by natural environment and infrequent human activity starting as early as 19:00 hours (19:00 or 23:00, to 07:00)".

Compliance with noise level limits is required to be assessed at both Plane of Window and Outdoor points of reception. The One Hour Equivalent Sound Level (L_{eq}) MECP exclusionary sound level limits in a Class 2 area are summarized in **Table 2**.

Table 2: MECP Exclusionary Sound Level Limits – Class 2

Period Name	Period Time	Plane of Window One Hour Leq (dBA)	Outdoor One Hour Leq (dBA)
Daytime	07:00 to 19:00	50	50
Evening	19:00 to 23:00	50	45
Night-time	23:00 to 07:00	45	40

The performance limit at each point of reception can be determined in accordance with Publication NPC-300 as the greater of either:

- The sound level limit based on the minimum background sound level that occurs or is likely to occur during operation of the source under assessment; or
- The exclusionary limit, as indicated in **Table 2** (Table B–1 and B–2 within Publication NPC-300)

The resulting performance limits for the points of reception are presented in **Table 3** for the appropriate time periods.

Table 3: Performance Limit(s) – Typical Operation

POR ID	MECP Designation	Receptor Type	Daytime Performance Limit (One Hour Leq, dBA)	Evening Performance Limit (One Hour Leq, dBA)	Night0time Performance Limit (One Hour Leq, dBA)
R01_POW	Class 2	Plane of Window	50	50	45
R02_POW	Class 2	Plane of Window	50	50	45
R03_POW	Class 2	Plane of Window	50	50	45
R04_POW	Class 2	Plane of Window	50	50	45
R04_OPR	Class 2	Outdoor Point of Reception	50	45	Not Applicable
R05_POW	Class 2	Plane of Window	50	50	45
R05_OPR	Class 2	Outdoor Point of Reception	50	45	Not Applicable
R06_POW	Class 2	Plane of Window	50	50	45
R07_POW	Class 2	Plane of Window	50	50	45
R08_POW	Class 2	Plane of Window	50	50	45
R09_POW	Class 2	Plane of Window	50	50	45
R10_POW	Class 2	Plane of Window	50	50	45
R11_POW	Class 2	Plane of Window	50	50	45

POR ID	MECP Designation	Receptor Type	Daytime Performance Limit (One Hour Leq, dBA)	Evening Performance Limit (One Hour Leq, dBA)	Night0time Performance Limit (One Hour Leq, dBA)
R11_OPR	Class 2	Outdoor Point of Reception	50	45	Not Applicable

NPC-300 states that the noise produced by emergency equipment operating in non-emergency situations, meaning testing or maintenance situations, should be assessed independently of all other stationary sources of noise. Sound level limits for noise produced by emergency equipment operating in non-emergency situations are 5 dB greater than the sound level limits otherwise applicable. Note that there are no remaining noise sources at the Facility associated with emergency equipment testing.

5. Existing Operations

5.1 Noise Source Summary

Significant noise sources were documented in the 2016 AAR (prepared by GHD). Since then, some equipment has been removed from the Facility, [redacted] BWXT and operates independently of the remainder of the Facility's operations. Other than the sources associated with BWXT, noise sourced removed from analysis include: grit blasting, incinerator ovens, backup power generators, chiller vent, duct collector, cut to length, and ring making. The remaining significant noise sources from the 2016 AAR have been included in this assessment.

A site visit to the Facility was conducted by AECOM staff on January 29th, 2024 and identified remaining significant heating and cooling equipment. Review of publicly available aerial imagery shows that the identified equipment existed prior to 2016 and were not specifically listed in the 2016 AAR, which noted that GHD has included all significant noise sources, and other potential noise sources were considered insignificant. As other equipment and noise sources have been decommissioned, the remaining heating and cooling equipment would be a greater component of the overall Facility noise impact. As such, these units have been included in the present AAR.

Additionally, a system blower fan associated with the water treatment process in the GETS was identified in 2023 [redacted], and noise measurements were subsequently conducted. As mentioned in **Section 1**, a new groundwater treatment system will replace the existing equipment currently with the same functionality. The new unit was modelled in lieu of the water treatment system on the [redacted].

The Facility's noise sources are understood to operate 24 hours a day, except for the equipment identified in the 2016 AAR as operating during the daytime only.

The resulting noise sources that were included in the noise modeling are summarized in **Table 4**. The locations of the noise sources are presented on **Figure 3**. Source sound power calculations, manufacturer information, and assumptions are presented in **Appendix B** and **Appendix C**.

Table 4: Scenario 1 - Noise Source Summary Table

Source ID	Sound Power Level (dBA) (1)	Source Location(2)	Sound Characteristic(3)	Noise Control Measures(4)	Other Notes
[redacted]	[redacted]	O	S	U	8, 10
[redacted]	[redacted]	O	S	U	8
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	8
[redacted]	[redacted]	O	S	U	8
[redacted]	[redacted]	O	S	U	8
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	8
[redacted]	[redacted]	O	S	U	8
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9

Source ID	Sound Power Level (dBA) (1)	Source Location(2)	Sound Characteristic(3)	Noise Control Measures(4)	Other Notes
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	8
[redacted]	[redacted]	O	S	U	8
[redacted]	[redacted]	O	S	U	8
[redacted]	[redacted]	O	S	U	8, 10
[redacted]	[redacted]	O	S	U	8
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	8
[redacted]	[redacted]	O	S	S	-
[redacted]	[redacted]	O	S	S	-
[redacted]	[redacted]	O	S	S	-

Notes to Table 4

1. Power level is referenced to 10^{-12} Watts and is measured or predicted after applicable penalties are applied
2. Source Location
   - O– located/installed outside the building, including on the roof
   - I – located/installed inside the building
3. Sound Characteristics
   - S – Steady
   - Q – Quasi Steady Impulsive
   - I – Impulsive
   - B – Buzzing
   - T – Tonal
   - C – Cyclic
4. Noise Mitigation Measures
   - S – silencers, acoustic louver, muffler
   - A – acoustic lining, plenum
   - B – sound barrier, berms, acoustical screening
   - L – lagging
   - E – acoustic enclosure
   - O – other
   - U – uncontrolled, or Existing Condition
5. A 5 dB penalty has been added for Tonal sound character as per NPC-104
6. A 5 dB penalty has been added for Cyclic sound character as per NPC-104
7. A 10 dB penalty has been added for Quasi-Steady Impulsive sound character as per NPC-104
8. From 2016 AAR
9. On Aerial Imagery predating 2016 AAR
10. Daytime only operation as per 2016 AAR

5.2 Impact Assessment

As noted in **Section 4**, one operation condition is considered in the assessment:

- Typical Operation: Assesses the predictable worst case scenario for each time period where all noise sources associated with each time period are operating.

The noise sources associated with the typical operations of the Facility, as described in **Section 5.1** and **Table 4** were used as inputs to the noise impact model. Noise impacts at the identified points of reception were then predicted in accordance with the ISO 9613-2 prediction algorithm. The predicted noise levels at the identified points of reception, due to each modeled noise source, are summarized in **Table 5**. The tables also include the distance from each source to the identified points of reception.

Table 5: Acoustic Assessment Summary – Typical Operation

POR ID	POR Description	Time Period	Sound Level at POR (Leq, dBA)	Verified by Acoustic Audit (Y/N)	Performance Limit (Leq, dBA)	Compliance with Performance Limit (Y/N)
R01_POW	Plane of Window	Daytime	40	No	50	Yes
		Evening	39		50	Yes
		Night	39		45	Yes
R02_POW	Plane of Window	Daytime	47	No	50	Yes
		Evening	45		50	Yes
		Night	45		45	Yes
R03_POW	Plane of Window	Daytime	47	No	50	Yes
		Evening	45		50	Yes
		Night	45		45	Yes
R04_POW	Plane of Window	Daytime	48	No	50	Yes
		Evening	45		50	Yes
		Night	45		45	Yes
R04_OPR	Outdoor Point of Reception	Daytime	47	No	50	Yes
		Evening	44		45	Yes
R05_POW	Plane of Window	Daytime	49	No	50	Yes
		Evening	44		50	Yes
		Night	44		45	Yes
R05_OPR	Outdoor Point of Reception	Daytime	48	No	50	Yes
		Evening	42		45	Yes
R06_POW	Plane of Window	Daytime	43	No	50	Yes
		Evening	43		50	Yes
		Night	43		45	Yes
R07_POW	Plane of Window	Daytime	40	No	50	Yes
		Evening	39		50	Yes
		Night	39		45	Yes
R08_POW	Plane of Window	Daytime	38	No	50	Yes
		Evening	38		50	Yes
		Night	38		45	Yes
R09_POW	Plane of Window	Daytime	50	No	50	Yes
		Evening	45		50	Yes
		Night	45		45	Yes
R10_POW	Plane of Window	Daytime	34	No	50	Yes
		Evening	33		50	Yes
		Night	33		45	Yes
R11_POW	Plane of Window	Daytime	38	No	50	Yes
		Evening	37		50	Yes
		Night	37		45	Yes
R11_OPR	Outdoor Point of Reception	Daytime	34	No	50	Yes
		Evening	33		45	Yes

Results in the above table show that the Facility operates in compliance with the MECP's noise limits during the worst-case hours of operation.

6. Future Operations

6.1 Noise Source Summary

Only the HVAC associated with building [redacted] as well as the GETS will be operational in the future. These sources were modelled to continuously operate 24 hours a day. The scenario noise sources are summarized in Table 6.

Table 6: Scenario 2 - Noise Source Summary Table

Source ID	Sound Power Level (dBA) (1)	Source Location(2)	Sound Characteristic(3)	Noise Control Measures(4)	Other Notes
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	U	9
[redacted]	[redacted]	O	S	S	-
[redacted]	[redacted]	O	S	S	-
[redacted]	[redacted]	O	S	S	-

Notes to Table 6

1. Power level is referenced to 10^{-12} Watts and is measured or predicted after applicable penalties are applied
2. Source Location
   - O– located/installed outside the building, including on the roof
   - I – located/installed inside the building
3. Sound Characteristics
   - S – Steady
   - Q – Quasi Steady Impulsive
   - I – Impulsive
   - B – Buzzing
   - T – Tonal
   - C – Cyclic
4. Noise Mitigation Measures
   - S – silencers, acoustic louver, muffler
   - A – acoustic lining, plenum
   - B – sound barrier, berms, acoustical screening
   - L – lagging
   - E – acoustic enclosure
   - O – other
   - U – uncontrolled, or Existing Condition
5. A 5 dB penalty has been added for Tonal sound character as per NPC-104
6. A 5 dB penalty has been added for Cyclic sound character as per NPC-104
7. A 10 dB penalty has been added for Quasi-Steady Impulsive sound character as per NPC-104
8. From 2016 AAR
9. On Aerial Imagery predating 2016 AAR
10. Daytime only operation as per 2016 AAR

6.2 Impact Assessment

As noted in **Section 4**, one phase of operation is considered in the assessment:

- Typical Operations: The predictable worst-case scenario is assessed for each time period where all noise sources associated with each time period are operating.

The noise sources associated with the typical operations of the Facility, as described in **Section 6.1** and **Table 7**, were used as inputs to the noise impact model. Noise impacts at the identified points of reception were then predicted in accordance with the ISO 9613-2 prediction algorithm. The predicted noise levels at the identified points of reception due to each modeled noise sources are summarized in **Table 7**. The tables also include the distance from each source to the identified points of reception.

Table 7: Acoustic Assessment Summary – Typical Operation

POR ID	POR Description	Time Period	Sound Level at POR (Leq dBA)	Verified by Acoustic Audit (Y/N)	Performance Limit (Leq dBA)	Compliance with Performance Limit (Y/N)
R01_POW	Plane of Window	Daytime	17	No	50	Yes
		Evening	17		50	Yes
		Night	17		45	Yes
R02_POW	Plane of Window	Daytime	21	No	50	Yes
		Evening	21		50	Yes
		Night	21		45	Yes
R03_POW	Plane of Window	Daytime	19	No	50	Yes
		Evening	19		50	Yes
		Night	19		45	Yes
R04_POW	Plane of Window	Daytime	16	No	50	Yes
		Evening	16		50	Yes
		Night	16		45	Yes
R04_OPR	Outdoor Point of Reception	Daytime	15	No	50	Yes
		Evening	15		45	Yes
R05_POW	Plane of Window	Daytime	24	No	50	Yes
		Evening	24		50	Yes
		Night	24		45	Yes
R05_OPR	Outdoor Point of Reception	Daytime	23	No	50	Yes
		Evening	23		45	Yes
R06_POW	Plane of Window	Daytime	24	No	50	Yes
		Evening	24		50	Yes
		Night	24		45	Yes
R07_POW	Plane of Window	Daytime	33	No	50	Yes
		Evening	33		50	Yes
		Night	33		45	Yes
R08_POW	Plane of Window	Daytime	26	No	50	Yes
		Evening	26		50	Yes
		Night	26		45	Yes
R09_POW	Plane of Window	Daytime	30	No	50	Yes
		Evening	30		50	Yes
		Night	30		45	Yes
R10_POW	Plane of Window	Daytime	15	No	50	Yes
		Evening	15		50	Yes
		Night	15		45	Yes
R11_POW	Plane of Window	Daytime	21	No	50	Yes
		Evening	21		50	Yes
		Night	21		45	Yes
R11_OPR	Outdoor Point of Reception	Daytime	20	No	50	Yes
		Evening	20		45	Yes

Results in the above table show that the Facility operates in compliance with the MECP's noise limits during the worst-case hours of operation.

7. Conclusions

AECOM was retained by GEPR to update an AAR for the facility located at 107 Park Street North in Peterborough Ontario (the Facility). This report has been prepared in accordance with all applicable Ministry of the Environment, Conservation and Change (MECP) noise guidelines.

Results of analysis shows that that Facility may operate in compliance with the MECP noise guidelines in both the existing (Scenario 1), and the future scenario (Scenario 2)..

In addition, all significant air emission sources were assessed in a separate updated Emissions Summary and Dispersion Model Report (ESDM).

8. References

International Organization for Standardization, ISO 9613-2: Acoustics - Attenuation of Sound during Propagation Outdoors Part 2: General Method of Calculation, Geneva, Switzerland, 1996.

Environment Canada, Environment Canada Climate Data Online. http://www.climate.weatheroffice.ec.gc.ca/climateData/hourlydata_e.html

Ontario Ministry of the Environment, Publication NPC-233: Information to be Submitted for Approval of Stationary Sources of Sound, October 1995.

Ontario Ministry of the Environment, Publication NPC-300: Stationary and Transportation Sources – Approval and Planning, August 2013.

Ontario Ministry of the Environment, Model Municipal Noise Control By-Law Publication NPC-103. Queens Printer for Ontario. August 1978.

Ontario Ministry of the Environment, Model Municipal Noise Control By-Law Publication NPC-104. Queens Printer for Ontario. August 1978.

Environmental Assessment and Approvals Branch. Basic Comprehensive Certificates of Approval (Air) User Guide Version 2.0. Ontario Ministry of the Environment. April 2004.

GHD, Acoustic Assessment Report, General Electric Canada – Peterborough, April 22, 2016

Figures

Figure 1: Facility Site

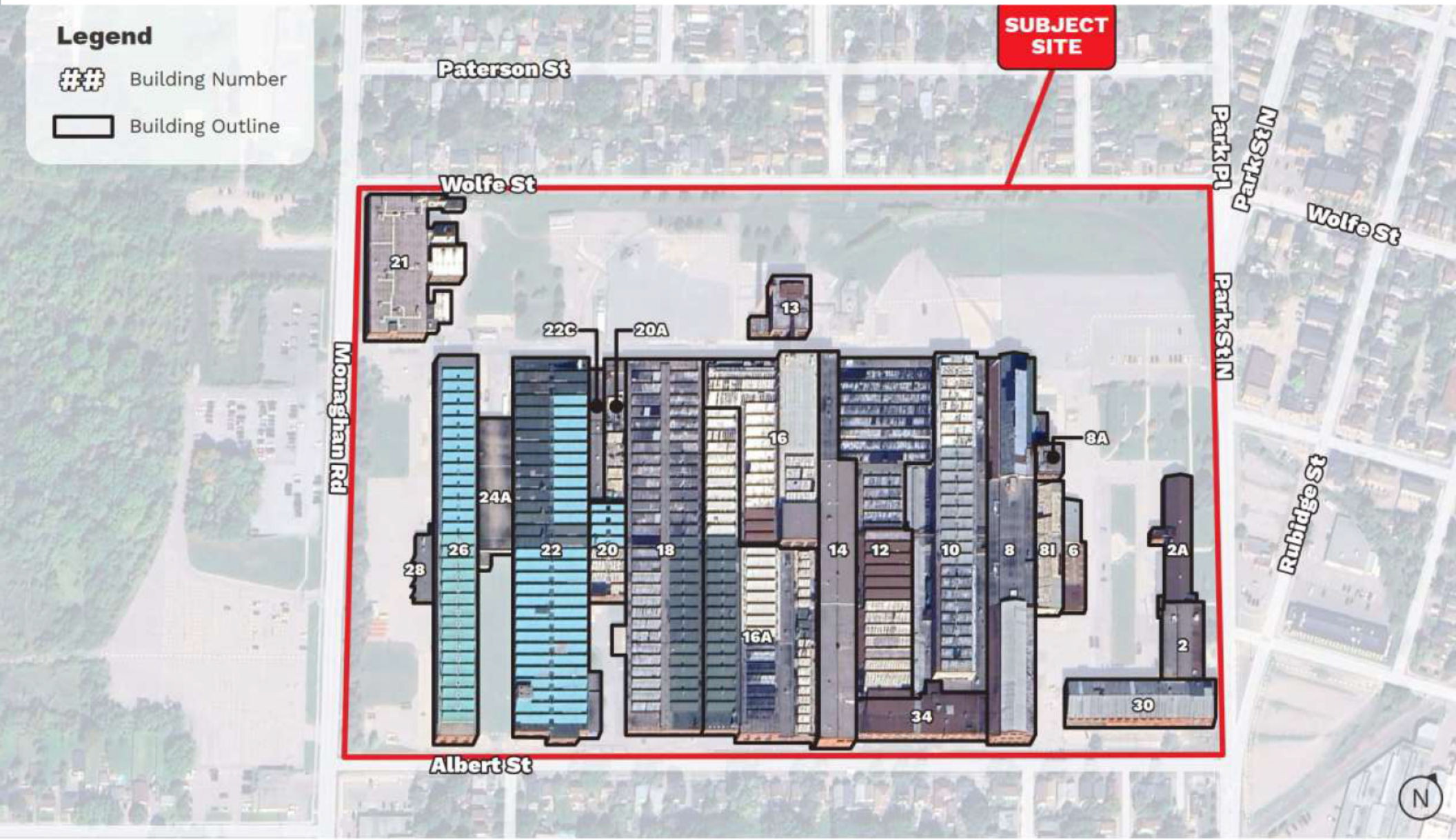
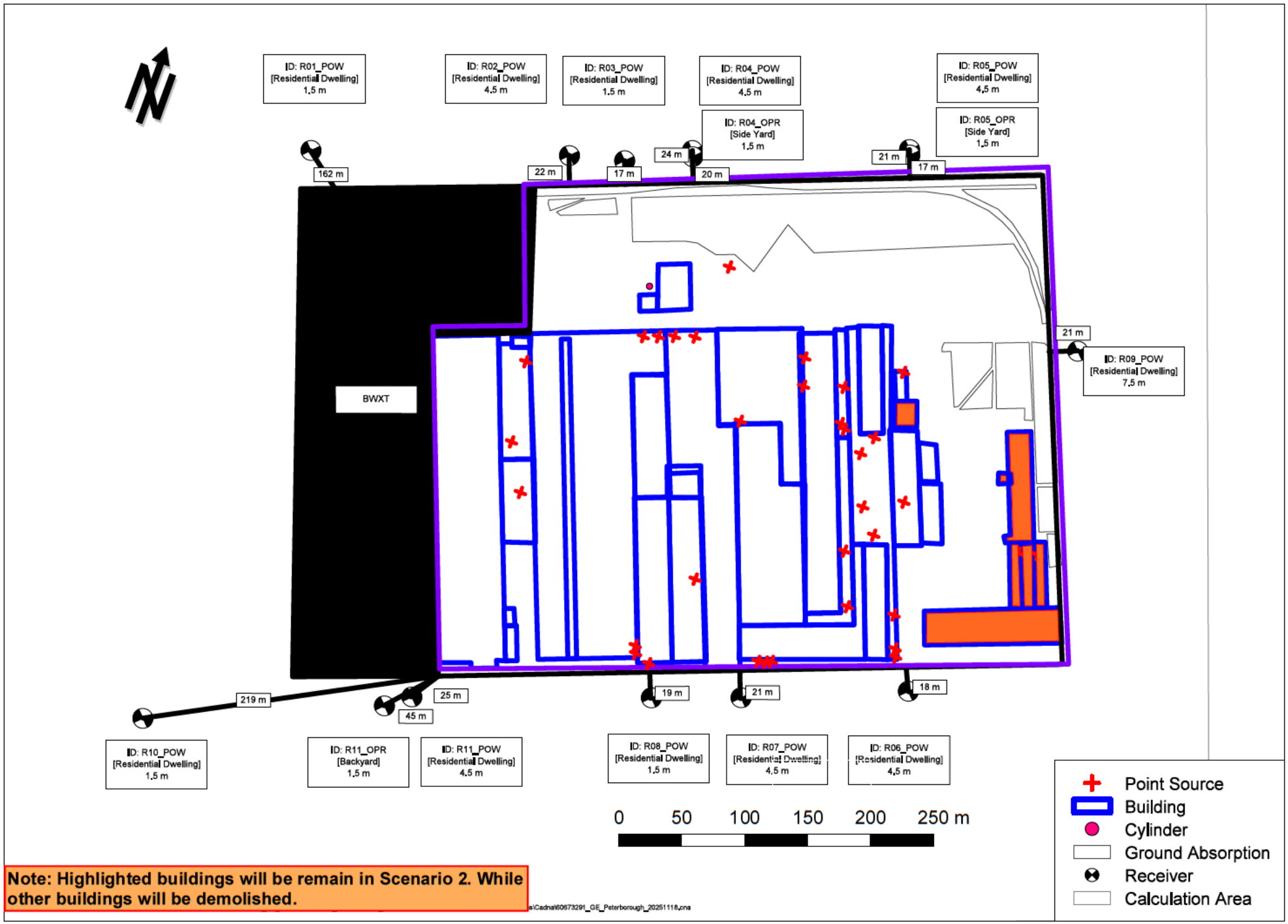


Figure 2: Site Plan Location



Note: Highlighted buildings will be remain in Scenario 2. While other buildings will be demolished.

s\Cadna\60673291_GE_Peterborough_20251118.cna

Figure 3: Source Identification Plan (Scenario 1)

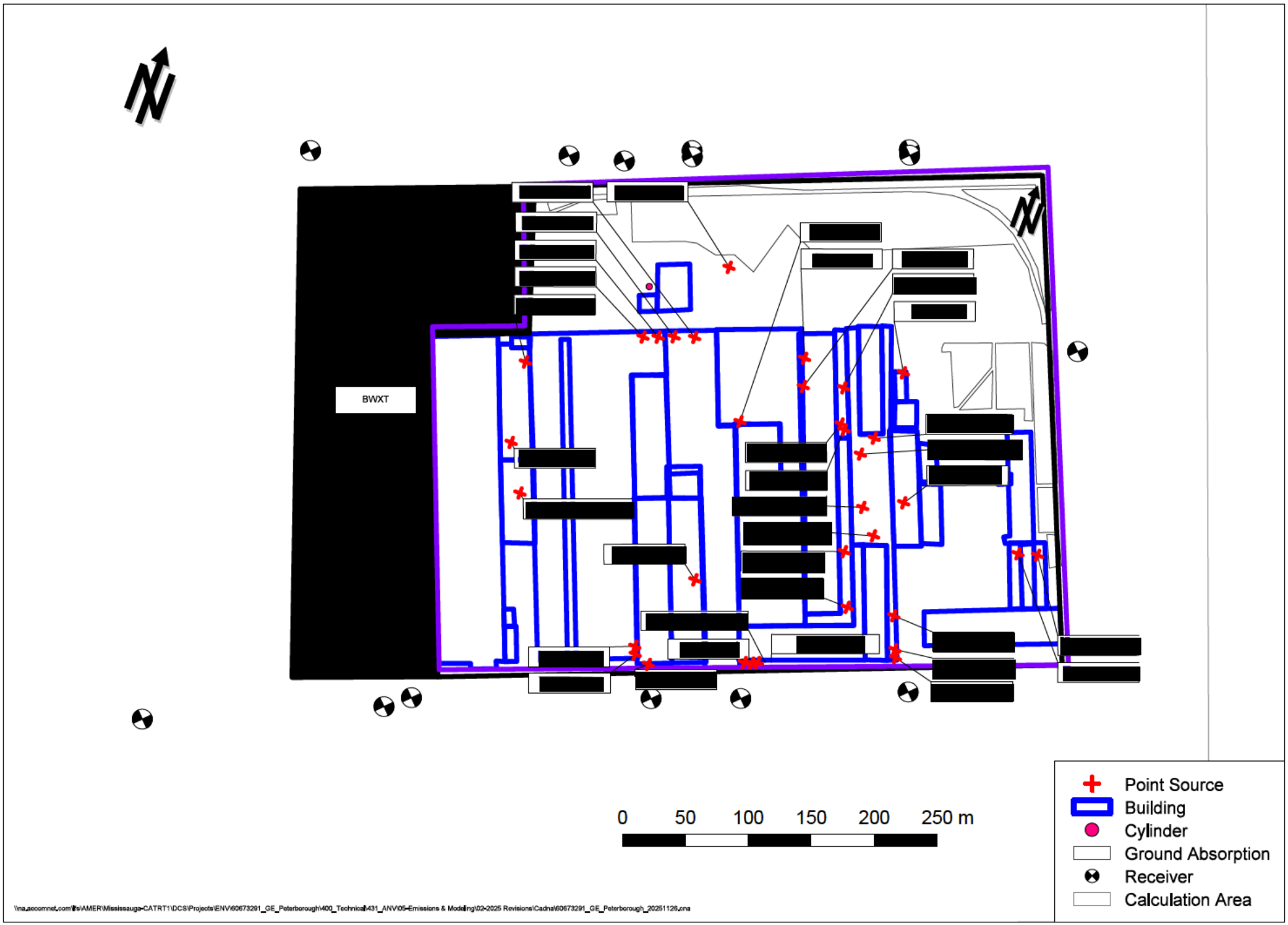


Figure 4: Source Identification Plan (Scenario 2)

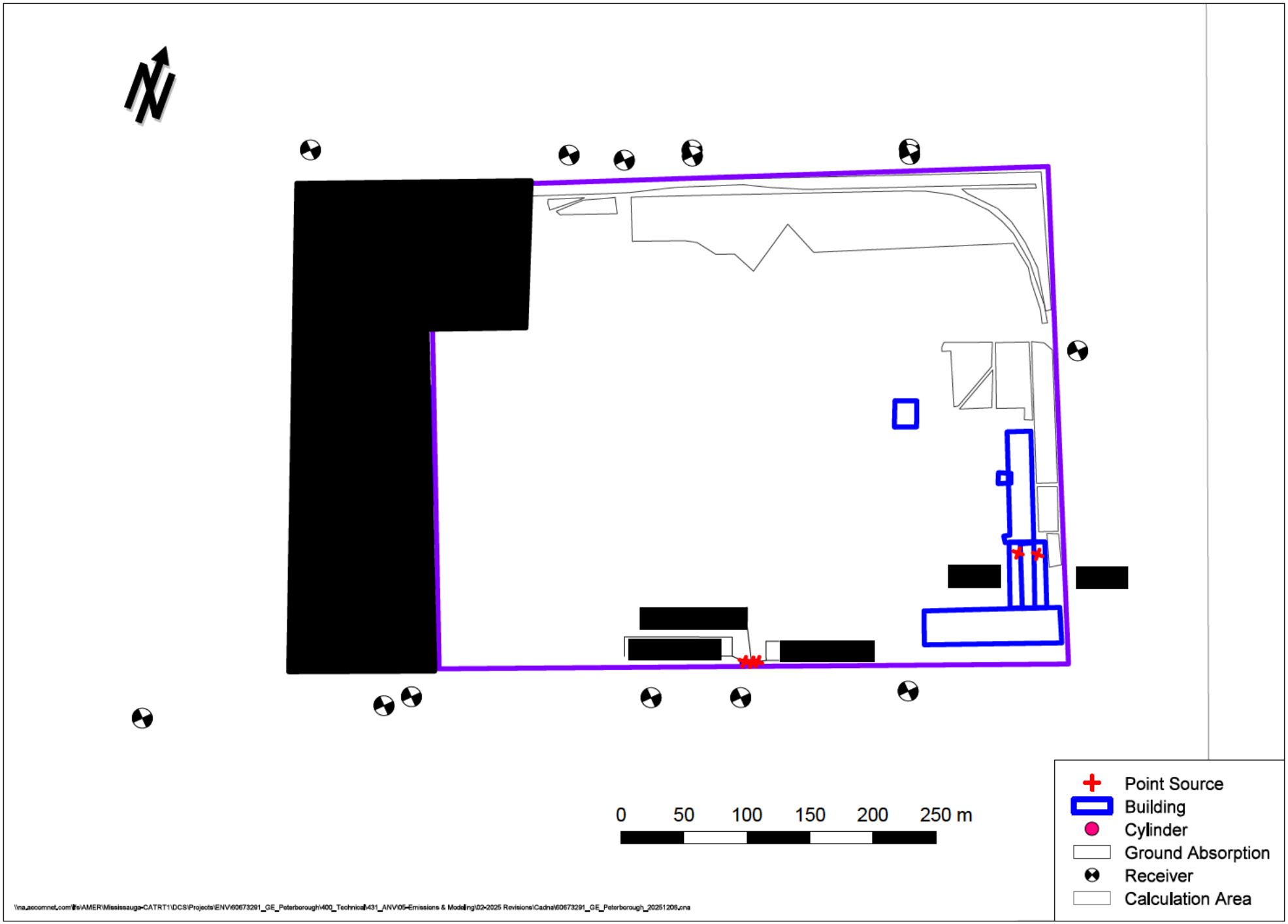


Figure 5: Modeling Results – Typical Operation (Scenario 1)

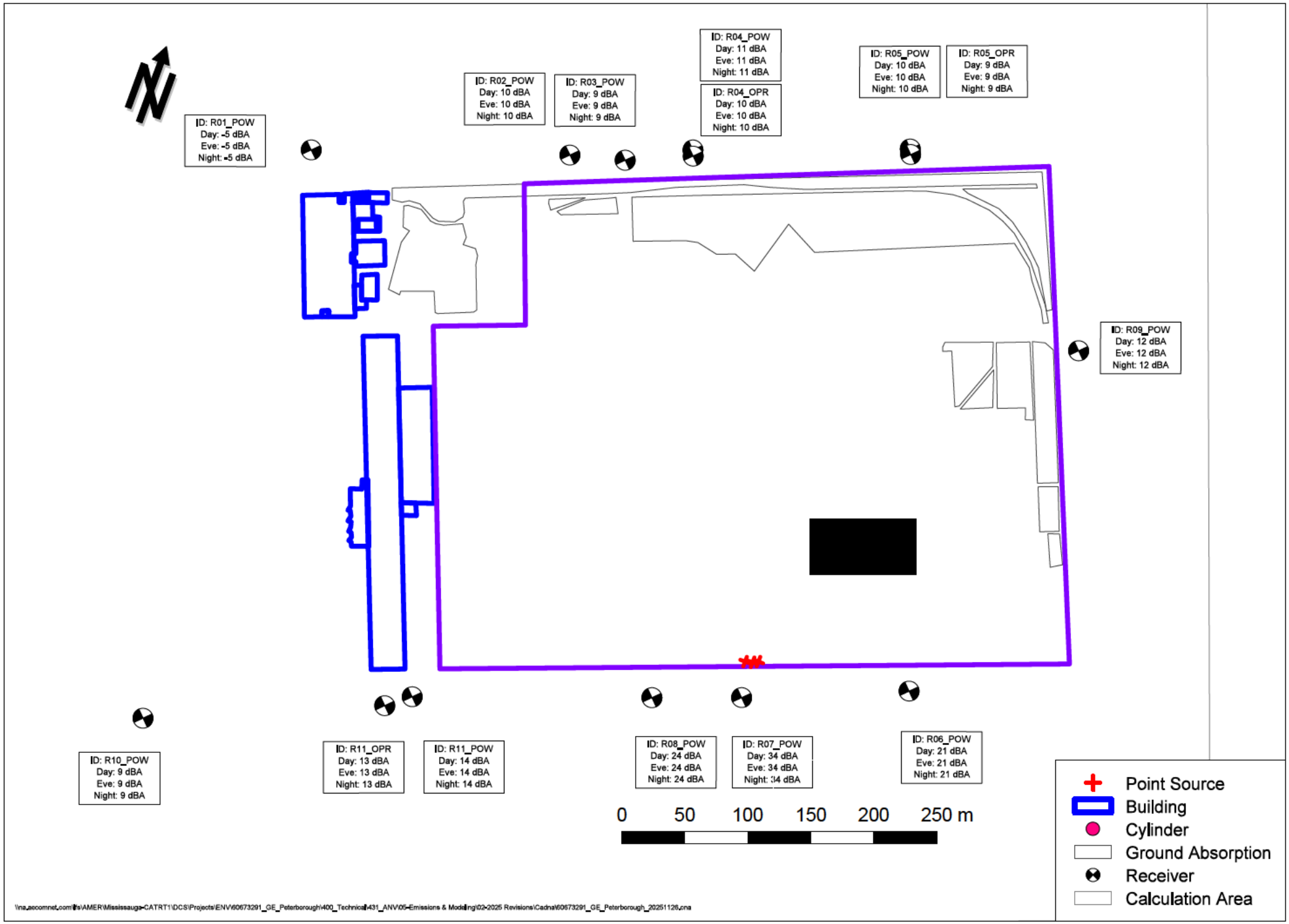
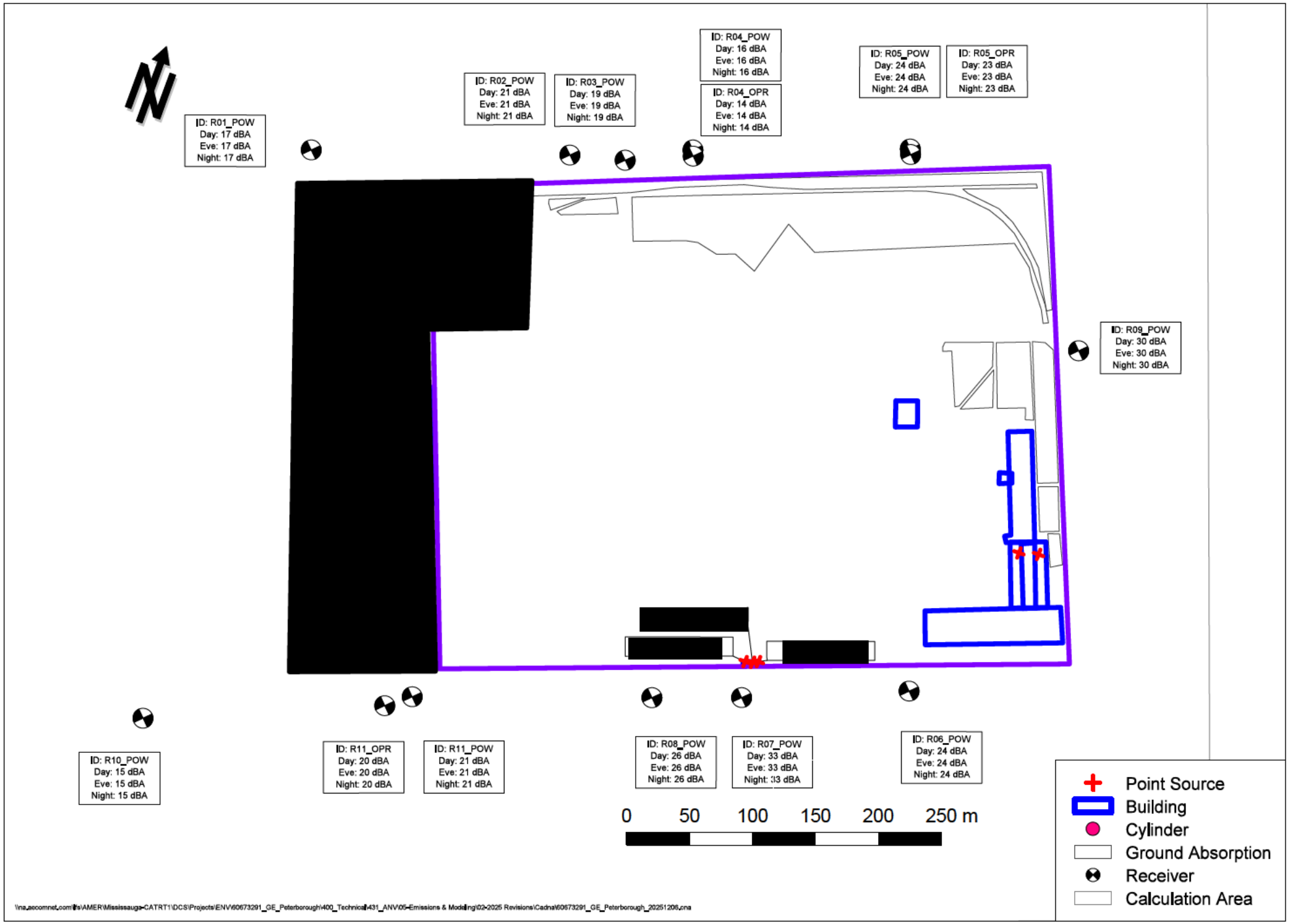


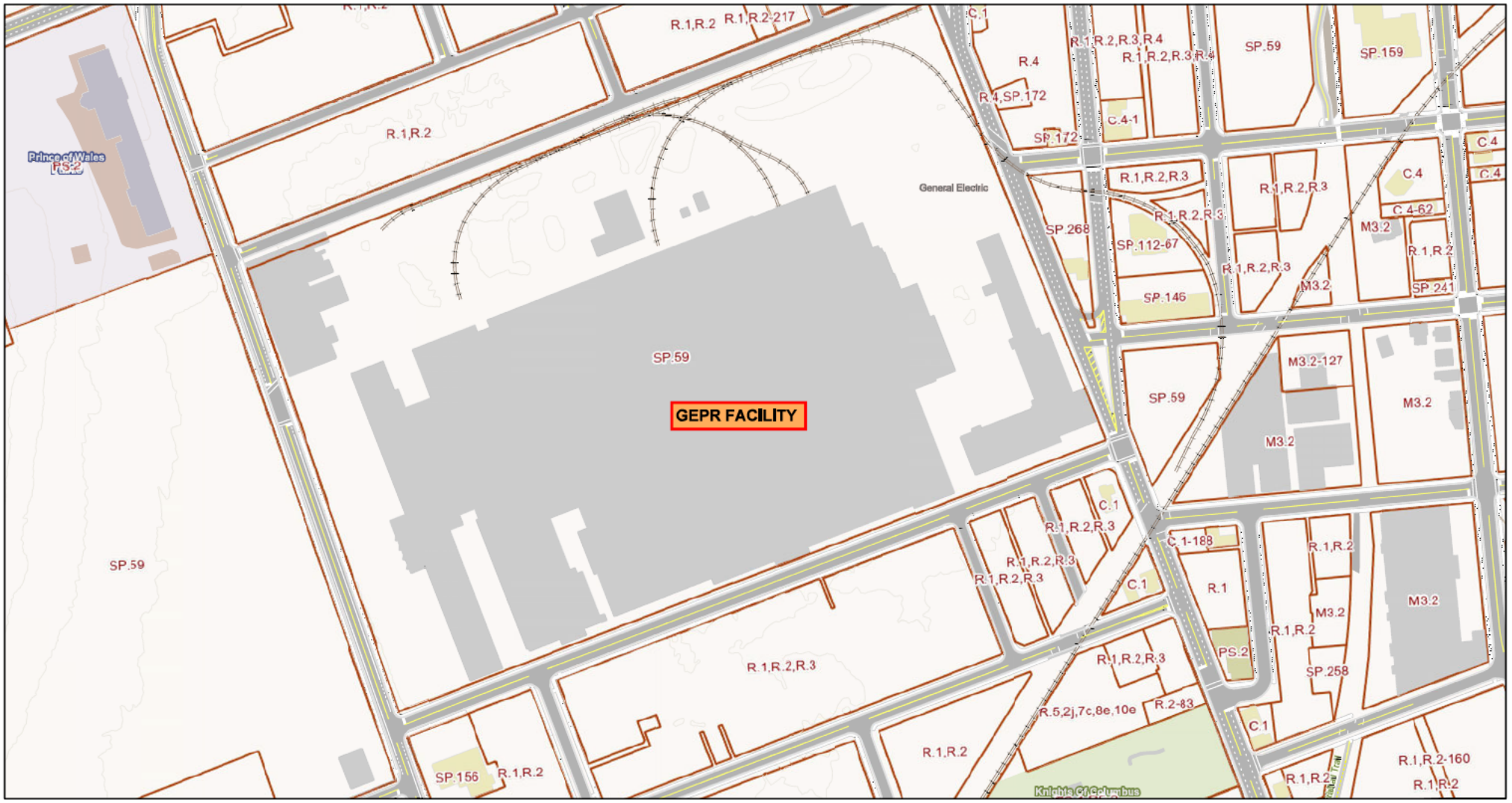
Figure 6: Modeling Results – Typical Operation (Scenario 2)



Appendix A

Zoning Maps

ArcGIS Web Map



11/20/2025, 6:21:31 PM

Zoning

1:3,922

0 0.04 0.07 0.14 mi

0 0.05 0.1 0.2 km

SECTION 87

SPECIAL DISTRICT 59 (SP.59)

87.1 For the purpose of this by-law, land use district "Special District 59" is hereby established and may be referred to by the symbol "SP.59". "SP.59" District is comprised of Parts 1, 2, 3, and 4 on the plan attached hereto as Schedule "A" to this Section.

PERMITTED USES

87.2 No person shall within an SP.59 District use any land or erect, alter or use any building or part thereof for any purpose other than:

(a) an assembly plant, processing plant or manufacturing plant exclusive and plant used for specific industrial purposes
(b) an electrical wholesale outlet
(c) a mobile radio repair depot

REGULATIONS

87.3 No person shall within an SP.59 District use any land or erect, alter or use any building or part thereof except in accordance with the following regulations:

Type	Requirement
a) any such building on Part 1 shall be erected in accordance with the following regulations:	
i) maximum building coverage	60%
ii) minimum distance from the centre line of High Street	19 metres
iii) minimum building setback	
i) north lot line	9 metres
ii) south lot line	18 metres
iv) maximum building height	18 metres
b) any such building on Parts 2 or 4 shall be erected wholly within one of the areas designated "Building Area – A" on the said plan and in accordance with the following regulations:	
i) maximum building coverage on Part 2	80%
ii) maximum building height on Part 2	21 metres
iii) maximum building height on Part 4	10.6 metres
c) no building shall be erected on Part 3	
d) landscaped open space shall be provided and maintained within the areas designated "Landscaped Open Space – B" on the said plan. Such landscaped open space may be interrupted by motor vehicle and railway access to the extent hereinafter permitted	
e) the areas designated "Parking Area – C" on the said plan shall be used exclusively for motor vehicle parking space, loading space and railway access	
f) notwithstanding the provisions of Section 4, motor vehicle access shall be located only in the areas designated "Driveway Area – D" on the said plan and the following:	
i) on High Street, one driveway north of the existing 220 metre elevation	
ii) on Frank Street, not more than two driveways	
iii) on Monaghan Road, one driveway at least 30 metres south of the north limit of Part 1 and at least 15 metres north of the northerly "Driveway Area – D" on the said plan	

Appendix B

Drawings and Manufacturer Information

[redacted]

[redacted]

[redacted]

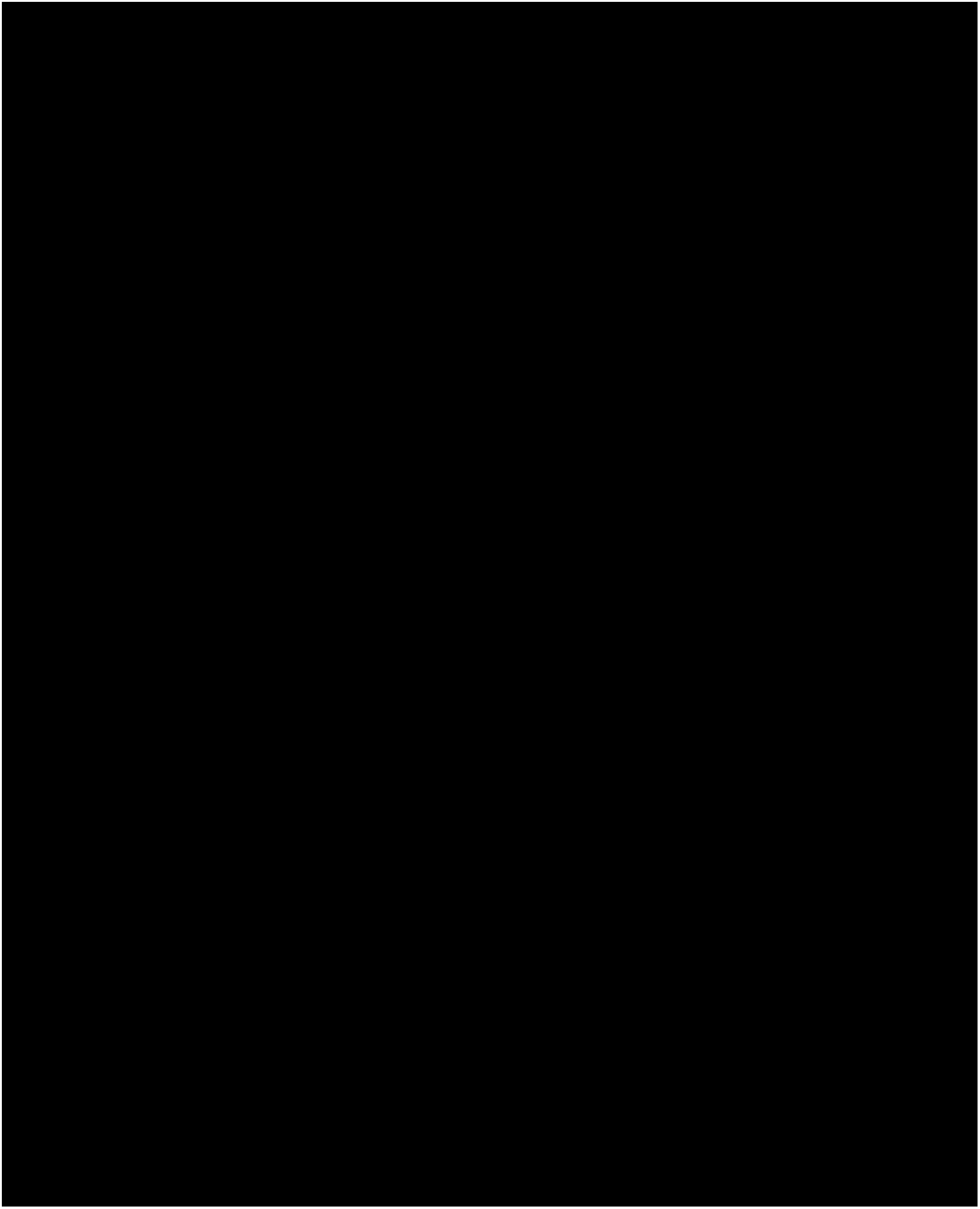
[redacted]

[redacted]

[redacted]

[redacted]





[redacted]

[redacted]

[redacted]

[redacted]



Appendix C

Sound Power Calculations

AECOM

Measurement Date: ASHRAE PREDICT | Last Updated: April 20, 2024

Project Name: GE Peterborough

Project Code: 60673291

2 | DataType = 2 | Staff: JA

TABLE C1

ASHRAE PREDICTED SOUND POWER LEVELS

Sheet # (1)	Source ID	Source Tag	Source Description	Flow rate (A_m ^{3}/s)	Flow rate (cfm)	Static Pressure (Inches WG)	ASHRAE FanType	Fan Efficiency Ratio%	Fan Efficiency Correction Factor (dB)	Band Frequency (Hz)	Band Frequency Correc ion (dB)	ASHRAE Predicted Base Total Power (dB ref. 10-12W) Sound							ASHRAE Pressure/ Flowrate Adj (dB)	ASHRAE Predicted Efficiency and BFI Adjustments (dB)								Total Sound Power (dB re 10^{-12} Watts)								Overall Sound Power (dB)	Overall Sound Power (dBA)	NOTES		
												63	125	250	500	1k	2k	4k	8k	63	125	250	500	1k	2k	4k	8k	63	125	250	500	1000	2000	4000	8000			Source Notes	Source Character (16)	CADNA IMPORT (17)
	[redacted]		[redacted]		[redacted]	3.000	2	85	3	250	3	45	45	43	39	34	28	24	19	52.33	3	3	6	3	3	3	3	3	100	100	101	94	89	83	79	74	106	97	[redacted]	S	0
						3.000	2	85	3	250	3	45	45	43	39	34	28	24	19	52.33	3	3	6	3	3	3	3	3	100	100	101	94	89	83	79	74	106	97	[redacted]	S	0
						3.000	2	85	3	250	3	45	45	43	39	34	28	24	19	49.96	3	3	6	3	3	3	3	3	98	98	99	92	87	81	77	72	104	94	[redacted]	S	1
						3.000	2	85	3	250	3	45	45	43	39	34	28	24	19	49.96	3	3	6	3	3	3	3	3	98	98	99	92	87	81	77	72	104	94	[redacted]	S	0
						2.000	2	85	3	250	3	45	45	43	39	34	28	24	19	51.34	3	3	6	3	3	3	3	3	99	99	100	93	88	82	78	73	105	96	[redacted]	S	1
						2.000	2	85	3	250	3	45	45	43	39	34	28	24	19	51.34	3	3	6	3	3	3	3	3	99	99	100	93	88	82	78	73	105	96	[redacted]	S	1

1 - Fan power "PREDICTIONS" based on ASHRAE formulas

AECOM

Description MANUFACTURER Last Updated April 20, 2024
Project Name GE Peterborough
Project Code 60673291
Staff JA

3 DataType = 3

TABLE C2

MANUFACTURER SOUND POWER DATA

Sheet # (1)	Source ID	Source Tag	Source Description	Wtd (2)	Inlet or Radiated Sound Power in Octave Bands [Hz]									Outlet Sound Power in Octave Bands [Hz]									Misc Adj (7)	Casing/Misc Adjustment [dB]									Approximate Radiated Sound Power in Octave Bands [Hz]										NOTES		
					32	63	125	250	500	1k	2k	4k	8k	Lw	32	63	125	250	500	1k	2k	4k	8k	Lw		32	63	125	250	500	1k	2k	4k	8k	Overall Lw	Overall LwA	Measurment/Source Notes	Source Character (15)	CADNA IMPORT (16)
				Linear	96	99.9	99	100	100	91	83	70	58	107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96	##	99	##	##	91	83	70	58	107	99	From 2016 AAR	S	1
				Linear	26	68.8	87	97	92	84	74	61	47	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	69	87	97	92	84	74	61	47	99	92	From 2016 AAR	S	1
				Linear	87	103	85	83	75	69	63	57	50	103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87	##	85	83	75	69	63	57	50	103	80	From 2016 AAR	S	1
				Linear	26	74.9	81	92	97	89	81	70	58	99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	75	81	92	97	89	81	70	58	99	96	From 2016 AAR	S	1
				Linear	94	83.8	84	74	60	45	57	56	58	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	84	84	74	60	45	57	56	58	95	71	From 2016 AAR	S	1
				Linear	90	82.5	73	42	49	44	61	52	61	91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	83	73	42	49	44	61	52	61	91	66	From 2016 AAR	S	1
				Linear	99	90.8	93	99	93	93	83	77	71	104	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99	91	93	99	93	93	83	77	71	104	96	From 2016 AAR	S	1
				Linear	81	79.1	80	88	86	80	71	62	51	91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	79	80	88	86	80	71	62	51	91	86	From 2016 AAR	S	1
				Linear	88	83	91	85	86	78	67	63	64	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	88	83	91	85	86	78	67	63	64	94	85	From 2016 AAR	S	1
				Linear	72	69.2	69	72	71	65	65	57	55	78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	72	69	69	72	71	65	65	57	55	78	72	From 2016 AAR	S	1
				Linear	72	69.2	69	72	71	65	65	57	55	78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	72	69	69	72	71	65	65	57	55	78	72	From 2016 AAR	S	1
				Linear	72	69.2	69	72	71	65	65	57	55	78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	72	69	69	72	71	65	65	57	55	78	72	From 2016 AAR	S	1
				Linear	71	71.8	71	72	70	74	75	68	65	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	71	72	71	72	70	74	75	68	65	81	79	From 2016 AAR	S	1
				Linear		80.5	86	83	80	76	71	67	61	89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	86	83	80	76	71	67	61	89	81		S	1
				Linear		80.5	86	83	80	76	71	67	61	89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	81	86	83	80	76	71	67	61	89	81		S	1
				Linear		88	91	90	87	84	78	74	69	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	88	91	90	87	84	78	74	69	95	89		S	1
				Linear		48	51	58	56	55	52	46	42	62	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0	0	0	0	0	0	29	77	80	87	85	84	81	75	71	91	88		S	1
				Linear		88	91	90	87	84	78	74	69	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	88	91	90	87	84	78	74	69	95	89		S	1
				Linear		79.5	82	75	73	72	67	62	55	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	82	75	73	72	67	62	55	85	76		S	1
				Linear		79.5	82	75	73	72	67	62	55	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	82	75	73	72	67	62	55	85	76		S	1
				Linear		89.5	92	89	88	84	79	74	67	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	92	89	88	84	79	74	67	96	89		S	1
				Linear		89.5	92	89	88	84	79	74	67	96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	92	89	88	84	79	74	67	96	89		S	1
				Linear			79	84	88	89	85	82	73	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79	84	88	89	85	82	73	94	92		S	1
				Linear			79	84	88	89	85	82	73	94	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	79	84	88	89	85	82	73	94	92		S	1

SEE ATTACHED NOTES

AECOM

Measurement Date: NA | Last Updated: April 20, 2024
Project Name: GE Peterborough
Project Code: 60673291
Staff: JA

4 DataType = 4

TABLE C3

SOUND POWER LEVEL PREDICTIONS BASED ON CALCULATIONS

| Sheet g[1] | Source ID | Source Tag | Source Description | Ver[2] | Calculated L_{in} in Octave Bands [Hz] 31.5 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | Overall Leq | Dir Type[4] | Angle[5] | Directivity Corrections in dB[6] 32 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | Adj[7] | Intensity Corrections in dB 31.5 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | Corrected/Adjusted L_{in}[8] 31.5 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | Overall Leq | STYP (9) | SPAN (10) | Dist[11] (m) | Area[12] (m^2) | Sound Power Lw or Sound Intensity Li[13] 31.5 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k | Overall Lw/Li | Overall Lw/Li dBA | TYPE (14) | Measurement/Source Notes | Source Checked (15) | CADNA IMPORT (16) |
|---|---|---

ASHRAE APPLICATIONS HANDBOOK, 1991

Table 4 - Specific Total Sound Power Levels of Typical Fans (Q=1cfm, P=1in water)

dB (ref 1 pW)

			63	125	250	500	1k	2k	4k	8k	BFI	BFIfreq
Centrifugal Fans												
1	Centrifugal	over 36" dia	40	40	39	34	30	23	19	17	3	250
2	Centrifugal	under 36" dia	45	45	43	39	34	28	24	19	3	250
3	Forward Curved	all sizes	53	53	43	36	36	31	26	21	2	500
4	Radial Bladed	4 to 10in Water	56	47	43	39	37	32	29	26	7	125
5	Radial Bladed	6 to 10in Water	58	54	45	42	38	33	29	26	8	125
6	Radial Bladed	15 to 60in Water	61	58	53	48	46	44	41	38	8	125
Axial Fans												
7	Vane Axial	Hub ratio 0.3 to 0.4	49	43	43	48	47	45	38	34	6	250
8	Vane Axial	Hub ratio 0.4 to 0.6	49	43	46	43	41	36	30	28	6	250
9	Vane Axial	Hub ratio 0.6 to 0.8	53	52	51	51	49	47	43	40	6	250
Tube Axial												
10	Over 40" Wheel Diameter		51	46	47	49	47	46	39	37	7	63
11	Under 40" Wheel Diameter		48	47	49	53	52	51	43	40	7	63
Propeller												
12	General Ventilation		48	51	58	56	55	52	46	42	5	63

Table 7 - Correction Factor C for Off-Peak Operation

% of Peak Static Efficiency	dB Correction Factor
100	0
99	0
98	0
97	0
96	0
95	0
94	0
93	0
92	0
91	0
90	0
89	3
88	3
87	3
86	3
85	3
84	6
83	6
82	6
81	6
80	6
79	6
78	6
77	6
76	6
75	6
74	9
73	9
72	9
71	9
70	9
69	9
68	9
67	9
66	9
65	9
64	12
63	12
62	12
61	12
60	12
59	12
58	12
57	12
56	12
55	12
54	15
53	15
52	15
51	15
50	15

$$B_f = \text{rps} \times \text{No. of Blades or rpm} \times \text{No. of Blades}/60 \quad (3)$$

The number of blades and the fan rpm (rps) can be obtained from the fan selection catalog. Table 4 lists specific sound power levels and blade frequency increments. Table 5 lists the octave band in which the BFI occurs. At present, the sound power level data for forwardly curved fans varies widely; the specific sound power levels given in Table 4 are an average of that data. For critical applications, the sound power levels for a particular fan should be obtained from the manufacturer. For a more complete description of fan types, construction, and applications, see Chapter 3 of the 1988 ASHRAE *Handbook—Equipment*.

Sound power levels at actual operating conditions can be estimated by the actual fan volume flow rate and fan pressure, as:

$$L_w = K_w + 10 \log (Q/Q_1) + 20 \log (p/p_1) + C \quad (4)$$

where

L_w = estimated sound power level of fan, dB re 1 pW
K_w = specific sound power level (see Table 4)
Q = flow rate, cfm
Q_1 = 1 cfm
p = pressure drop, in. of water
p_1 = 1 in. of water
C = correction factor for point of fan operation, dB

Values of the estimated sound power level are calculated for all eight bands, and the BFI is added to the sound pressure level in the octave band in which the blade passage frequency falls.

Notes to Sound Level Measurement Tables:

(1) Uniquely identifies measurements. For tables not containing unique measurements (Assumed, Manufacturer, ASHRAE) identifier is used to indicate the source of data or method of prediction.

(2) The spectral weighting filter network associated with the data: [**A]** A-Weighted, [**Linear]** Z-Weighted.

(3) Measured sound pressure levels (L_{EQ}) or Manufacturer/Predicted sound power levels (L_W) in octave bands.

(4) Refers to the directivity correction used **[0]** – none or **[1/2/3]** – stack type (See Attached Table & Figure).

(5) The relative angle between the microphone and the source stack opening. (See Attached Table & Figure).

(6) Directivity correction values in octave bands corresponding to both items (5) and (6).

(7) An adjustment to the overall level. If two identical sources were present at the time of the measurement -3dB could be assumed if the objective is to calculate the power level of just one source.

(8) These are the sound pressure levels (L_{EQ}) with all indicated corrections applied.

(9) Identifies the method with which to calculate L_W or L_I from the corrected sound pressure levels.

(0) The corrected sound pressure is taken to be an intensity level $\left[L_I\right]$ with no modifications to the level values.

(1) The corrected sound pressure is taken to be an intensity level $\left[L_I(c)\right]$ originating from inside a building. For the calculation of the radiated sound from the building envelope the associated transmission loss properties of the building construction must also be provided.

(2) The corrected sound pressure is taken to be a power level $\left[L_W\right]$ with no modifications to the level values.

(3) The corrected sound pressure is taken to be a pressure measurement in the radiation plane of an area source. The power level $\left[L_W(A)\right]$ is calculated from the pressure level $\left[L_{EQ} / L_p\right]$ as follows: $L_W(A) = L_{EQ} + 10 \log(Area)$

(4) The corrected sound pressure is taken to be a pressure measurement at a distance from a point source. The power level $\left[L_W(D)\right]$ is calculated from the pressure level $\left[L_{EQ} / L_p\right]$ as follows: $L_W(D) = L_{EQ} + 10 \log\left(\frac{4\pi SPH\ \%}{100}\right) + 20 \log(Dist)$

(10) (SPH%) The percentage of spherical area radiation of a point source (IF STYPI = 4).

(11) (Dist) The linear distance of the measurement location from the point source (IF STYPI = 4).

(12) (Area) The area of the plane of radiation of the area source (IF STYPI = 3).

(13) Resultant sound power or sound intensity depending upon the value of STYPI.

(14) Indicates whether the results are power levels (L_W) or intensity levels (L_I).

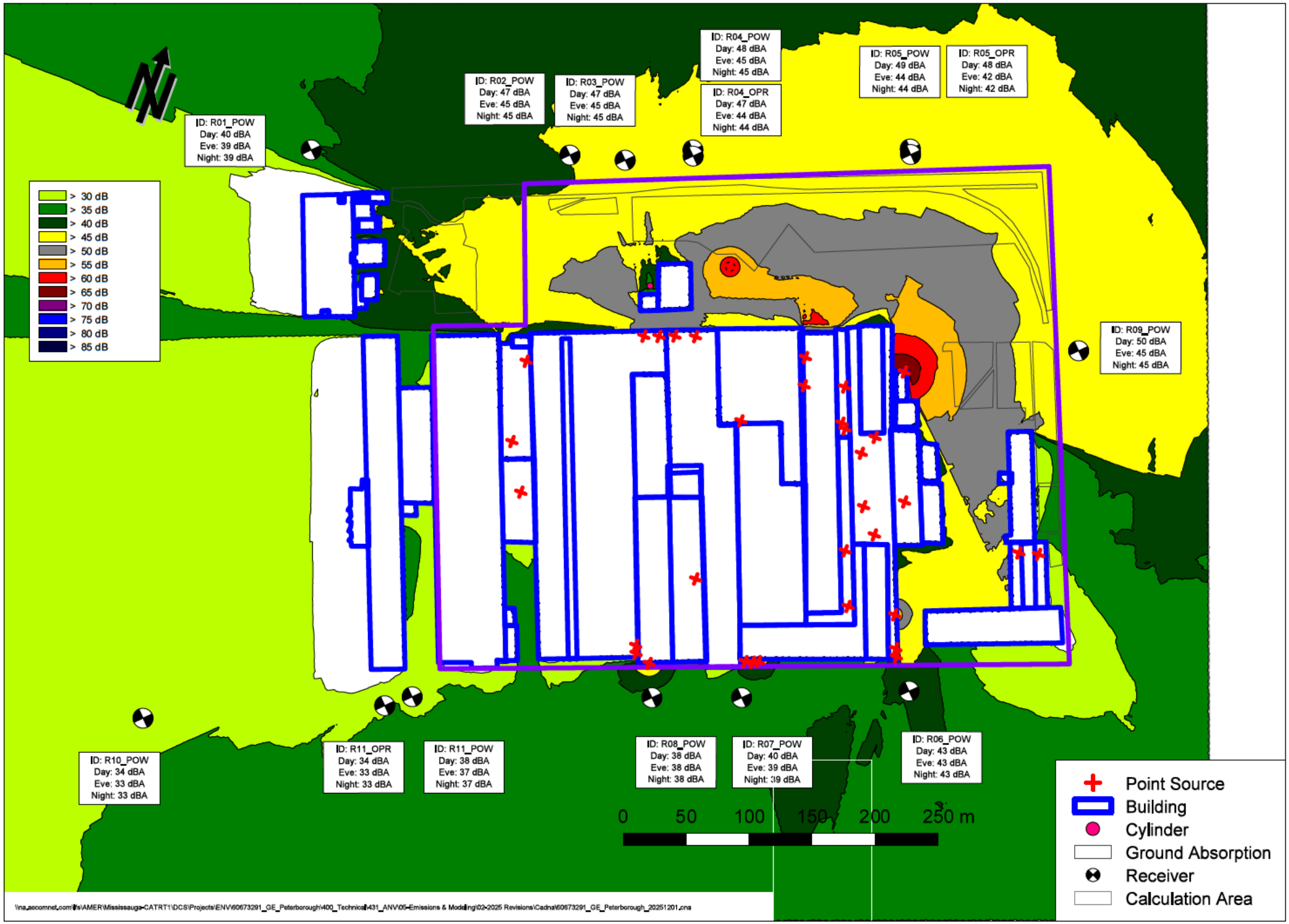
(15) The character of the noise source (S) – Steady, (T) – Tonal, (C) - Cyclic, (I) – Impulsive, (Q) – Quasi-Steady Impulsive.

(16) Indicates whether measurement was used in CadnaA model (0) – NO, (1) – YES.

Appendix D

Noise Contours and Noise Model Sample Calculations

Scenario 1 Daytime - 1.5 m Height



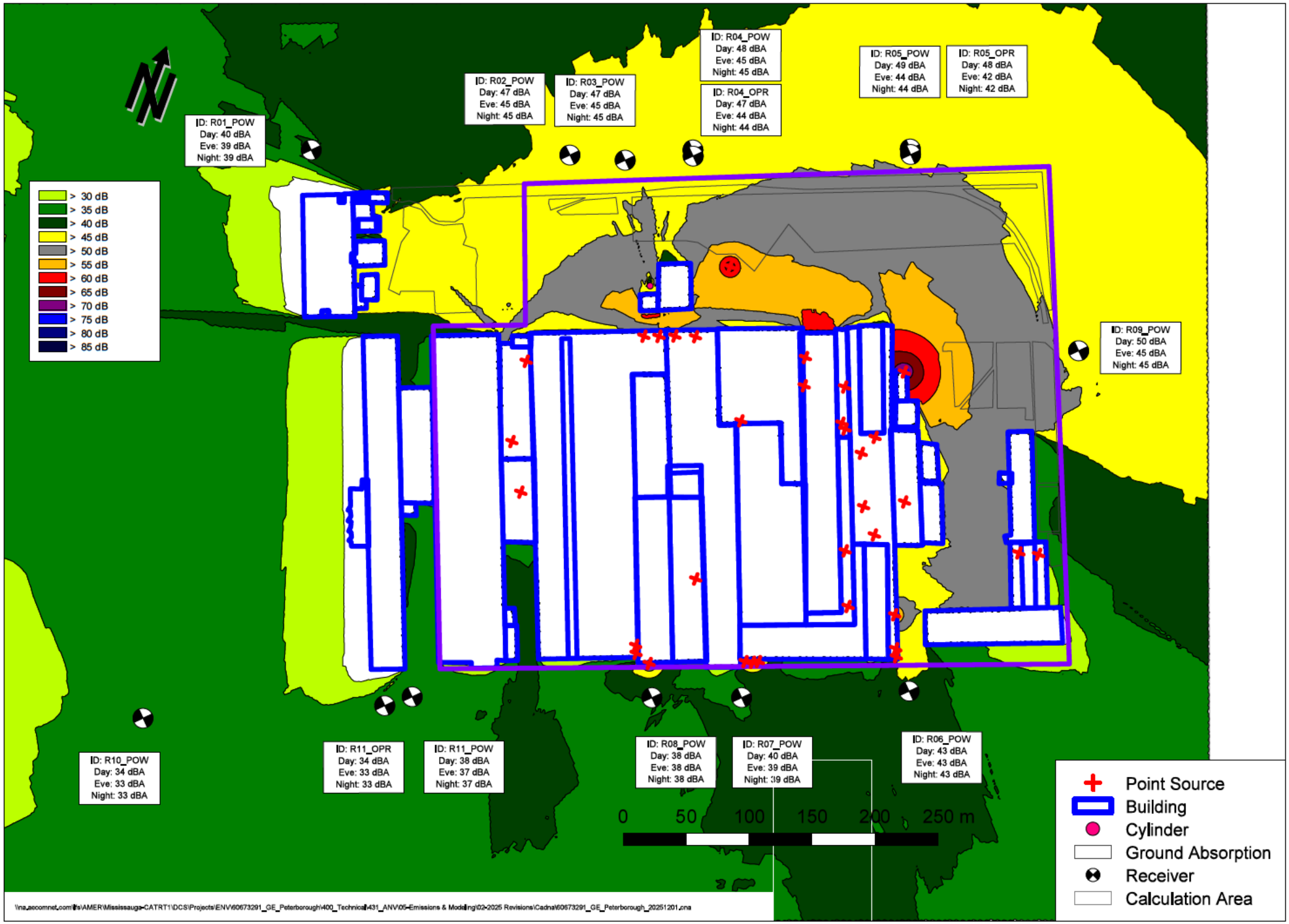
Scenario 1 Evening - 1.5 m Height



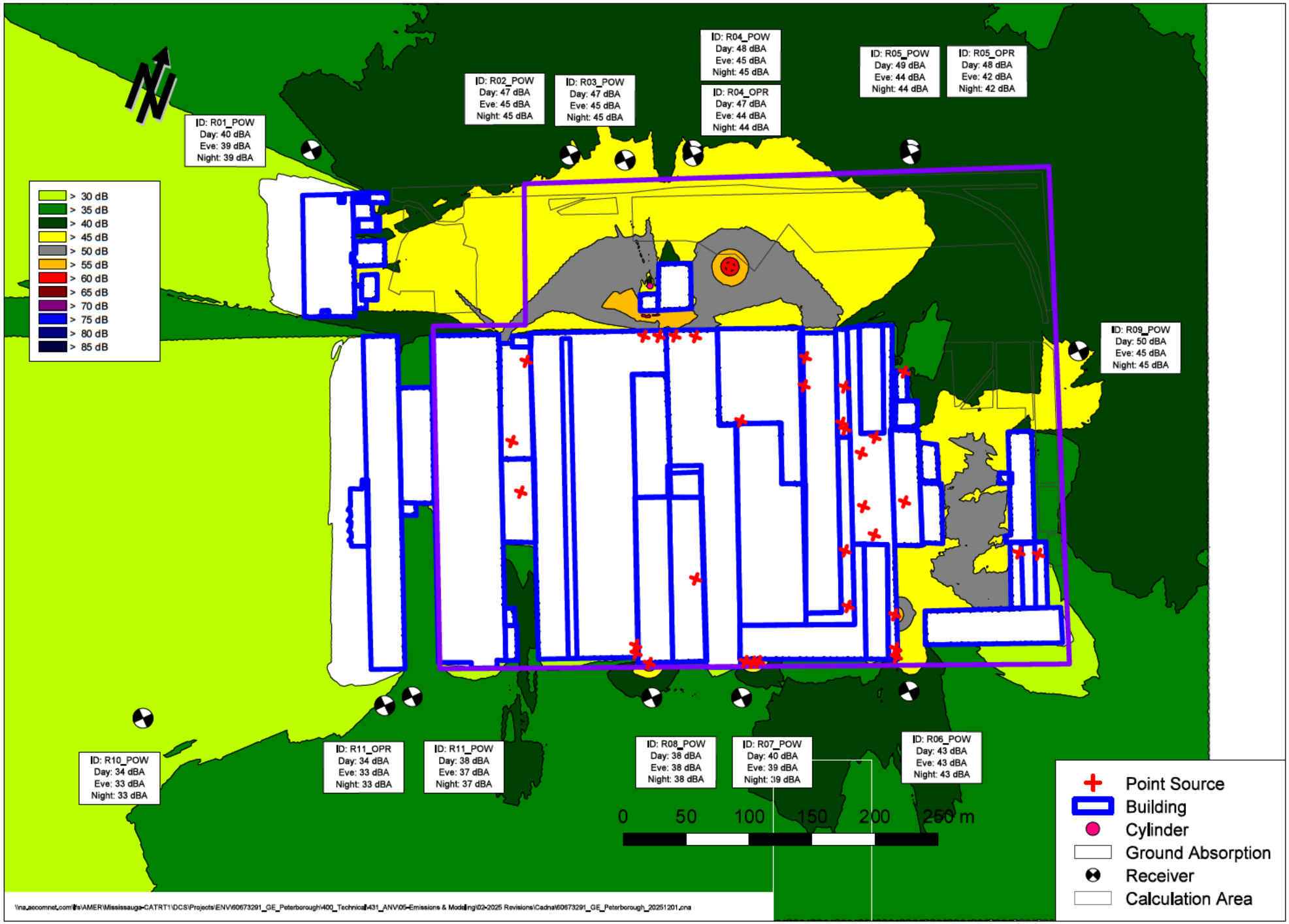
Scenario 1 Nighttime - 1.5 m Height



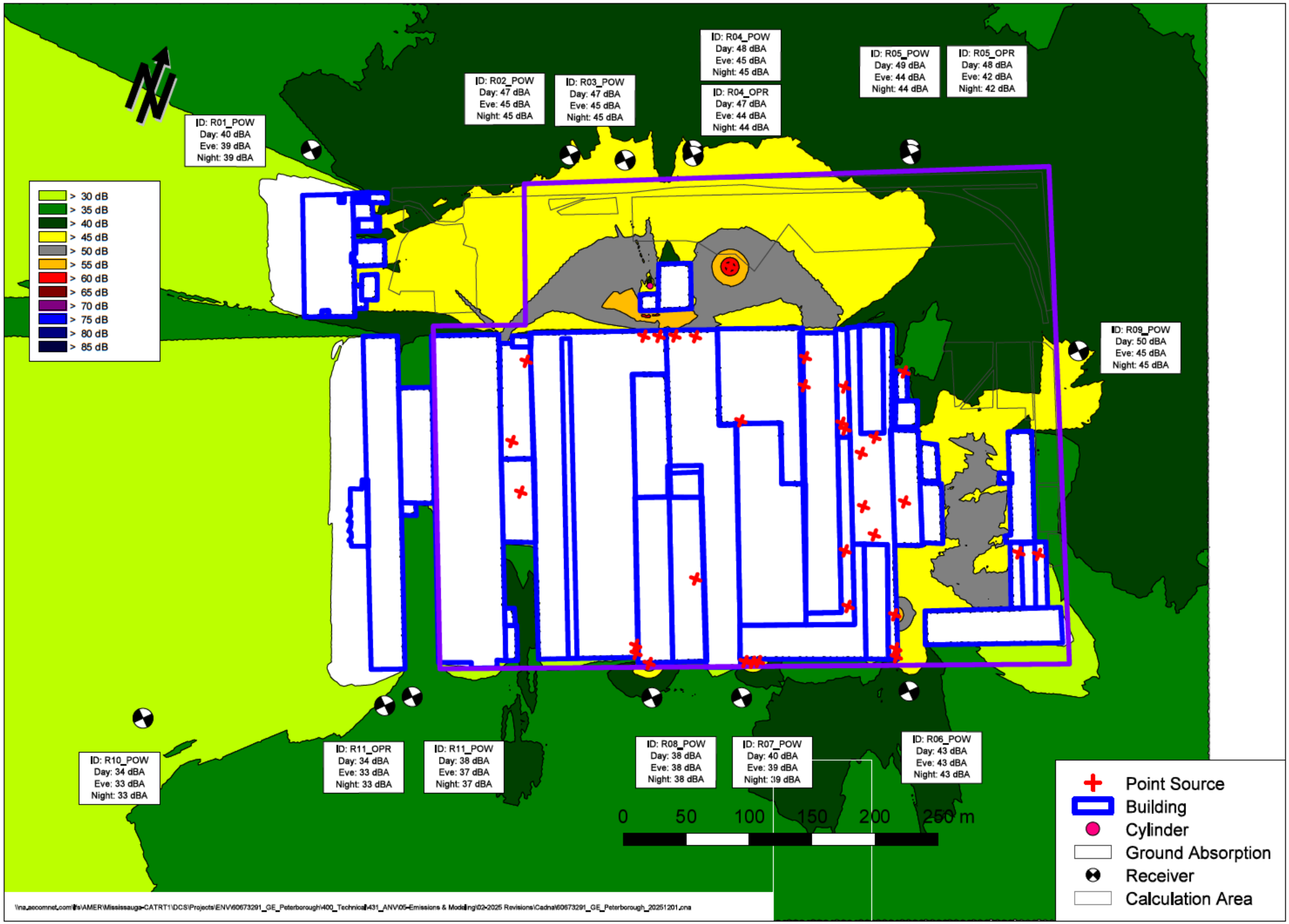
Scenario 1 Daytime - 4.5 m Height



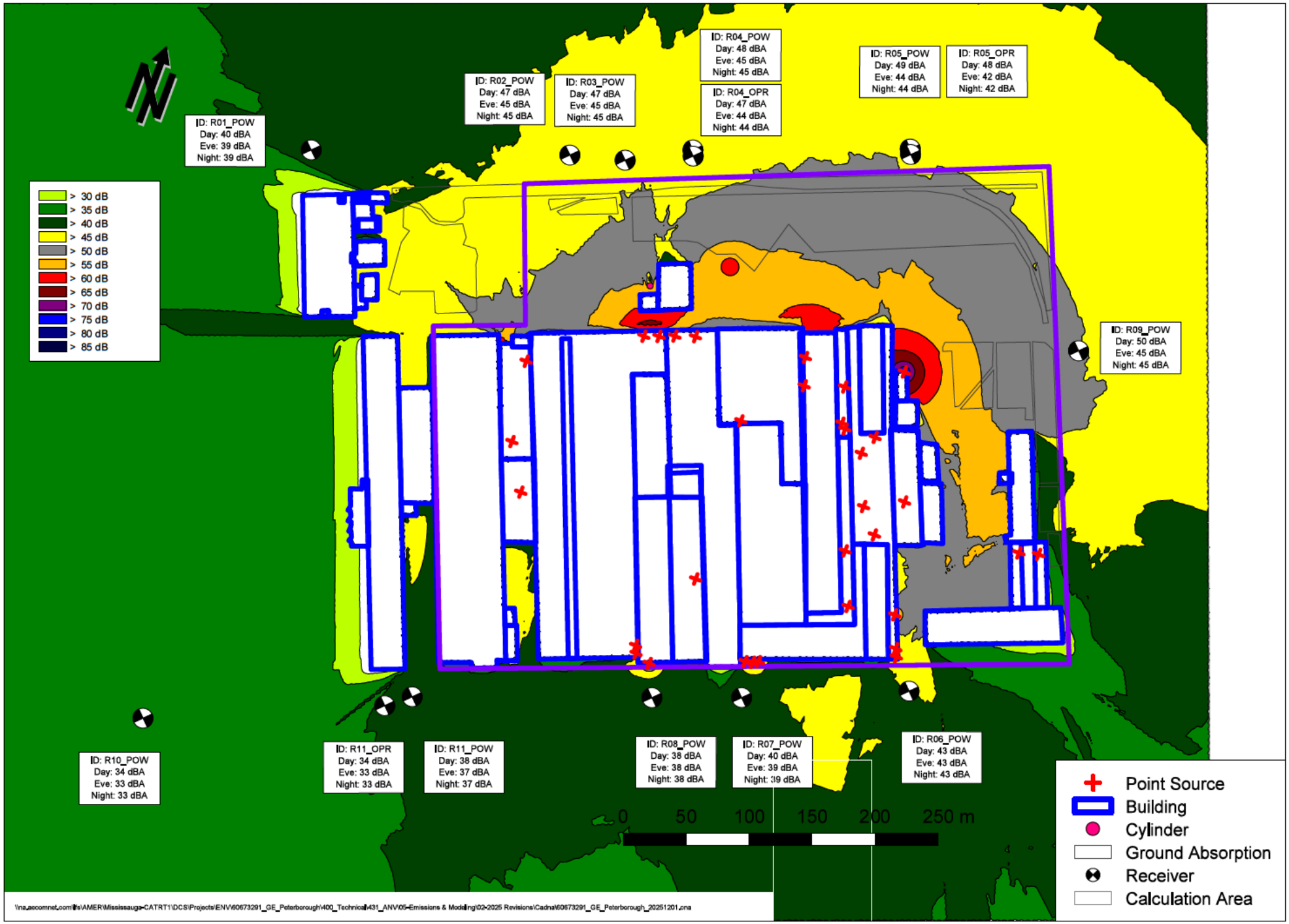
Scenario 1 Evening - 4.5 m Height



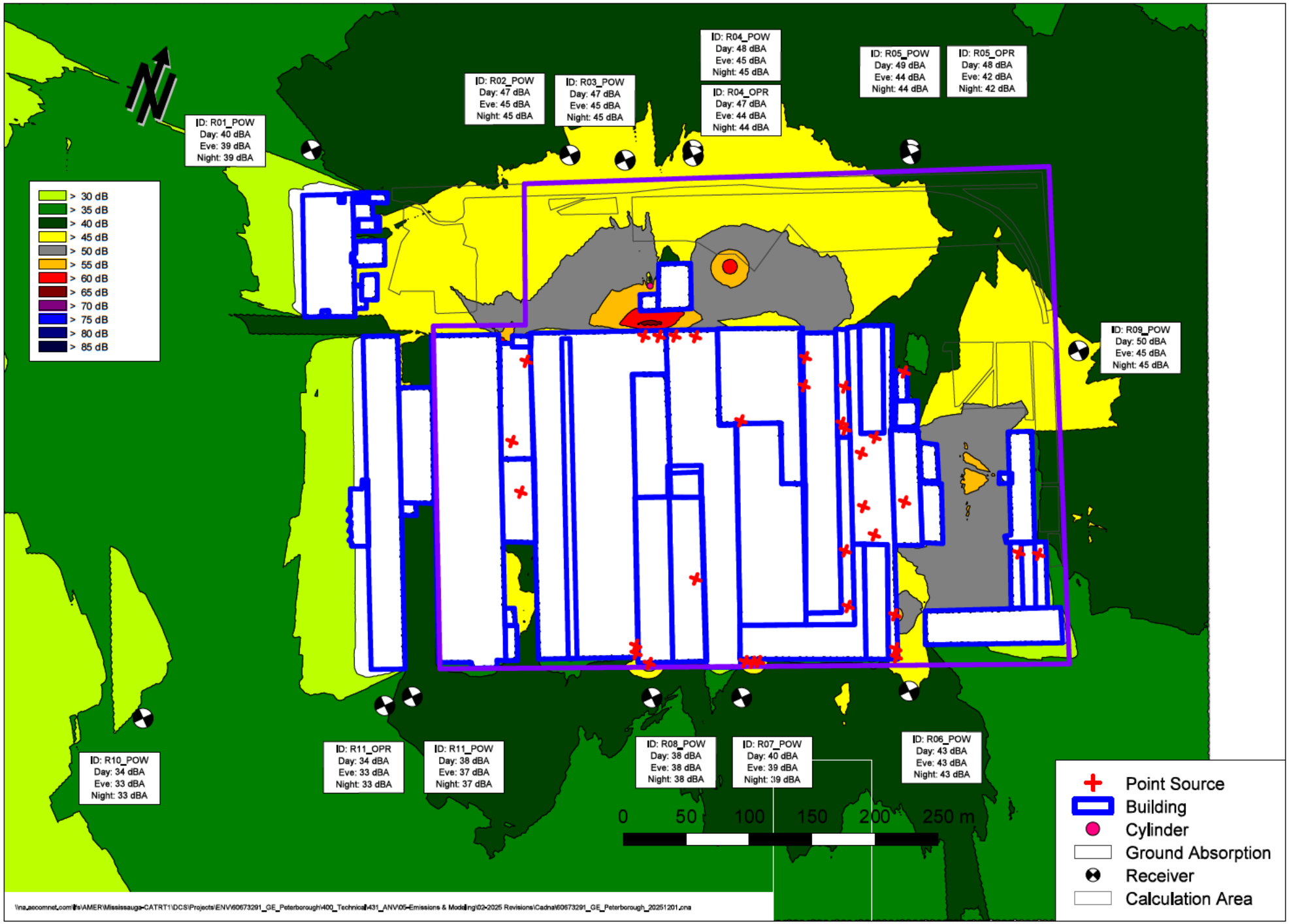
Scenario 1 Nighttime - 4.5 m Height



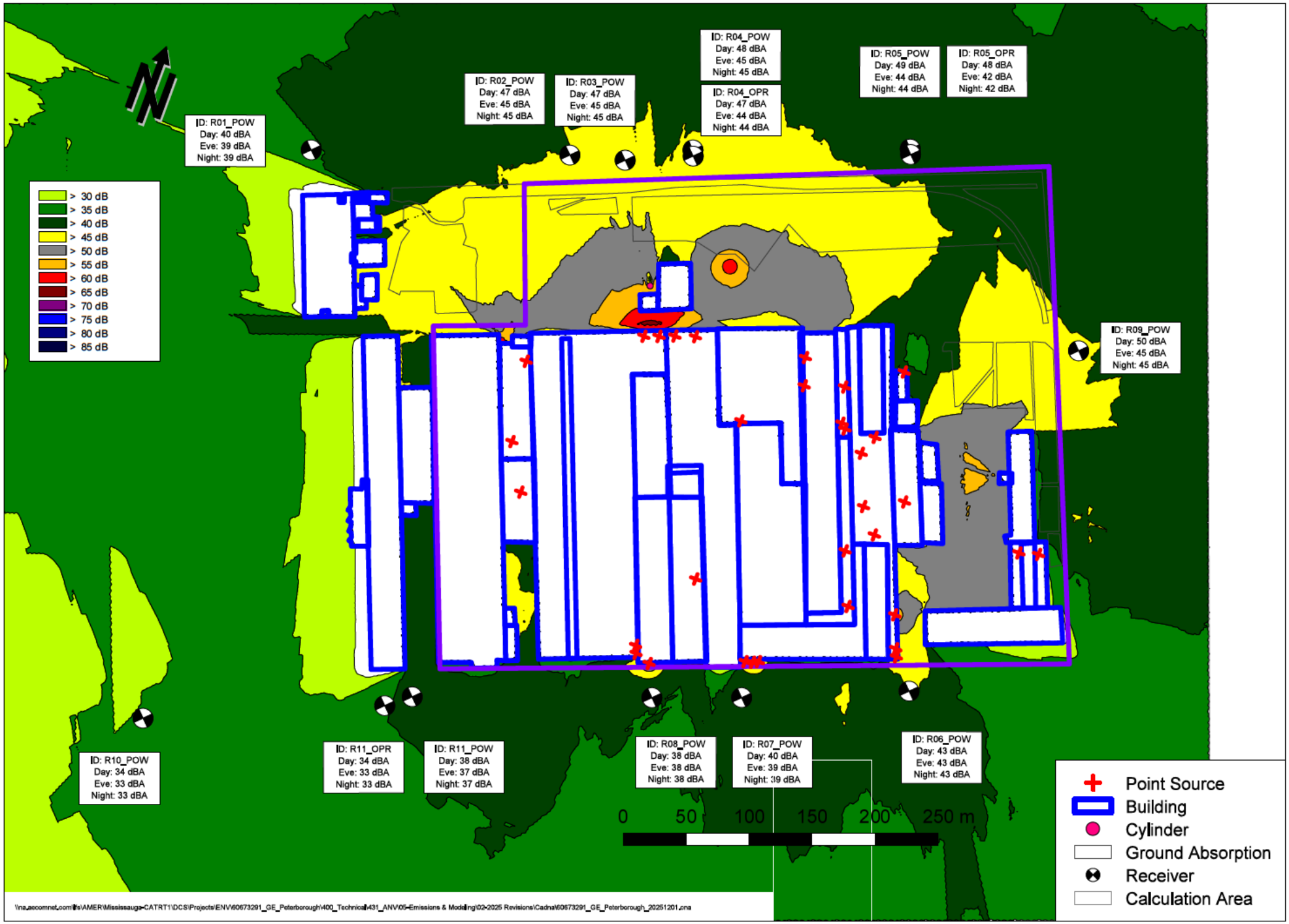
Scenario 1 Daytime - 7.5 m Height



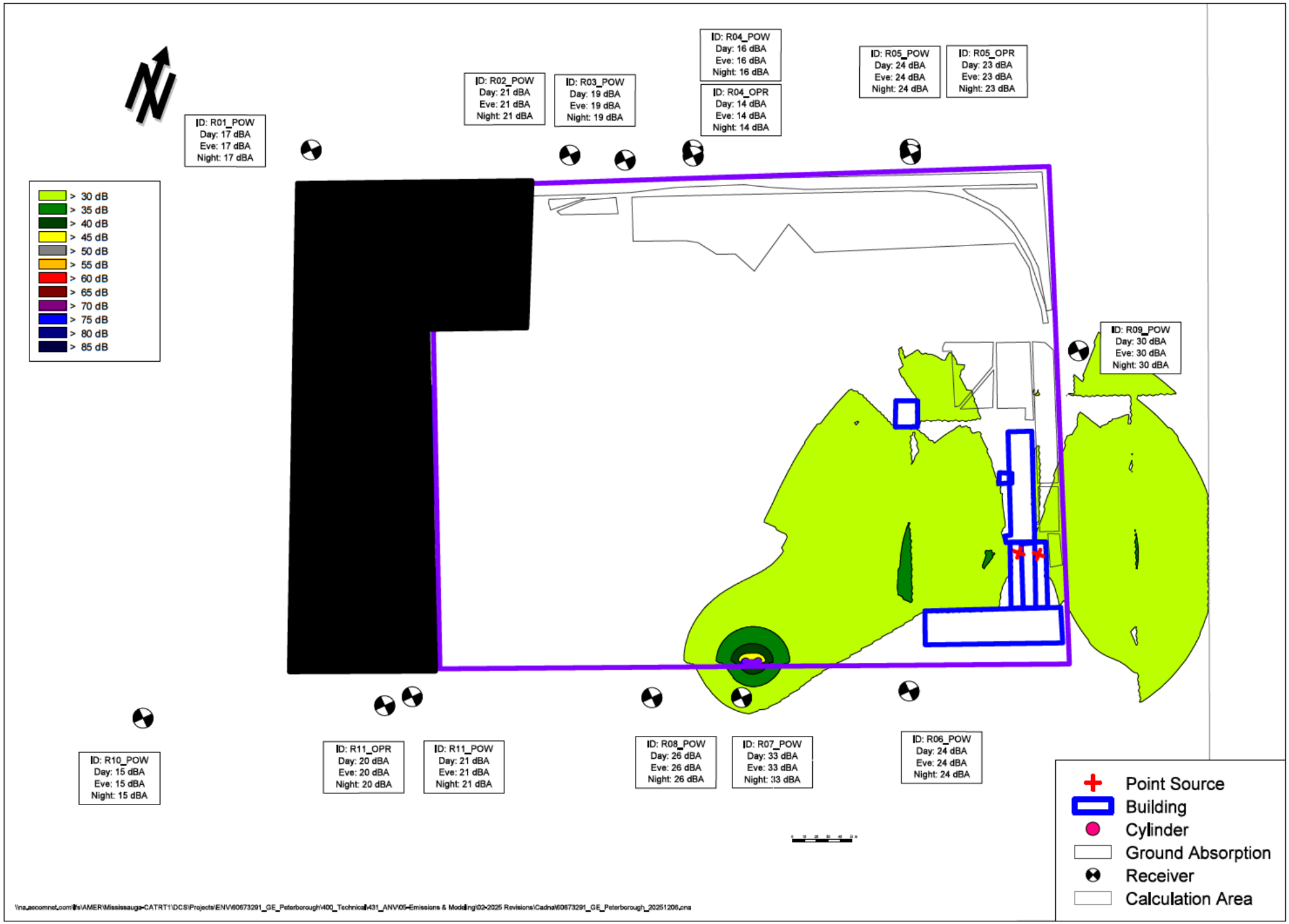
Scenario 1 Evening - 7.5 m Height



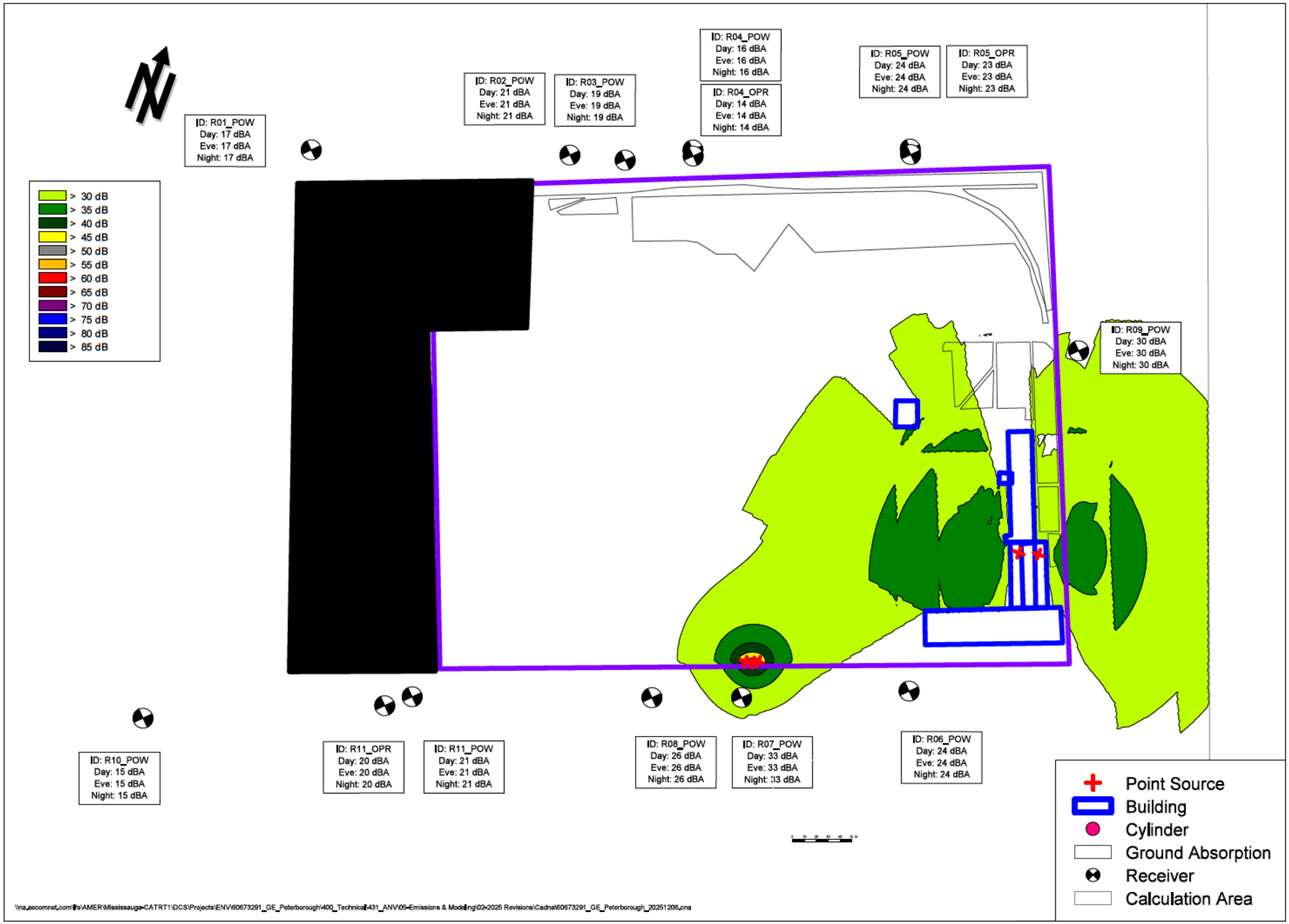
Scenario 1 Nighttime - 7.5 m Height



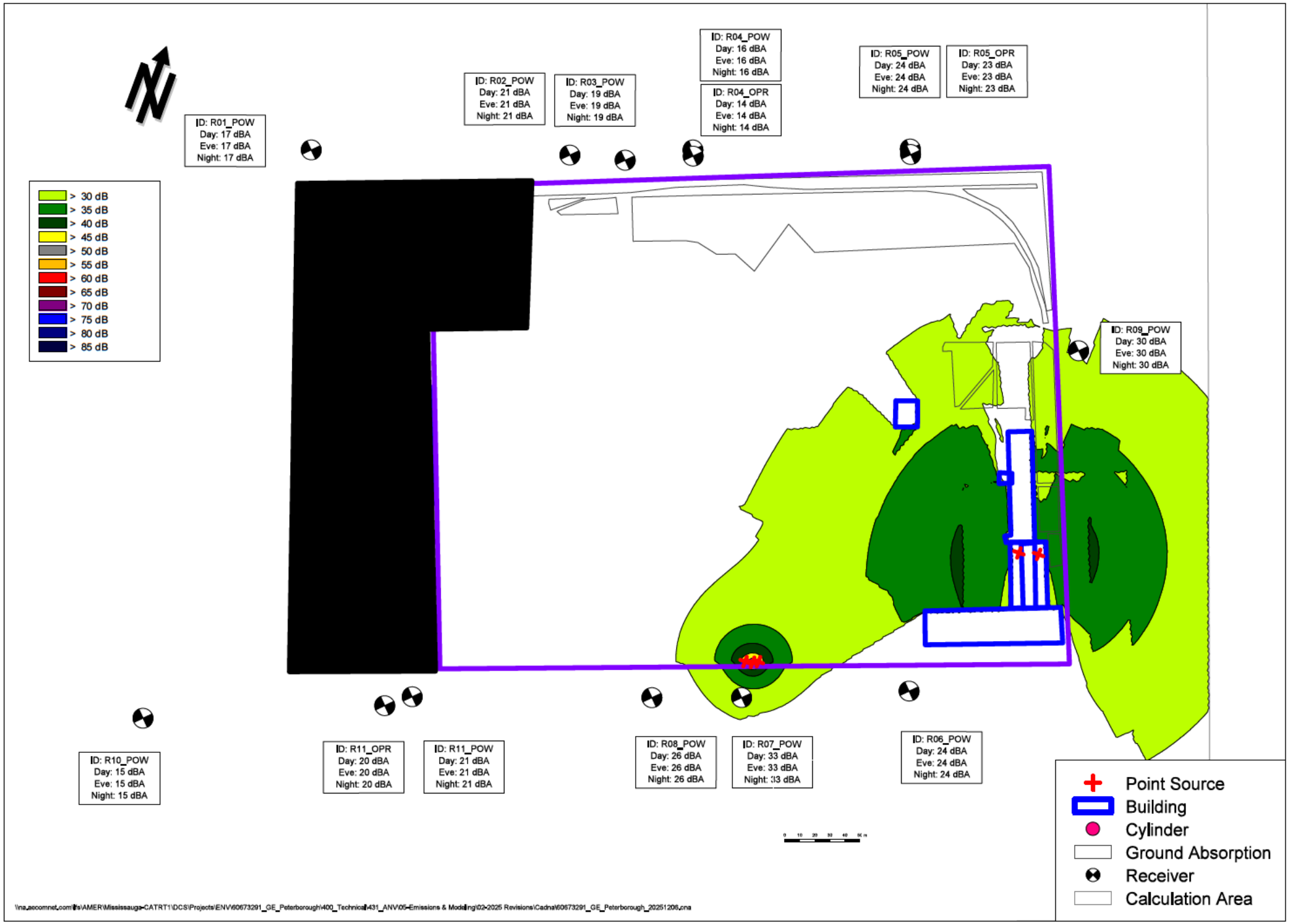
Scenario 2 Daytime, Evening, and Nighttime - 1.5 m Height



Scenario 2 Daytime, Evening, and Nighttime - 4.5 m Height



Scenario 2 Daytime, Evening, and Nighttime - 7.5 m Height



Configuration Settings

Configuration	
Parameter	Value
General	
Max. Error (dB)	0.00
Max. Search Radius (#(Unit,LEN))	2000.00
Min. Dist Src to Rcvr	0.00
Partition	
Raster Factor	0.50
Max. Length of Section (#(Unit,LEN))	1000.00
Min. Length of Section (#(Unit,LEN))	1.00
Min. Length of Section (%)	0.00
Proj. Line Sources	On
Proj. Area Sources	On
Ref. Time	
Reference Time Day (min)	60.00
Reference Time Night (min)	60.00
Daytime Penalty (dB)	0.00
Recr. Time Penalty (dB)	6.00
Night-time Penalty (dB)	10.00
DTM	
Standard Height (m)	0.00
Model of Terrain	Triangulation
Reflection	
max. Order of Reflection	1
Search Radius Src	100.00
Search Radius Rcvr	100.00
Max. Distance Source - Rcvr	1000.00 1000.00
Min. Distance Rvcr - Reflector	1.00 1.00
Min. Distance Source - Reflector	0.10
Industrial (ISO 9613)	
Lateral Diffraction	some Obj
Obst. within Area Src do not shield	Off
Screening	Excl. Ground Att. over Barrier
	Dz with limit (20/25)
Barrier Coefficients C1,2,3	3.0 20.0 0.0
Temperature (#(Unit,TEMP))	10

Configuration	
Parameter	Value
rel. Humidity (%)	70
Ground Absorption G	0.25
Wind Speed for Dir. (#(Unit,SPEED))	3.0
Roads (TNM)	
Railways (FTA/FRA)	
Aircraft (???)	
Strictly acc. to AzB	

Results Table

Receiver		Land Use	Limiting Value		rel. Axis			Lr w/o Noise Control		dL req.		Lr w/ Noise Control		Exceeding		passive NC
Name	ID		Day	Night	Station	Distance	Height	Day	Night	Day	Night	Day	Night	Day	Night	
			dB(A)	dB(A)	m	m	m	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
R01_POW	R01_POW		0	0				39.7	38.9	39.7	38.9	39.7	38.9	39.7	38.9	39.7
R02_POW	R02_POW		0	0				46.6	44.6	46.6	44.6	46.6	44.6	46.6	44.6	46.6
R03_POW	R03_POW		0	0				46.8	45.0	46.8	45.0	46.8	45.0	46.8	45.0	46.8
R04_POW	R04_POW		0	0				48.0	45.1	48.0	45.1	48.0	45.1	48.0	45.1	48.0
R04_OPR	R04_OPR		0	0				46.6	43.6	46.6	43.6	46.6	43.6	46.6	43.6	46.6
R05_POW	R05_POW		0	0				49.4	43.7	49.4	43.7	49.4	43.7	49.4	43.7	49.4
R05_OPR	R05_OPR		0	0				47.8	41.9	47.8	41.9	47.8	41.9	47.8	41.9	47.8
R06_POW	R06_POW		0	0				43.4	43.1	43.4	43.1	43.4	43.1	43.4	43.1	43.4
R07_POW	R07_POW		0	0				39.9	39.4	39.9	39.4	39.9	39.4	39.9	39.4	39.9
R08_POW	R08_POW		0	0				38.5	38.4	38.5	38.4	38.5	38.4	38.5	38.4	38.5
R09_POW	R09_POW		0	0				50.2	45.4	50.2	45.4	50.2	45.4	50.2	45.4	50.2
R10_POW	R10_POW		0	0				34.4	33.0	34.4	33.0	34.4	33.0	34.4	33.0	34.4
R11_POW	R11_POW		0	0				37.7	36.7	37.7	36.7	37.7	36.7	37.7	36.7	37.7
R11_OPR	R11_OPR		0	0				34.3	33.2	34.3	33.2	34.3	33.2	34.3	33.2	34.3

Point Sources

Name	Sel.	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
				Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
				(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)				(m)	(m)	(m)
		~	[redacted]	99.3	99.3	99.3	Lw	[redacted]		0.0	0.0	0.0				60.00	0.00	0.00	0.0		(none)	19.50	r	713060.08	4908247.06	19.50
		~		92.3	92.3	92.3	Lw			0.0	0.0	0.0							0.0		(none)	21.00	r	713066.36	4908227.18	21.00
		~		88.5	88.5	88.5	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	713094.51	4908236.59	10.50
		~		89.0	89.0	89.0	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	713136.16	4908123.54	10.50
		~		89.0	89.0	89.0	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	713152.05	4908085.82	10.50
		~		80.3	80.3	80.3	Lw			0.0	0.0	0.0							0.0		(none)	18.00	r	713039.91	4908066.41	18.00
		~		95.7	95.7	95.7	Lw			0.0	0.0	0.0							0.0		(none)	10.70	r	713031.30	4908187.08	10.70
		-		77.5	77.5	77.5	Lw			0.0	0.0	0.0							3.0		(none)	3.50	r	713091.79	4908020.48	3.50
		~		72.2	72.2	72.2	Lw			0.0	0.0	0.0							0.0		(none)	6.50	r	713029.01	4907996.41	6.50
		~		92.5	92.5	92.5	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	712943.14	4908221.24	9.50
		~		92.5	92.5	92.5	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	712953.49	4908224.99	9.50
		~		88.2	88.2	88.2	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	712964.48	4908229.05	16.50
		~		88.2	88.2	88.2	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	712978.91	4908233.81	16.50
		~		71.3	71.3	71.3	Lw			0.0	0.0	0.0							0.0		(none)	12.00	r	713015.13	4908005.44	12.00
		~		66.1	66.1	66.1	Lw			0.0	0.0	0.0							0.0		(none)	11.00	r	713017.41	4908000.15	11.00
		~		81.3	81.3	81.3	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	713256.61	4908165.80	14.00
		~		81.3	81.3	81.3	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	713270.62	4908169.55	14.00
		~		88.5	88.5	88.5	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	712897.32	4908082.53	9.50
		~		88.4	88.4	88.4	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	712878.35	4908115.19	6.50
		~		94.4	94.4	94.4	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	712868.07	4908174.36	6.50
		~		79.4	79.4	79.4	Lw			0.0	0.0	0.0							0.0		(none)	4.30	r	713186.32	4908091.70	4.30
		~		72.2	72.2	72.2	Lw			0.0	0.0	0.0							0.0		(none)	15.50	r	713198.14	4908063.03	15.50
		~		72.2	72.2	72.2	Lw			0.0	0.0	0.0							0.0		(none)	15.50	r	713195.59	4908068.69	15.50

Name	Sel.	M.	ID	Result. PWL			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Height		Coordinates		
				Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night						X	Y	Z
				(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)		(m)		(m)	(m)	(m)
		~	[redacted]	96.3	96.3	96.3	Lw	[redacted]		0.0	0.0	0.0				60.00	0.00	0.00	0.0		(none)	9.00	r	713131.90	4908262.00	9.00
		~		85.6	85.6	85.6	Lw			0.0	0.0	0.0							0.0		(none)	10.50	r	713164.91	4908172.24	10.50
		~		87.8	87.8	87.8	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	713122.70	4908195.02	11.00
		~		87.8	87.8	87.8	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	713137.67	4908158.72	11.00
		~		95.8	95.8	95.8	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	713128.23	4908209.37	11.00
		~		95.8	95.8	95.8	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	713152.33	4908141.81	11.00
		~		75.9	75.9	75.9	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	713101.69	4908210.94	10.50
		~		75.9	75.9	75.9	Lw			0.0	0.0	0.0							0.0		(none)	1.00	g	713105.39	4908207.66	10.50
		~		85.1	85.1	85.1	Lw			0.0	0.0	0.0							0.0		(none)	3.00	r	712984.97	4908290.99	3.00
[redacted]				63.7	63.7	63.7	Lw			0.0	0.0	0.0			silencer				3.0		(none)	2.30	r	713104.03	4908025.47	2.30
				63.8	63.8	63.8	Lw			0.0	0.0	0.0			silencer				3.0		(none)	2.30	r	713113.34	4908028.85	2.30
				65.0	65.0	65.0	Lw			0.0	0.0	0.0							3.0		(none)	0.90	g	713109.44	4908027.00	0.90

Line Source Table

Name	Sel.	M.	ID	Result. PWL			Result. PWL'			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.	Moving Pt. Src			
				Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night				Number			Speed
				(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)		Day	Evening	Night	(km/h)

Vertical Area Source Table

Name	Sel.	M.	ID	Result. PWL			Result. PWL"			Lw / Li			Correction			Sound Reduction		Attenuation	Operating Time			K0	Freq.	Direct.
				Day	Evening	Night	Day	Evening	Night	Type	Value	norm.	Day	Evening	Night	R	Area		Day	Special	Night			
				(dBA)	(dBA)	(dBA)	(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)	dB(A)		(m²)		(min)	(min)	(min)	(dB)	(Hz)	

Receiver
Name: R01_POW
ID: R01_POW
X: 712666.21 m
Y: 4908266.51 m
Z: 1.50 m

Point Source, ISO 9613, Name: "", ID: "src_ge_B20A_MAU1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
416	712868.07	4908174.36	6.50	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	57.9	0.0	-3.0	0.0	0.0	8.5	0.0	0.0	-102.8
416	712868.07	4908174.36	6.50	0	DEN	63	71.8	0.0	0.0	0.0	0.0	57.9	0.0	-3.0	0.0	0.0	10.5	0.0	0.0	6.3
416	712868.07	4908174.36	6.50	0	DEN	125	81.9	0.0	0.0	0.0	0.0	57.9	0.1	-0.9	0.0	0.0	13.1	0.0	0.0	11.7
416	712868.07	4908174.36	6.50	0	DEN	250	90.4	0.0	0.0	0.0	0.0	57.9	0.2	-0.3	0.0	0.0	16.4	0.0	0.0	16.1
416	712868.07	4908174.36	6.50	0	DEN	500	88.8	0.0	0.0	0.0	0.0	57.9	0.4	-0.8	0.0	0.0	20.7	0.0	0.0	10.6
416	712868.07	4908174.36	6.50	0	DEN	1000	87.0	0.0	0.0	0.0	0.0	57.9	0.8	-1.9	0.0	0.0	25.0	0.0	0.0	5.1
416	712868.07	4908174.36	6.50	0	DEN	2000	82.2	0.0	0.0	0.0	0.0	57.9	2.1	-2.1	0.0	0.0	25.0	0.0	0.0	-0.8
416	712868.07	4908174.36	6.50	0	DEN	4000	78.0	0.0	0.0	0.0	0.0	57.9	7.3	-2.1	0.0	0.0	25.0	0.0	0.0	-10.2
416	712868.07	4908174.36	6.50	0	DEN	8000	70.9	0.0	0.0	0.0	0.0	57.9	25.9	-2.1	0.0	0.0	25.0	0.0	0.0	-35.9
418	712868.07	4908174.36	6.50	1	DEN	63	71.8	0.0	0.0	0.0	0.0	58.1	0.0	-3.0	0.0	0.0	14.9	0.0	1.0	0.7
418	712868.07	4908174.36	6.50	1	DEN	125	81.9	0.0	0.0	0.0	0.0	58.1	0.1	-0.9	0.0	0.0	17.9	0.0	1.0	5.7
418	712868.07	4908174.36	6.50	1	DEN	250	90.4	0.0	0.0	0.0	0.0	58.1	0.2	-0.3	0.0	0.0	20.8	0.0	1.0	10.5
418	712868.07	4908174.36	6.50	1	DEN	500	88.8	0.0	0.0	0.0	0.0	58.1	0.4	-0.9	0.0	0.0	23.8	0.0	1.0	6.3
418	712868.07	4908174.36	6.50	1	DEN	1000	87.0	0.0	0.0	0.0	0.0	58.1	0.8	-1.9	0.0	0.0	25.0	0.0	1.0	4.0
418	712868.07	4908174.36	6.50	1	DEN	2000	82.2	0.0	0.0	0.0	0.0	58.1	2.2	-2.1	0.0	0.0	25.0	0.0	1.0	-2.0
418	712868.07	4908174.36	6.50	1	DEN	4000	78.0	0.0	0.0	0.0	0.0	58.1	7.4	-2.1	0.0	0.0	25.0	0.0	1.0	-11.5
418	712868.07	4908174.36	6.50	1	DEN	8000	70.9	0.0	0.0	0.0	0.0	58.1	26.5	-2.1	0.0	0.0	25.0	0.0	1.0	-37.6

Point Source, ISO 9613, Name: "", ID: "src_ge_B14_4"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
424	713031.30	4908187.08	10.70	0	DEN	32	-13.9	0.0	0.0	0.0	0.0	62.5	0.0	-3.1	0.0	0.0	6.1	0.0	0.0	-79.4
424	713031.30	4908187.08	10.70	0	DEN	63	48.7	0.0	0.0	0.0	0.0	62.5	0.0	-3.1	0.0	0.0	7.9	0.0	0.0	-18.6
424	713031.30	4908187.08	10.70	0	DEN	125	64.4	0.0	0.0	0.0	0.0	62.5	0.2	-1.6	0.0	0.0	10.5	0.0	0.0	-7.1
424	713031.30	4908187.08	10.70	0	DEN	250	83.4	0.0	0.0	0.0	0.0	62.5	0.4	-0.5	0.0	0.0	13.3	0.0	0.0	7.7
424	713031.30	4908187.08	10.70	0	DEN	500	93.9	0.0	0.0	0.0	0.0	62.5	0.7	-1.0	0.0	0.0	16.1	0.0	0.0	15.6
424	713031.30	4908187.08	10.70	0	DEN	1000	89.3	0.0	0.0	0.0	0.0	62.5	1.4	-2.0	0.0	0.0	19.0	0.0	0.0	8.5
424	713031.30	4908187.08	10.70	0	DEN	2000	82.0	0.0	0.0	0.0	0.0	62.5	3.6	-2.2	0.0	0.0	21.9	0.0	0.0	-3.8
424	713031.30	4908187.08	10.70	0	DEN	4000	71.3	0.0	0.0	0.0	0.0	62.5	12.2	-2.2	0.0	0.0	24.9	0.0	0.0	-26.1
424	713031.30	4908187.08	10.70	0	DEN	8000	56.6	0.0	0.0	0.0	0.0	62.5	43.7	-2.2	0.0	0.0	25.0	0.0	0.0	-72.3
426	713031.30	4908187.08	10.70	1	DEN	125	64.4	0.0	0.0	0.0	0.0	62.5	0.2	-1.7	0.0	0.0	13.5	0.0	1.0	-11.2
426	713031.30	4908187.08	10.70	1	DEN	250	83.4	0.0	0.0	0.0	0.0	62.5	0.4	-0.5	0.0	0.0	16.5	0.0	1.0	3.4
426	713031.30	4908187.08	10.70	1	DEN	500	93.9	0.0	0.0	0.0	0.0	62.5	0.7	-1.0	0.0	0.0	19.4	0.0	1.0	11.2
426	713031.30	4908187.08	10.70	1	DEN	1000	89.3	0.0	0.0	0.0	0.0	62.5	1.4	-2.1	0.0	0.0	22.4	0.0	1.0	4.1
426	713031.30	4908187.08	10.70	1	DEN	2000	82.0	0.0	0.0	0.0	0.0	62.5	3.6	-2.2	0.0	0.0	25.0	0.0	1.0	-7.9
426	713031.30	4908187.08	10.70	1	DEN	4000	71.3	0.0	0.0	0.0	0.0	62.5	12.4	-2.2	0.0	0.0	25.0	0.0	1.0	-27.4
426	713031.30	4908187.08	10.70	1	DEN	8000	56.6	0.0	0.0	0.0	0.0	62.5	44.1	-2.2	0.0	0.0	25.0	0.0	1.0	-73.8
428	713031.30	4908187.08	10.70	1	DEN	32	-13.9	0.0	0.0	0.0	0.0	62.5	0.0	-3.1	0.0	0.0	6.1	0.0	1.0	-80.5
428	713031.30	4908187.08	10.70	1	DEN	63	48.7	0.0	0.0	0.0	0.0	62.5	0.0	-3.1	0.0	0.0	7.9	0.0	1.0	-19.6
428	713031.30	4908187.08	10.70	1	DEN	125	64.4	0.0	0.0	0.0	0.0	62.5	0.2	-1.6	0.0	0.0	10.5	0.0	1.0	-8.1
428	713031.30	4908187.08	10.70	1	DEN	250	83.4	0.0	0.0	0.0	0.0	62.5	0.4	-0.5	0.0	0.0	13.3	0.0	1.0	6.7
428	713031.30	4908187.08	10.70	1	DEN	500	93.9	0.0	0.0	0.0	0.0	62.5	0.7	-1.0	0.0	0.0	16.1	0.0	1.0	14.6
428	713031.30	4908187.08	10.70	1	DEN	1000	89.3	0.0	0.0	0.0	0.0	62.5	1.4	-2.1	0.0	0.0	19.0	0.0	1.0	7.5
428	713031.30	4908187.08	10.70	1	DEN	2000	82.0	0.0	0.0	0.0	0.0	62.5	3.6	-2.2	0.0	0.0	21.9	0.0	1.0	-4.8
428	713031.30	4908187.08	10.70	1	DEN	4000	71.3	0.0	0.0	0.0	0.0	62.5	12.3	-2.2	0.0	0.0	24.9	0.0	1.0	-27.2
428	713031.30	4908187.08	10.70	1	DEN	8000	56.6	0.0	0.0	0.0	0.0	62.5	43.9	-2.2	0.0	0.0	25.0	0.0	1.0	-73.6
430	713031.30	4908187.08	10.70	1	DEN	125	64.4	0.0	0.0	0.0	0.0	63.3	0.2	-1.8	0.0	0.0	19.7	0.0	1.0	-18.0
430	713031.30	4908187.08	10.70	1	DEN	250	83.4	0.0	0.0	0.0	0.0	63.3	0.4	-0.7	0.0	0.0	22.7	0.0	1.0	-3.4
430	713031.30	4908187.08	10.70	1	DEN	500	93.9	0.0	0.0	0.0	0.0	63.3	0.8	-1.2	0.0	0.0	25.0	0.0	1.0	5.0
430	713031.30	4908187.08	10.70	1	DEN	1000	89.3	0.0	0.0	0.0	0.0	63.3	1.5	-2.2	0.0	0.0	25.0	0.0	1.0	0.7
430	713031.30	4908187.08	10.70	1	DEN	2000	82.0	0.0	0.0	0.0	0.0	63.3	4.0	-2.4	0.0	0.0	25.0	0.0	1.0	-8.9
430	713031.30	4908187.08	10.70	1	DEN	4000	71.3	0.0	0.0	0.0	0.0	63.3	13.5	-2.4	0.0	0.0	25.0	0.0	1.0	-29.1

Point Source, ISO 9613, Name: "", ID: "src_ge_B14_4"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
430	713031.30	4908187.08	10.70	1	DEN	8000	56.6	0.0	0.0	0.0	0.0	63.3	48.2	-2.4	0.0	0.0	25.0	0.0	1.0	-78.5

Point Source, ISO 9613, Name: "", ID: "src_ge_B16_HVAC1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
450	712943.14	4908221.24	9.50	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	60.0	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	-96.4
450	712943.14	4908221.24	9.50	0	DEN	63	-26.2	0.0	0.0	0.0	0.0	60.0	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	-83.2
450	712943.14	4908221.24	9.50	0	DEN	125	62.9	0.0	0.0	0.0	0.0	60.0	0.1	-1.7	0.0	0.0	0.0	0.0	0.0	4.5
450	712943.14	4908221.24	9.50	0	DEN	250	75.4	0.0	0.0	0.0	0.0	60.0	0.3	-0.4	0.0	0.0	0.0	0.0	0.0	15.6
450	712943.14	4908221.24	9.50	0	DEN	500	84.8	0.0	0.0	0.0	0.0	60.0	0.5	-0.9	0.0	0.0	0.0	0.0	0.0	25.2
450	712943.14	4908221.24	9.50	0	DEN	1000	89.0	0.0	0.0	0.0	0.0	60.0	1.0	-2.0	0.0	0.0	0.0	0.0	0.0	30.0
450	712943.14	4908221.24	9.50	0	DEN	2000	86.2	0.0	0.0	0.0	0.0	60.0	2.7	-2.2	0.0	0.0	0.0	0.0	0.0	25.7
450	712943.14	4908221.24	9.50	0	DEN	4000	83.0	0.0	0.0	0.0	0.0	60.0	9.2	-2.2	0.0	0.0	0.0	0.0	0.0	16.0
450	712943.14	4908221.24	9.50	0	DEN	8000	71.9	0.0	0.0	0.0	0.0	60.0	32.8	-2.2	0.0	0.0	0.0	0.0	0.0	-18.7

Point Source, ISO 9613, Name: "", ID: "src_ge_B16_HVAC2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
452	712953.49	4908224.99	9.50	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	60.3	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	-96.7
452	712953.49	4908224.99	9.50	0	DEN	63	-26.2	0.0	0.0	0.0	0.0	60.3	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	-83.5
452	712953.49	4908224.99	9.50	0	DEN	125	62.9	0.0	0.0	0.0	0.0	60.3	0.1	-1.7	0.0	0.0	0.0	0.0	0.0	4.2
452	712953.49	4908224.99	9.50	0	DEN	250	75.4	0.0	0.0	0.0	0.0	60.3	0.3	-0.4	0.0	0.0	0.0	0.0	0.0	15.2
452	712953.49	4908224.99	9.50	0	DEN	500	84.8	0.0	0.0	0.0	0.0	60.3	0.6	-0.9	0.0	0.0	0.0	0.0	0.0	24.9
452	712953.49	4908224.99	9.50	0	DEN	1000	89.0	0.0	0.0	0.0	0.0	60.3	1.1	-2.0	0.0	0.0	0.0	0.0	0.0	29.7
452	712953.49	4908224.99	9.50	0	DEN	2000	86.2	0.0	0.0	0.0	0.0	60.3	2.8	-2.2	0.0	0.0	0.0	0.0	0.0	25.3
452	712953.49	4908224.99	9.50	0	DEN	4000	83.0	0.0	0.0	0.0	0.0	60.3	9.5	-2.2	0.0	0.0	0.0	0.0	0.0	15.4
452	712953.49	4908224.99	9.50	0	DEN	8000	71.9	0.0	0.0	0.0	0.0	60.3	33.9	-2.2	0.0	0.0	0.0	0.0	0.0	-20.1
461	712953.49	4908224.99	9.50	1	DEN	32	-39.4	0.0	0.0	0.0	0.0	60.5	0.0	-3.0	0.0	0.0	0.0	0.0	1.0	-97.9
461	712953.49	4908224.99	9.50	1	DEN	63	-26.2	0.0	0.0	0.0	0.0	60.5	0.0	-3.0	0.0	0.0	0.0	0.0	1.0	-84.8
461	712953.49	4908224.99	9.50	1	DEN	125	62.9	0.0	0.0	0.0	0.0	60.5	0.1	-1.6	0.0	0.0	0.0	0.0	1.0	2.9
461	712953.49	4908224.99	9.50	1	DEN	250	75.4	0.0	0.0	0.0	0.0	60.5	0.3	-0.4	0.0	0.0	0.0	0.0	1.0	13.9
461	712953.49	4908224.99	9.50	1	DEN	500	84.8	0.0	0.0	0.0	0.0	60.5	0.6	-0.9	0.0	0.0	0.0	0.0	1.0	23.6
461	712953.49	4908224.99	9.50	1	DEN	1000	89.0	0.0	0.0	0.0	0.0	60.5	1.1	-2.0	0.0	0.0	0.0	0.0	1.0	28.3
461	712953.49	4908224.99	9.50	1	DEN	2000	86.2	0.0	0.0	0.0	0.0	60.5	2.9	-2.1	0.0	0.0	0.0	0.0	1.0	23.9
461	712953.49	4908224.99	9.50	1	DEN	4000	83.0	0.0	0.0	0.0	0.0	60.5	9.8	-2.1	0.0	0.0	0.0	0.0	1.0	13.8
461	712953.49	4908224.99	9.50	1	DEN	8000	71.9	0.0	0.0	0.0	0.0	60.5	35.0	-2.1	0.0	0.0	0.0	0.0	1.0	-22.5

Point Source, ISO 9613, Name: "", ID: "src_ge_B8_upper_MAU1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
479	713128.23	4908209.37	11.00	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	64.4	0.0	-3.6	0.0	0.0	9.5	0.0	0.0	-109.7
479	713128.23	4908209.37	11.00	0	DEN	63	73.1	0.0	0.0	0.0	0.0	64.4	0.1	-3.6	0.0	0.0	12.1	0.0	0.0	0.2
479	713128.23	4908209.37	11.00	0	DEN	125	83.2	0.0	0.0	0.0	0.0	64.4	0.2	-1.8	0.0	0.0	14.8	0.0	0.0	5.7
479	713128.23	4908209.37	11.00	0	DEN	250	91.7	0.0	0.0	0.0	0.0	64.4	0.5	-0.8	0.0	0.0	17.6	0.0	0.0	10.0
479	713128.23	4908209.37	11.00	0	DEN	500	90.1	0.0	0.0	0.0	0.0	64.4	0.9	-1.3	0.0	0.0	20.6	0.0	0.0	5.6
479	713128.23	4908209.37	11.00	0	DEN	1000	88.3	0.0	0.0	0.0	0.0	64.4	1.7	-2.4	0.0	0.0	23.5	0.0	0.0	1.1
479	713128.23	4908209.37	11.00	0	DEN	2000	83.5	0.0	0.0	0.0	0.0	64.4	4.5	-2.5	0.0	0.0	25.0	0.0	0.0	-7.8
479	713128.23	4908209.37	11.00	0	DEN	4000	79.3	0.0	0.0	0.0	0.0	64.4	15.3	-2.5	0.0	0.0	25.0	0.0	0.0	-22.7
479	713128.23	4908209.37	11.00	0	DEN	8000	72.2	0.0	0.0	0.0	0.0	64.4	54.4	-2.5	0.0	0.0	25.0	0.0	0.0	-69.0

Point Source, ISO 9613, Name: "", ID: "src_ge_B8_upper_MAU2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
483	713152.33	4908141.81	11.00	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	65.0	0.0	-3.8	0.0	0.0	5.4	0.0	0.0	-106.1
483	713152.33	4908141.81	11.00	0	DEN	63	73.1	0.0	0.0	0.0	0.0	65.0	0.1	-3.8	0.0	0.0	6.0	0.0	0.0	5.8
483	713152.33	4908141.81	11.00	0	DEN	125	83.2	0.0	0.0	0.0	0.0	65.0	0.2	-1.9	0.0	0.0	7.0	0.0	0.0	13.0
483	713152.33	4908141.81	11.00	0	DEN	250	91.7	0.0	0.0	0.0	0.0	65.0	0.5	-0.9	0.0	0.0	8.5	0.0	0.0	18.7
483	713152.33	4908141.81	11.00	0	DEN	500	90.1	0.0	0.0	0.0	0.0	65.0	1.0	-1.5	0.0	0.0	10.4	0.0	0.0	15.2
483	713152.33	4908141.81	11.00	0	DEN	1000	88.3	0.0	0.0	0.0	0.0	65.0	1.8	-2.5	0.0	0.0	12.8	0.0	0.0	11.2
483	713152.33	4908141.81	11.00	0	DEN	2000	83.5	0.0	0.0	0.0	0.0	65.0	4.9	-2.7	0.0	0.0	15.5	0.0	0.0	0.9
483	713152.33	4908141.81	11.00	0	DEN	4000	79.3	0.0	0.0	0.0	0.0	65.0	16.4	-2.7	0.0	0.0	18.3	0.0	0.0	-17.7
483	713152.33	4908141.81	11.00	0	DEN	8000	72.2	0.0	0.0	0.0	0.0	65.0	58.7	-2.7	0.0	0.0	21.2	0.0	0.0	-69.9

Point Source, ISO 9613, Name: "", ID: "src_ge_B10_1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
493	713060.08	4908247.06	19.50	0	D	32	57.0	0.0	0.0	0.0	0.0	62.9	0.0	-3.0	0.0	0.0	4.8	0.0	0.0	-7.7
493	713060.08	4908247.06	19.50	0	D	63	73.7	0.0	0.0	0.0	0.0	62.9	0.0	-3.0	0.0	0.0	4.8	0.0	0.0	9.0
493	713060.08	4908247.06	19.50	0	D	125	82.8	0.0	0.0	0.0	0.0	62.9	0.2	-1.6	0.0	0.0	4.8	0.0	0.0	16.5
493	713060.08	4908247.06	19.50	0	D	250	91.7	0.0	0.0	0.0	0.0	62.9	0.4	-0.4	0.0	0.0	4.8	0.0	0.0	24.0
493	713060.08	4908247.06	19.50	0	D	500	97.1	0.0	0.0	0.0	0.0	62.9	0.8	-0.9	0.0	0.0	4.8	0.0	0.0	29.6
493	713060.08	4908247.06	19.50	0	D	1000	91.3	0.0	0.0	0.0	0.0	62.9	1.4	-2.0	0.0	0.0	4.8	0.0	0.0	24.1
493	713060.08	4908247.06	19.50	0	D	2000	84.4	0.0	0.0	0.0	0.0	62.9	3.8	-2.2	0.0	0.0	4.8	0.0	0.0	15.0
493	713060.08	4908247.06	19.50	0	D	4000	71.4	0.0	0.0	0.0	0.0	62.9	12.9	-2.2	0.0	0.0	4.8	0.0	0.0	-7.1
493	713060.08	4908247.06	19.50	0	D	8000	56.8	0.0	0.0	0.0	0.0	62.9	46.1	-2.2	0.0	0.0	4.8	0.0	0.0	-54.9
493	713060.08	4908247.06	19.50	0	N	32	57.0	0.0	-188.0	0.0	0.0	62.9	0.0	-3.0	0.0	0.0	4.8	0.0	0.0	-195.7
493	713060.08	4908247.06	19.50	0	N	63	73.7	0.0	-188.0	0.0	0.0	62.9	0.0	-3.0	0.0	0.0	4.8	0.0	0.0	-179.0
493	713060.08	4908247.06	19.50	0	N	125	82.8	0.0	-188.0	0.0	0.0	62.9	0.2	-1.6	0.0	0.0	4.8	0.0	0.0	-171.5
493	713060.08	4908247.06	19.50	0	N	250	91.7	0.0	-188.0	0.0	0.0	62.9	0.4	-0.4	0.0	0.0	4.8	0.0	0.0	-164.0
493	713060.08	4908247.06	19.50	0	N	500	97.1	0.0	-188.0	0.0	0.0	62.9	0.8	-0.9	0.0	0.0	4.8	0.0	0.0	-158.4
493	713060.08	4908247.06	19.50	0	N	1000	91.3	0.0	-188.0	0.0	0.0	62.9	1.4	-2.0	0.0	0.0	4.8	0.0	0.0	-163.9
493	713060.08	4908247.06	19.50	0	N	2000	84.4	0.0	-188.0	0.0	0.0	62.9	3.8	-2.2	0.0	0.0	4.8	0.0	0.0	-173.0
493	713060.08	4908247.06	19.50	0	N	4000	71.4	0.0	-188.0	0.0	0.0	62.9	12.9	-2.2	0.0	0.0	4.8	0.0	0.0	-195.1
493	713060.08	4908247.06	19.50	0	N	8000	56.8	0.0	-188.0	0.0	0.0	62.9	46.1	-2.2	0.0	0.0	4.8	0.0	0.0	-242.9
493	713060.08	4908247.06	19.50	0	E	32	57.0	0.0	-188.0	0.0	0.0	62.9	0.0	-3.0	0.0	0.0	4.8	0.0	0.0	-195.7
493	713060.08	4908247.06	19.50	0	E	63	73.7	0.0	-188.0	0.0	0.0	62.9	0.0	-3.0	0.0	0.0	4.8	0.0	0.0	-179.0
493	713060.08	4908247.06	19.50	0	E	125	82.8	0.0	-188.0	0.0	0.0	62.9	0.2	-1.6	0.0	0.0	4.8	0.0	0.0	-171.5
493	713060.08	4908247.06	19.50	0	E	250	91.7	0.0	-188.0	0.0	0.0	62.9	0.4	-0.4	0.0	0.0	4.8	0.0	0.0	-164.0
493	713060.08	4908247.06	19.50	0	E	500	97.1	0.0	-188.0	0.0	0.0	62.9	0.8	-0.9	0.0	0.0	4.8	0.0	0.0	-158.4
493	713060.08	4908247.06	19.50	0	E	1000	91.3	0.0	-188.0	0.0	0.0	62.9	1.4	-2.0	0.0	0.0	4.8	0.0	0.0	-163.9
493	713060.08	4908247.06	19.50	0	E	2000	84.4	0.0	-188.0	0.0	0.0	62.9	3.8	-2.2	0.0	0.0	4.8	0.0	0.0	-173.0
493	713060.08	4908247.06	19.50	0	E	4000	71.4	0.0	-188.0	0.0	0.0	62.9	12.9	-2.2	0.0	0.0	4.8	0.0	0.0	-195.1
493	713060.08	4908247.06	19.50	0	E	8000	56.8	0.0	-188.0	0.0	0.0	62.9	46.1	-2.2	0.0	0.0	4.8	0.0	0.0	-242.9

Point Source, ISO 9613, Name: "", ID: "src_ge_B10_5"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
495	713066.36	4908227.18	21.00	0	DEN	32	-13.4	0.0	0.0	0.0	0.0	63.1	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	-73.5
495	713066.36	4908227.18	21.00	0	DEN	63	42.6	0.0	0.0	0.0	0.0	63.1	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	-17.5
495	713066.36	4908227.18	21.00	0	DEN	125	70.9	0.0	0.0	0.0	0.0	63.1	0.2	-1.6	0.0	0.0	0.0	0.0	0.0	9.2
495	713066.36	4908227.18	21.00	0	DEN	250	88.6	0.0	0.0	0.0	0.0	63.1	0.4	-0.4	0.0	0.0	0.0	0.0	0.0	25.5
495	713066.36	4908227.18	21.00	0	DEN	500	88.4	0.0	0.0	0.0	0.0	63.1	0.8	-0.9	0.0	0.0	0.0	0.0	0.0	25.4
495	713066.36	4908227.18	21.00	0	DEN	1000	83.5	0.0	0.0	0.0	0.0	63.1	1.5	-2.0	0.0	0.0	0.0	0.0	0.0	20.9
495	713066.36	4908227.18	21.00	0	DEN	2000	75.4	0.0	0.0	0.0	0.0	63.1	3.9	-2.2	0.0	0.0	0.0	0.0	0.0	10.6
495	713066.36	4908227.18	21.00	0	DEN	4000	61.8	0.0	0.0	0.0	0.0	63.1	13.2	-2.2	0.0	0.0	0.0	0.0	0.0	-12.3
495	713066.36	4908227.18	21.00	0	DEN	8000	46.2	0.0	0.0	0.0	0.0	63.1	47.1	-2.2	0.0	0.0	0.0	0.0	0.0	-61.8

Point Source, ISO 9613, Name: "", ID: "src_ge_B20a_HVAC1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
504	712878.35	4908115.19	6.50	0	DEN	32	-10.4	0.0	0.0	0.0	0.0	59.3	0.0	-3.2	0.0	0.0	11.6	0.0	0.0	-78.1
504	712878.35	4908115.19	6.50	0	DEN	63	50.8	0.0	0.0	0.0	0.0	59.3	0.0	-3.2	0.0	0.0	14.5	0.0	0.0	-19.8
504	712878.35	4908115.19	6.50	0	DEN	125	63.9	0.0	0.0	0.0	0.0	59.3	0.1	-1.4	0.0	0.0	17.4	0.0	0.0	-11.5
504	712878.35	4908115.19	6.50	0	DEN	250	78.4	0.0	0.0	0.0	0.0	59.3	0.3	-0.6	0.0	0.0	20.3	0.0	0.0	-0.9
504	712878.35	4908115.19	6.50	0	DEN	500	81.8	0.0	0.0	0.0	0.0	59.3	0.5	-1.1	0.0	0.0	23.2	0.0	0.0	-0.1
504	712878.35	4908115.19	6.50	0	DEN	1000	84.0	0.0	0.0	0.0	0.0	59.3	1.0	-2.2	0.0	0.0	25.0	0.0	0.0	0.9
504	712878.35	4908115.19	6.50	0	DEN	2000	82.2	0.0	0.0	0.0	0.0	59.3	2.5	-2.4	0.0	0.0	25.0	0.0	0.0	-2.3
504	712878.35	4908115.19	6.50	0	DEN	4000	76.0	0.0	0.0	0.0	0.0	59.3	8.5	-2.4	0.0	0.0	25.0	0.0	0.0	-14.5
504	712878.35	4908115.19	6.50	0	DEN	8000	69.9	0.0	0.0	0.0	0.0	59.3	30.5	-2.4	0.0	0.0	25.0	0.0	0.0	-42.5
506	712878.35	4908115.19	6.50	1	DEN	500	81.8	0.0	0.0	0.0	0.0	60.8	0.6	-1.3	0.0	0.0	23.5	0.0	1.0	-2.7
506	712878.35	4908115.19	6.50	1	DEN	1000	84.0	0.0	0.0	0.0	0.0	60.8	1.1	-2.4	0.0	0.0	25.0	0.0	1.0	-1.5
506	712878.35	4908115.19	6.50	1	DEN	2000	82.2	0.0	0.0	0.0	0.0	60.8	3.0	-2.6	0.0	0.0	25.0	0.0	1.0	-5.0
506	712878.35	4908115.19	6.50	1	DEN	4000	76.0	0.0	0.0	0.0	0.0	60.8	10.1	-2.6	0.0	0.0	25.0	0.0	1.0	-18.4
506	712878.35	4908115.19	6.50	1	DEN	8000	69.9	0.0	0.0	0.0	0.0	60.8	36.1	-2.6	0.0	0.0	25.0	0.0	1.0	-50.5
507	712878.35	4908115.19	6.50	1	DEN	250	78.4	0.0	0.0	0.0	0.0	59.9	0.3	-0.6	0.0	0.0	16.6	0.0	1.0	1.3
507	712878.35	4908115.19	6.50	1	DEN	500	81.8	0.0	0.0	0.0	0.0	59.9	0.5	-1.2	0.0	0.0	19.8	0.0	1.0	1.8
507	712878.35	4908115.19	6.50	1	DEN	1000	84.0	0.0	0.0	0.0	0.0	59.9	1.0	-2.3	0.0	0.0	22.8	0.0	1.0	1.5
507	712878.35	4908115.19	6.50	1	DEN	2000	82.2	0.0	0.0	0.0	0.0	59.9	2.7	-2.4	0.0	0.0	25.0	0.0	1.0	-3.9
507	712878.35	4908115.19	6.50	1	DEN	4000	76.0	0.0	0.0	0.0	0.0	59.9	9.1	-2.4	0.0	0.0	25.0	0.0	1.0	-16.6

Point Source, ISO 9613, Name: "", ID: "src_ge_B20a_HVAC1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
507	712878.35	4908115.19	6.50	1	DEN	8000	69.9	0.0	0.0	0.0	0.0	59.9	32.5	-2.4	0.0	0.0	25.0	0.0	1.0	-46.1
516	712878.35	4908115.19	6.50	1	DEN	250	78.4	0.0	0.0	0.0	0.0	60.0	0.3	-0.8	0.0	0.0	20.3	0.0	1.0	-2.5
516	712878.35	4908115.19	6.50	1	DEN	500	81.8	0.0	0.0	0.0	0.0	60.0	0.5	-1.3	0.0	0.0	23.3	0.0	1.0	-1.7
516	712878.35	4908115.19	6.50	1	DEN	1000	84.0	0.0	0.0	0.0	0.0	60.0	1.0	-2.4	0.0	0.0	25.0	0.0	1.0	-0.7
516	712878.35	4908115.19	6.50	1	DEN	2000	82.2	0.0	0.0	0.0	0.0	60.0	2.7	-2.6	0.0	0.0	25.0	0.0	1.0	-4.0
516	712878.35	4908115.19	6.50	1	DEN	4000	76.0	0.0	0.0	0.0	0.0	60.0	9.3	-2.6	0.0	0.0	25.0	0.0	1.0	-16.7
516	712878.35	4908115.19	6.50	1	DEN	8000	69.9	0.0	0.0	0.0	0.0	60.0	33.0	-2.6	0.0	0.0	25.0	0.0	1.0	-46.6

Point Source, ISO 9613, Name: "", ID: "src_ge_B20_Carpenter_HVAC1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
533	712897.32	4908082.53	9.50	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	60.4	0.0	-3.0	0.0	0.0	7.5	0.0	0.0	-104.3
533	712897.32	4908082.53	9.50	0	DEN	63	61.8	0.0	0.0	0.0	0.0	60.4	0.0	-3.0	0.0	0.0	9.4	0.0	0.0	-5.0
533	712897.32	4908082.53	9.50	0	DEN	125	74.9	0.0	0.0	0.0	0.0	60.4	0.1	-1.7	0.0	0.0	11.9	0.0	0.0	4.2
533	712897.32	4908082.53	9.50	0	DEN	250	80.9	0.0	0.0	0.0	0.0	60.4	0.3	-0.5	0.0	0.0	15.4	0.0	0.0	5.2
533	712897.32	4908082.53	9.50	0	DEN	500	83.3	0.0	0.0	0.0	0.0	60.4	0.6	-1.0	0.0	0.0	19.7	0.0	0.0	3.6
533	712897.32	4908082.53	9.50	0	DEN	1000	83.5	0.0	0.0	0.0	0.0	60.4	1.1	-2.1	0.0	0.0	23.7	0.0	0.0	0.4
533	712897.32	4908082.53	9.50	0	DEN	2000	79.2	0.0	0.0	0.0	0.0	60.4	2.9	-2.2	0.0	0.0	24.8	0.0	0.0	-6.6
533	712897.32	4908082.53	9.50	0	DEN	4000	75.0	0.0	0.0	0.0	0.0	60.4	9.7	-2.2	0.0	0.0	24.9	0.0	0.0	-17.8
533	712897.32	4908082.53	9.50	0	DEN	8000	67.9	0.0	0.0	0.0	0.0	60.4	34.5	-2.2	0.0	0.0	24.9	0.0	0.0	-49.8

Point Source, ISO 9613, Name: "", ID: "src_ge_B16_MAU1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
535	712964.48	4908229.05	16.50	0	DEN	32	-42.4	0.0	0.0	0.0	0.0	60.6	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	-100.0
535	712964.48	4908229.05	16.50	0	DEN	63	68.1	0.0	0.0	0.0	0.0	60.6	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	10.5
535	712964.48	4908229.05	16.50	0	DEN	125	76.2	0.0	0.0	0.0	0.0	60.6	0.1	-1.7	0.0	0.0	0.0	0.0	0.0	17.2
535	712964.48	4908229.05	16.50	0	DEN	250	84.7	0.0	0.0	0.0	0.0	60.6	0.3	-0.4	0.0	0.0	0.0	0.0	0.0	24.2
535	712964.48	4908229.05	16.50	0	DEN	500	83.1	0.0	0.0	0.0	0.0	60.6	0.6	-0.9	0.0	0.0	0.0	0.0	0.0	22.9
535	712964.48	4908229.05	16.50	0	DEN	1000	79.3	0.0	0.0	0.0	0.0	60.6	1.1	-2.0	0.0	0.0	0.0	0.0	0.0	19.6
535	712964.48	4908229.05	16.50	0	DEN	2000	73.5	0.0	0.0	0.0	0.0	60.6	2.9	-2.1	0.0	0.0	0.0	0.0	0.0	12.2
535	712964.48	4908229.05	16.50	0	DEN	4000	65.3	0.0	0.0	0.0	0.0	60.6	9.9	-2.1	0.0	0.0	0.0	0.0	0.0	-3.0
535	712964.48	4908229.05	16.50	0	DEN	8000	58.2	0.0	0.0	0.0	0.0	60.6	35.2	-2.1	0.0	0.0	0.0	0.0	0.0	-35.4

Point Source, ISO 9613, Name: "", ID: "src_ge_B16_MAU2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
537	712978.91	4908233.81	16.50	0	DEN	32	-42.4	0.0	0.0	0.0	0.0	61.0	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	-100.4
537	712978.91	4908233.81	16.50	0	DEN	63	68.1	0.0	0.0	0.0	0.0	61.0	0.0	-3.0	0.0	0.0	0.0	0.0	0.0	10.1
537	712978.91	4908233.81	16.50	0	DEN	125	76.2	0.0	0.0	0.0	0.0	61.0	0.1	-1.7	0.0	0.0	0.0	0.0	0.0	16.8
537	712978.91	4908233.81	16.50	0	DEN	250	84.7	0.0	0.0	0.0	0.0	61.0	0.3	-0.4	0.0	0.0	0.0	0.0	0.0	23.8
537	712978.91	4908233.81	16.50	0	DEN	500	83.1	0.0	0.0	0.0	0.0	61.0	0.6	-0.9	0.0	0.0	0.0	0.0	0.0	22.4
537	712978.91	4908233.81	16.50	0	DEN	1000	79.3	0.0	0.0	0.0	0.0	61.0	1.2	-2.0	0.0	0.0	0.0	0.0	0.0	19.2
537	712978.91	4908233.81	16.50	0	DEN	2000	73.5	0.0	0.0	0.0	0.0	61.0	3.0	-2.1	0.0	0.0	0.0	0.0	0.0	11.7
537	712978.91	4908233.81	16.50	0	DEN	4000	65.3	0.0	0.0	0.0	0.0	61.0	10.3	-2.1	0.0	0.0	0.0	0.0	0.0	-3.8
537	712978.91	4908233.81	16.50	0	DEN	8000	58.2	0.0	0.0	0.0	0.0	61.0	36.8	-2.1	0.0	0.0	0.0	0.0	0.0	-37.4

Point Source, ISO 9613, Name: "", ID: "src_ge_B8_1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
551	713131.90	4908262.00	9.00	0	D	32	59.4	0.0	0.0	0.0	0.0	64.4	0.0	-4.0	0.0	0.0	8.4	0.0	0.0	-9.4
551	713131.90	4908262.00	9.00	0	D	63	64.6	0.0	0.0	0.0	0.0	64.4	0.1	-4.0	0.0	0.0	11.0	0.0	0.0	-6.8
551	713131.90	4908262.00	9.00	0	D	125	76.4	0.0	0.0	0.0	0.0	64.4	0.2	-2.0	0.0	0.0	13.6	0.0	0.0	0.3
551	713131.90	4908262.00	9.00	0	D	250	90.6	0.0	0.0	0.0	0.0	64.4	0.5	-1.1	0.0	0.0	16.4	0.0	0.0	10.5
551	713131.90	4908262.00	9.00	0	D	500	89.5	0.0	0.0	0.0	0.0	64.4	0.9	-1.6	0.0	0.0	19.3	0.0	0.0	6.6
551	713131.90	4908262.00	9.00	0	D	1000	92.7	0.0	0.0	0.0	0.0	64.4	1.7	-2.7	0.0	0.0	22.2	0.0	0.0	7.1
551	713131.90	4908262.00	9.00	0	D	2000	83.9	0.0	0.0	0.0	0.0	64.4	4.5	-2.8	0.0	0.0	24.8	0.0	0.0	-6.9
551	713131.90	4908262.00	9.00	0	D	4000	78.1	0.0	0.0	0.0	0.0	64.4	15.3	-2.8	0.0	0.0	24.9	0.0	0.0	-23.6
551	713131.90	4908262.00	9.00	0	D	8000	69.5	0.0	0.0	0.0	0.0	64.4	54.4	-2.8	0.0	0.0	24.9	0.0	0.0	-71.4
551	713131.90	4908262.00	9.00	0	N	32	59.4	0.0	-188.0	0.0	0.0	64.4	0.0	-4.0	0.0	0.0	8.4	0.0	0.0	-197.4
551	713131.90	4908262.00	9.00	0	N	63	64.6	0.0	-188.0	0.0	0.0	64.4	0.1	-4.0	0.0	0.0	11.0	0.0	0.0	-194.8
551	713131.90	4908262.00	9.00	0	N	125	76.4	0.0	-188.0	0.0	0.0	64.4	0.2	-2.0	0.0	0.0	13.6	0.0	0.0	-187.7
551	713131.90	4908262.00	9.00	0	N	250	90.6	0.0	-188.0	0.0	0.0	64.4	0.5	-1.1	0.0	0.0	16.4	0.0	0.0	-177.5

Point Source, ISO 9613, Name: "", ID: "src_ge_B8_1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
551	713131.90	4908262.00	9.00	0	N	500	89.5	0.0	-188.0	0.0	0.0	64.4	0.9	-1.6	0.0	0.0	19.3	0.0	0.0	-181.4
551	713131.90	4908262.00	9.00	0	N	1000	92.7	0.0	-188.0	0.0	0.0	64.4	1.7	-2.7	0.0	0.0	22.2	0.0	0.0	-180.9
551	713131.90	4908262.00	9.00	0	N	2000	83.9	0.0	-188.0	0.0	0.0	64.4	4.5	-2.8	0.0	0.0	24.8	0.0	0.0	-194.9
551	713131.90	4908262.00	9.00	0	N	4000	78.1	0.0	-188.0	0.0	0.0	64.4	15.3	-2.8	0.0	0.0	24.9	0.0	0.0	-211.6
551	713131.90	4908262.00	9.00	0	N	8000	69.5	0.0	-188.0	0.0	0.0	64.4	54.4	-2.8	0.0	0.0	24.9	0.0	0.0	-259.4
551	713131.90	4908262.00	9.00	0	E	32	59.4	0.0	-188.0	0.0	0.0	64.4	0.0	-4.0	0.0	0.0	8.4	0.0	0.0	-197.4
551	713131.90	4908262.00	9.00	0	E	63	64.6	0.0	-188.0	0.0	0.0	64.4	0.1	-4.0	0.0	0.0	11.0	0.0	0.0	-194.8
551	713131.90	4908262.00	9.00	0	E	125	76.4	0.0	-188.0	0.0	0.0	64.4	0.2	-2.0	0.0	0.0	13.6	0.0	0.0	-187.7
551	713131.90	4908262.00	9.00	0	E	250	90.6	0.0	-188.0	0.0	0.0	64.4	0.5	-1.1	0.0	0.0	16.4	0.0	0.0	-177.5
551	713131.90	4908262.00	9.00	0	E	500	89.5	0.0	-188.0	0.0	0.0	64.4	0.9	-1.6	0.0	0.0	19.3	0.0	0.0	-181.4
551	713131.90	4908262.00	9.00	0	E	1000	92.7	0.0	-188.0	0.0	0.0	64.4	1.7	-2.7	0.0	0.0	22.2	0.0	0.0	-180.9
551	713131.90	4908262.00	9.00	0	E	2000	83.9	0.0	-188.0	0.0	0.0	64.4	4.5	-2.8	0.0	0.0	24.8	0.0	0.0	-194.9
551	713131.90	4908262.00	9.00	0	E	4000	78.1	0.0	-188.0	0.0	0.0	64.4	15.3	-2.8	0.0	0.0	24.9	0.0	0.0	-211.6
551	713131.90	4908262.00	9.00	0	E	8000	69.5	0.0	-188.0	0.0	0.0	64.4	54.4	-2.8	0.0	0.0	24.9	0.0	0.0	-259.4

Point Source, ISO 9613, Name: "", ID: "src_ge_B10a_HVAC1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
574	713094.51	4908236.59	10.50	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	63.7	0.0	-3.5	0.0	0.0	4.6	0.0	0.0	-104.2
574	713094.51	4908236.59	10.50	0	DEN	63	61.8	0.0	0.0	0.0	0.0	63.7	0.1	-3.5	0.0	0.0	5.1	0.0	0.0	-3.5
574	713094.51	4908236.59	10.50	0	DEN	125	74.9	0.0	0.0	0.0	0.0	63.7	0.2	-1.8	0.0	0.0	5.9	0.0	0.0	7.0
574	713094.51	4908236.59	10.50	0	DEN	250	80.9	0.0	0.0	0.0	0.0	63.7	0.4	-0.7	0.0	0.0	7.0	0.0	0.0	10.5
574	713094.51	4908236.59	10.50	0	DEN	500	83.3	0.0	0.0	0.0	0.0	63.7	0.8	-1.2	0.0	0.0	8.5	0.0	0.0	11.5
574	713094.51	4908236.59	10.50	0	DEN	1000	83.5	0.0	0.0	0.0	0.0	63.7	1.6	-2.3	0.0	0.0	10.6	0.0	0.0	10.0
574	713094.51	4908236.59	10.50	0	DEN	2000	79.2	0.0	0.0	0.0	0.0	63.7	4.2	-2.4	0.0	0.0	13.0	0.0	0.0	0.9
574	713094.51	4908236.59	10.50	0	DEN	4000	75.0	0.0	0.0	0.0	0.0	63.7	14.1	-2.4	0.0	0.0	15.6	0.0	0.0	-15.9
574	713094.51	4908236.59	10.50	0	DEN	8000	67.9	0.0	0.0	0.0	0.0	63.7	50.2	-2.4	0.0	0.0	18.5	0.0	0.0	-62.0
583	713094.51	4908236.59	10.50	1	DEN	63	61.8	0.0	0.0	0.0	0.0	64.1	0.1	-3.6	0.0	0.0	5.0	0.0	1.0	-4.7
583	713094.51	4908236.59	10.50	1	DEN	125	74.9	0.0	0.0	0.0	0.0	64.1	0.2	-1.8	0.0	0.0	5.3	0.0	1.0	6.2
583	713094.51	4908236.59	10.50	1	DEN	250	80.9	0.0	0.0	0.0	0.0	64.1	0.5	-0.8	0.0	0.0	5.9	0.0	1.0	10.2
583	713094.51	4908236.59	10.50	1	DEN	500	83.3	0.0	0.0	0.0	0.0	64.1	0.9	-1.3	0.0	0.0	7.0	0.0	1.0	11.6
583	713094.51	4908236.59	10.50	1	DEN	1000	83.5	0.0	0.0	0.0	0.0	64.1	1.6	-2.4	0.0	0.0	8.6	0.0	1.0	10.6
583	713094.51	4908236.59	10.50	1	DEN	2000	79.2	0.0	0.0	0.0	0.0	64.1	4.3	-2.5	0.0	0.0	10.6	0.0	1.0	1.7
583	713094.51	4908236.59	10.50	1	DEN	4000	75.0	0.0	0.0	0.0	0.0	64.1	14.7	-2.5	0.0	0.0	13.0	0.0	1.0	-15.3
583	713094.51	4908236.59	10.50	1	DEN	8000	67.9	0.0	0.0	0.0	0.0	64.1	52.6	-2.5	0.0	0.0	15.7	0.0	1.0	-62.9

Point Source, ISO 9613, Name: "", ID: "src_ge_B10D_HVAC1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
586	713136.16	4908123.54	10.50	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	64.8	0.0	-3.8	0.0	0.0	9.6	0.0	0.0	-110.1
586	713136.16	4908123.54	10.50	0	DEN	63	63.3	0.0	0.0	0.0	0.0	64.8	0.1	-3.8	0.0	0.0	12.0	0.0	0.0	-9.8
586	713136.16	4908123.54	10.50	0	DEN	125	75.9	0.0	0.0	0.0	0.0	64.8	0.2	-2.0	0.0	0.0	14.5	0.0	0.0	-1.7
586	713136.16	4908123.54	10.50	0	DEN	250	80.4	0.0	0.0	0.0	0.0	64.8	0.5	-1.0	0.0	0.0	17.3	0.0	0.0	-1.3
586	713136.16	4908123.54	10.50	0	DEN	500	84.3	0.0	0.0	0.0	0.0	64.8	0.9	-1.5	0.0	0.0	20.2	0.0	0.0	-0.2
586	713136.16	4908123.54	10.50	0	DEN	1000	84.0	0.0	0.0	0.0	0.0	64.8	1.8	-2.6	0.0	0.0	23.2	0.0	0.0	-3.2
586	713136.16	4908123.54	10.50	0	DEN	2000	79.7	0.0	0.0	0.0	0.0	64.8	4.7	-2.7	0.0	0.0	25.0	0.0	0.0	-12.1
586	713136.16	4908123.54	10.50	0	DEN	4000	74.5	0.0	0.0	0.0	0.0	64.8	16.1	-2.7	0.0	0.0	25.0	0.0	0.0	-28.7
586	713136.16	4908123.54	10.50	0	DEN	8000	65.4	0.0	0.0	0.0	0.0	64.8	57.4	-2.7	0.0	0.0	25.0	0.0	0.0	-79.1

Point Source, ISO 9613, Name: "", ID: "src_ge_transformer"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
588	712984.97	4908290.99	3.00	0	DEN	32	48.2	0.0	0.0	0.0	0.0	61.1	0.0	-4.7	0.0	0.0	0.0	0.0	0.0	-8.2
588	712984.97	4908290.99	3.00	0	DEN	63	56.8	0.0	0.0	0.0	0.0	61.1	0.0	-4.7	0.0	0.0	0.0	0.0	0.0	0.4
588	712984.97	4908290.99	3.00	0	DEN	125	74.5	0.0	0.0	0.0	0.0	61.1	0.1	-2.3	0.0	0.0	0.0	0.0	0.0	15.5
588	712984.97	4908290.99	3.00	0	DEN	250	76.6	0.0	0.0	0.0	0.0	61.1	0.3	-0.6	0.0	0.0	0.0	0.0	0.0	15.8
588	712984.97	4908290.99	3.00	0	DEN	500	82.6	0.0	0.0	0.0	0.0	61.1	0.6	-2.1	0.0	0.0	0.0	0.0	0.0	23.0
588	712984.97	4908290.99	3.00	0	DEN	1000	77.5	0.0	0.0	0.0	0.0	61.1	1.2	-3.2	0.0	0.0	0.0	0.0	0.0	18.5
588	712984.97	4908290.99	3.00	0	DEN	2000	68.2	0.0	0.0	0.0	0.0	61.1	3.1	-3.4	0.0	0.0	0.0	0.0	0.0	7.4
588	712984.97	4908290.99	3.00	0	DEN	4000	63.6	0.0	0.0	0.0	0.0	61.1	10.5	-3.4	0.0	0.0	0.0	0.0	0.0	-4.6
588	712984.97	4908290.99	3.00	0	DEN	8000	63.1	0.0	0.0	0.0	0.0	61.1	37.4	-3.4	0.0	0.0	0.0	0.0	0.0	-32.0

Point Source, ISO 9613, Name: "", ID: "src_ge_B10D_HVAC2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
600	713152.05	4908085.82	10.50	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	65.3	0.0	-3.9	0.0	0.0	11.2	0.0	0.0	-112.0
600	713152.05	4908085.82	10.50	0	DEN	63	63.3	0.0	0.0	0.0	0.0	65.3	0.1	-3.9	0.0	0.0	13.8	0.0	0.0	-11.9
600	713152.05	4908085.82	10.50	0	DEN	125	75.9	0.0	0.0	0.0	0.0	65.3	0.2	-2.0	0.0	0.0	16.5	0.0	0.0	-4.1
600	713152.05	4908085.82	10.50	0	DEN	250	80.4	0.0	0.0	0.0	0.0	65.3	0.5	-1.1	0.0	0.0	19.4	0.0	0.0	-3.8
600	713152.05	4908085.82	10.50	0	DEN	500	84.3	0.0	0.0	0.0	0.0	65.3	1.0	-1.6	0.0	0.0	22.4	0.0	0.0	-2.8
600	713152.05	4908085.82	10.50	0	DEN	1000	84.0	0.0	0.0	0.0	0.0	65.3	1.9	-2.7	0.0	0.0	25.0	0.0	0.0	-5.5
600	713152.05	4908085.82	10.50	0	DEN	2000	79.7	0.0	0.0	0.0	0.0	65.3	5.0	-2.8	0.0	0.0	25.0	0.0	0.0	-12.8
600	713152.05	4908085.82	10.50	0	DEN	4000	74.5	0.0	0.0	0.0	0.0	65.3	17.0	-2.8	0.0	0.0	25.0	0.0	0.0	-30.0
600	713152.05	4908085.82	10.50	0	DEN	8000	65.4	0.0	0.0	0.0	0.0	65.3	60.6	-2.8	0.0	0.0	25.0	0.0	0.0	-82.7
602	713152.05	4908085.82	10.50	1	DEN	63	63.3	0.0	0.0	0.0	0.0	65.6	0.1	-4.0	0.0	0.0	11.1	0.0	1.0	-10.4
602	713152.05	4908085.82	10.50	1	DEN	125	75.9	0.0	0.0	0.0	0.0	65.6	0.2	-2.0	0.0	0.0	13.5	0.0	1.0	-2.4
602	713152.05	4908085.82	10.50	1	DEN	250	80.4	0.0	0.0	0.0	0.0	65.6	0.6	-1.1	0.0	0.0	16.2	0.0	1.0	-1.9
602	713152.05	4908085.82	10.50	1	DEN	500	84.3	0.0	0.0	0.0	0.0	65.6	1.0	-1.6	0.0	0.0	19.1	0.0	1.0	-0.8
602	713152.05	4908085.82	10.50	1	DEN	1000	84.0	0.0	0.0	0.0	0.0	65.6	2.0	-2.7	0.0	0.0	22.0	0.0	1.0	-3.9
602	713152.05	4908085.82	10.50	1	DEN	2000	79.7	0.0	0.0	0.0	0.0	65.6	5.2	-2.9	0.0	0.0	25.0	0.0	1.0	-14.2
602	713152.05	4908085.82	10.50	1	DEN	4000	74.5	0.0	0.0	0.0	0.0	65.6	17.6	-2.9	0.0	0.0	25.0	0.0	1.0	-31.8
602	713152.05	4908085.82	10.50	1	DEN	8000	65.4	0.0	0.0	0.0	0.0	65.6	62.8	-2.9	0.0	0.0	25.0	0.0	1.0	-86.2

Point Source, ISO 9613, Name: "", ID: "src_ge_B8_lower_heating_1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
618	713122.70	4908195.02	11.00	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	64.3	0.0	-3.6	0.0	0.0	4.9	0.0	0.0	-105.0
618	713122.70	4908195.02	11.00	0	DEN	63	71.8	0.0	0.0	0.0	0.0	64.3	0.1	-3.6	0.0	0.0	5.0	0.0	0.0	6.0
618	713122.70	4908195.02	11.00	0	DEN	125	81.9	0.0	0.0	0.0	0.0	64.3	0.2	-1.9	0.0	0.0	5.4	0.0	0.0	13.9
618	713122.70	4908195.02	11.00	0	DEN	250	85.4	0.0	0.0	0.0	0.0	64.3	0.5	-0.8	0.0	0.0	6.0	0.0	0.0	15.4
618	713122.70	4908195.02	11.00	0	DEN	500	78.8	0.0	0.0	0.0	0.0	64.3	0.9	-1.3	0.0	0.0	7.1	0.0	0.0	7.8
618	713122.70	4908195.02	11.00	0	DEN	1000	72.0	0.0	0.0	0.0	0.0	64.3	1.7	-2.4	0.0	0.0	8.6	0.0	0.0	-0.2
618	713122.70	4908195.02	11.00	0	DEN	2000	62.2	0.0	0.0	0.0	0.0	64.3	4.5	-2.6	0.0	0.0	10.6	0.0	0.0	-14.6
618	713122.70	4908195.02	11.00	0	DEN	4000	56.0	0.0	0.0	0.0	0.0	64.3	15.1	-2.6	0.0	0.0	13.0	0.0	0.0	-33.9
618	713122.70	4908195.02	11.00	0	DEN	8000	45.9	0.0	0.0	0.0	0.0	64.3	54.0	-2.6	0.0	0.0	15.7	0.0	0.0	-85.6

Point Source, ISO 9613, Name: "", ID: "src_ge_B8_lower_heating_2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
622	713137.67	4908158.72	11.00	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	64.7	0.0	-3.7	0.0	0.0	4.8	0.0	0.0	-105.3
622	713137.67	4908158.72	11.00	0	DEN	63	71.8	0.0	0.0	0.0	0.0	64.7	0.1	-3.7	0.0	0.0	5.0	0.0	0.0	5.7
622	713137.67	4908158.72	11.00	0	DEN	125	81.9	0.0	0.0	0.0	0.0	64.7	0.2	-1.9	0.0	0.0	5.2	0.0	0.0	13.6
622	713137.67	4908158.72	11.00	0	DEN	250	85.4	0.0	0.0	0.0	0.0	64.7	0.5	-0.9	0.0	0.0	5.7	0.0	0.0	15.3
622	713137.67	4908158.72	11.00	0	DEN	500	78.8	0.0	0.0	0.0	0.0	64.7	0.9	-1.4	0.0	0.0	6.6	0.0	0.0	7.9
622	713137.67	4908158.72	11.00	0	DEN	1000	72.0	0.0	0.0	0.0	0.0	64.7	1.8	-2.5	0.0	0.0	7.9	0.0	0.0	0.1
622	713137.67	4908158.72	11.00	0	DEN	2000	62.2	0.0	0.0	0.0	0.0	64.7	4.7	-2.6	0.0	0.0	9.7	0.0	0.0	-14.3
622	713137.67	4908158.72	11.00	0	DEN	4000	56.0	0.0	0.0	0.0	0.0	64.7	15.9	-2.6	0.0	0.0	11.9	0.0	0.0	-33.9
622	713137.67	4908158.72	11.00	0	DEN	8000	45.9	0.0	0.0	0.0	0.0	64.7	56.5	-2.6	0.0	0.0	14.5	0.0	0.0	-87.2

Point Source, ISO 9613, Name: "", ID: "src_ge_B8_4"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
640	713164.91	4908172.24	10.50	0	DEN	32	41.6	0.0	0.0	0.0	0.0	65.1	0.0	-3.9	0.0	0.0	4.8	0.0	0.0	-24.5
640	713164.91	4908172.24	10.50	0	DEN	63	52.9	0.0	0.0	0.0	0.0	65.1	0.1	-3.9	0.0	0.0	4.9	0.0	0.0	-13.3
640	713164.91	4908172.24	10.50	0	DEN	125	64.0	0.0	0.0	0.0	0.0	65.1	0.2	-2.0	0.0	0.0	5.1	0.0	0.0	-4.4
640	713164.91	4908172.24	10.50	0	DEN	250	79.4	0.0	0.0	0.0	0.0	65.1	0.5	-1.1	0.0	0.0	5.6	0.0	0.0	9.2
640	713164.91	4908172.24	10.50	0	DEN	500	82.3	0.0	0.0	0.0	0.0	65.1	1.0	-1.6	0.0	0.0	6.3	0.0	0.0	11.5
640	713164.91	4908172.24	10.50	0	DEN	1000	79.5	0.0	0.0	0.0	0.0	65.1	1.9	-2.6	0.0	0.0	7.4	0.0	0.0	7.7
640	713164.91	4908172.24	10.50	0	DEN	2000	71.8	0.0	0.0	0.0	0.0	65.1	4.9	-2.8	0.0	0.0	9.1	0.0	0.0	-4.5
640	713164.91	4908172.24	10.50	0	DEN	4000	62.5	0.0	0.0	0.0	0.0	65.1	16.6	-2.8	0.0	0.0	11.2	0.0	0.0	-27.6
640	713164.91	4908172.24	10.50	0	DEN	8000	50.2	0.0	0.0	0.0	0.0	65.1	59.3	-2.8	0.0	0.0	13.7	0.0	0.0	-85.1

Point Source, ISO 9613, Name: "", ID: "src_ge_B14_2_2a"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
644	713039.91	4908066.41	18.00	0	DEN	32	48.0	0.0	0.0	0.0	0.0	63.6	0.0	-3.0	0.0	0.0	4.7	0.0	0.0	-17.2
644	713039.91	4908066.41	18.00	0	DEN	63	76.4	0.0	0.0	0.0	0.0	63.6	0.1	-3.0	0.0	0.0	6.0	0.0	0.0	9.8
644	713039.91	4908066.41	18.00	0	DEN	125	68.7	0.0	0.0	0.0	0.0	63.6	0.2	-1.6	0.0	0.0	7.8	0.0	0.0	-1.3

Point Source, ISO 9613, Name: "", ID: "src_ge_B14_2_2a"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
644	713039.91	4908066.41	18.00	0	DEN	250	74.8	0.0	0.0	0.0	0.0	63.6	0.4	-0.4	0.0	0.0	9.9	0.0	0.0	1.3
644	713039.91	4908066.41	18.00	0	DEN	500	71.5	0.0	0.0	0.0	0.0	63.6	0.8	-0.9	0.0	0.0	12.4	0.0	0.0	-4.4
644	713039.91	4908066.41	18.00	0	DEN	1000	68.7	0.0	0.0	0.0	0.0	63.6	1.6	-2.0	0.0	0.0	15.2	0.0	0.0	-9.5
644	713039.91	4908066.41	18.00	0	DEN	2000	64.4	0.0	0.0	0.0	0.0	63.6	4.1	-2.2	0.0	0.0	18.0	0.0	0.0	-19.1
644	713039.91	4908066.41	18.00	0	DEN	4000	57.7	0.0	0.0	0.0	0.0	63.6	13.9	-2.2	0.0	0.0	19.6	0.0	0.0	-37.1
644	713039.91	4908066.41	18.00	0	DEN	8000	48.6	0.0	0.0	0.0	0.0	63.6	49.6	-2.2	0.0	0.0	19.8	0.0	0.0	-82.1

Point Source, ISO 9613, Name: "", ID: "src_ge_B2_HVAC1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
667	713256.61	4908165.80	14.00	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	66.5	0.0	-3.7	0.0	0.0	4.8	0.0	0.0	-107.1
667	713256.61	4908165.80	14.00	0	DEN	63	54.3	0.0	0.0	0.0	0.0	66.5	0.1	-3.7	0.0	0.0	4.8	0.0	0.0	-13.4
667	713256.61	4908165.80	14.00	0	DEN	125	69.9	0.0	0.0	0.0	0.0	66.5	0.2	-1.8	0.0	0.0	4.8	0.0	0.0	0.1
667	713256.61	4908165.80	14.00	0	DEN	250	73.9	0.0	0.0	0.0	0.0	66.5	0.6	-0.9	0.0	0.0	4.8	0.0	0.0	2.8
667	713256.61	4908165.80	14.00	0	DEN	500	76.3	0.0	0.0	0.0	0.0	66.5	1.2	-1.4	0.0	0.0	4.9	0.0	0.0	5.1
667	713256.61	4908165.80	14.00	0	DEN	1000	75.5	0.0	0.0	0.0	0.0	66.5	2.2	-2.5	0.0	0.0	5.0	0.0	0.0	4.3
667	713256.61	4908165.80	14.00	0	DEN	2000	71.7	0.0	0.0	0.0	0.0	66.5	5.8	-2.7	0.0	0.0	5.2	0.0	0.0	-3.2
667	713256.61	4908165.80	14.00	0	DEN	4000	67.5	0.0	0.0	0.0	0.0	66.5	19.6	-2.7	0.0	0.0	5.6	0.0	0.0	-21.6
667	713256.61	4908165.80	14.00	0	DEN	8000	59.9	0.0	0.0	0.0	0.0	66.5	70.0	-2.7	0.0	0.0	6.4	0.0	0.0	-80.3
669	713256.61	4908165.80	14.00	1	DEN	32	-39.4	0.0	0.0	0.0	0.0	66.6	0.0	-3.7	0.0	0.0	4.8	0.0	1.0	-108.1
669	713256.61	4908165.80	14.00	1	DEN	63	54.3	0.0	0.0	0.0	0.0	66.6	0.1	-3.7	0.0	0.0	4.8	0.0	1.0	-14.5
669	713256.61	4908165.80	14.00	1	DEN	125	69.9	0.0	0.0	0.0	0.0	66.6	0.2	-1.8	0.0	0.0	4.8	0.0	1.0	-1.0
669	713256.61	4908165.80	14.00	1	DEN	250	73.9	0.0	0.0	0.0	0.0	66.6	0.6	-0.9	0.0	0.0	4.8	0.0	1.0	1.8
669	713256.61	4908165.80	14.00	1	DEN	500	76.3	0.0	0.0	0.0	0.0	66.6	1.2	-1.4	0.0	0.0	4.9	0.0	1.0	4.1
669	713256.61	4908165.80	14.00	1	DEN	1000	75.5	0.0	0.0	0.0	0.0	66.6	2.2	-2.5	0.0	0.0	5.0	0.0	1.0	3.2
669	713256.61	4908165.80	14.00	1	DEN	2000	71.7	0.0	0.0	0.0	0.0	66.6	5.8	-2.7	0.0	0.0	5.2	0.0	1.0	-4.2
669	713256.61	4908165.80	14.00	1	DEN	4000	67.5	0.0	0.0	0.0	0.0	66.6	19.7	-2.7	0.0	0.0	5.6	0.0	1.0	-22.7
669	713256.61	4908165.80	14.00	1	DEN	8000	59.9	0.0	0.0	0.0	0.0	66.6	70.4	-2.7	0.0	0.0	6.3	0.0	1.0	-81.7

Point Source, ISO 9613, Name: "", ID: "src_ge_B2_HVAC2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
676	713270.62	4908169.55	14.00	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	66.7	0.0	-3.7	0.0	0.0	5.7	0.0	0.0	-108.2
676	713270.62	4908169.55	14.00	0	DEN	63	54.3	0.0	0.0	0.0	0.0	66.7	0.1	-3.7	0.0	0.0	6.6	0.0	0.0	-15.4
676	713270.62	4908169.55	14.00	0	DEN	125	69.9	0.0	0.0	0.0	0.0	66.7	0.3	-1.8	0.0	0.0	7.8	0.0	0.0	-3.1
676	713270.62	4908169.55	14.00	0	DEN	250	73.9	0.0	0.0	0.0	0.0	66.7	0.6	-1.0	0.0	0.0	9.6	0.0	0.0	-2.1
676	713270.62	4908169.55	14.00	0	DEN	500	76.3	0.0	0.0	0.0	0.0	66.7	1.2	-1.5	0.0	0.0	11.9	0.0	0.0	-2.0
676	713270.62	4908169.55	14.00	0	DEN	1000	75.5	0.0	0.0	0.0	0.0	66.7	2.2	-2.5	0.0	0.0	14.4	0.0	0.0	-5.4
676	713270.62	4908169.55	14.00	0	DEN	2000	71.7	0.0	0.0	0.0	0.0	66.7	5.9	-2.7	0.0	0.0	17.2	0.0	0.0	-15.4
676	713270.62	4908169.55	14.00	0	DEN	4000	67.5	0.0	0.0	0.0	0.0	66.7	20.1	-2.7	0.0	0.0	20.1	0.0	0.0	-36.7
676	713270.62	4908169.55	14.00	0	DEN	8000	59.9	0.0	0.0	0.0	0.0	66.7	71.6	-2.7	0.0	0.0	23.0	0.0	0.0	-98.7

Point Source, ISO 9613, Name: "", ID: "src_ge_B8 unitheater1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
686	713186.32	4908091.70	4.30	0	DEN	32	31.4	0.0	0.0	0.0	0.0	65.8	0.0	-5.0	0.0	0.0	16.4	0.0	0.0	-45.8
686	713186.32	4908091.70	4.30	0	DEN	63	45.6	0.0	0.0	0.0	0.0	65.8	0.1	-5.0	0.0	0.0	19.4	0.0	0.0	-34.6
686	713186.32	4908091.70	4.30	0	DEN	125	55.0	0.0	0.0	0.0	0.0	65.8	0.2	-2.0	0.0	0.0	22.3	0.0	0.0	-31.3
686	713186.32	4908091.70	4.30	0	DEN	250	63.8	0.0	0.0	0.0	0.0	65.8	0.6	-1.5	0.0	0.0	25.0	0.0	0.0	-26.0
686	713186.32	4908091.70	4.30	0	DEN	500	67.2	0.0	0.0	0.0	0.0	65.8	1.1	-2.4	0.0	0.0	25.0	0.0	0.0	-22.2
686	713186.32	4908091.70	4.30	0	DEN	1000	73.8	0.0	0.0	0.0	0.0	65.8	2.0	-3.5	0.0	0.0	25.0	0.0	0.0	-15.5
686	713186.32	4908091.70	4.30	0	DEN	2000	76.4	0.0	0.0	0.0	0.0	65.8	5.3	-3.7	0.0	0.0	25.0	0.0	0.0	-16.0
686	713186.32	4908091.70	4.30	0	DEN	4000	69.4	0.0	0.0	0.0	0.0	65.8	18.0	-3.7	0.0	0.0	25.0	0.0	0.0	-35.7
686	713186.32	4908091.70	4.30	0	DEN	8000	63.4	0.0	0.0	0.0	0.0	65.8	64.1	-3.7	0.0	0.0	25.0	0.0	0.0	-87.8
688	713186.32	4908091.70	4.30	1	DEN	500	67.2	0.0	0.0	0.0	0.0	67.8	1.3	-2.6	0.0	0.0	5.6	0.0	1.0	-5.9
688	713186.32	4908091.70	4.30	1	DEN	1000	73.8	0.0	0.0	0.0	0.0	67.8	2.5	-3.7	0.0	0.0	6.3	0.0	1.0	-0.1
688	713186.32	4908091.70	4.30	1	DEN	2000	76.4	0.0	0.0	0.0	0.0	67.8	6.7	-3.9	0.0	0.0	7.5	0.0	1.0	-2.6
688	713186.32	4908091.70	4.30	1	DEN	4000	69.4	0.0	0.0	0.0	0.0	67.8	22.6	-3.9	0.0	0.0	9.1	0.0	1.0	-27.2
688	713186.32	4908091.70	4.30	1	DEN	8000	63.4	0.0	0.0	0.0	0.0	67.8	80.6	-3.9	0.0	0.0	11.2	0.0	1.0	-93.4

Point Source, ISO 9613, Name: "", ID: "src_ge_B8E_HVAC1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
702	713101.69	4908210.94	10.50	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	63.9	0.0	-3.5	0.0	0.0	4.8	0.0	0.0	-104.5
702	713101.69	4908210.94	10.50	0	DEN	63	53.3	0.0	0.0	0.0	0.0	63.9	0.1	-3.5	0.0	0.0	5.1	0.0	0.0	-12.2
702	713101.69	4908210.94	10.50	0	DEN	125	65.4	0.0	0.0	0.0	0.0	63.9	0.2	-1.8	0.0	0.0	5.8	0.0	0.0	-2.6
702	713101.69	4908210.94	10.50	0	DEN	250	65.9	0.0	0.0	0.0	0.0	63.9	0.5	-0.8	0.0	0.0	6.8	0.0	0.0	-4.5
702	713101.69	4908210.94	10.50	0	DEN	500	69.8	0.0	0.0	0.0	0.0	63.9	0.8	-1.3	0.0	0.0	8.3	0.0	0.0	-1.9
702	713101.69	4908210.94	10.50	0	DEN	1000	71.5	0.0	0.0	0.0	0.0	63.9	1.6	-2.3	0.0	0.0	10.2	0.0	0.0	-1.8
702	713101.69	4908210.94	10.50	0	DEN	2000	67.7	0.0	0.0	0.0	0.0	63.9	4.2	-2.5	0.0	0.0	12.6	0.0	0.0	-10.5
702	713101.69	4908210.94	10.50	0	DEN	4000	62.5	0.0	0.0	0.0	0.0	63.9	14.4	-2.5	0.0	0.0	15.2	0.0	0.0	-28.4
702	713101.69	4908210.94	10.50	0	DEN	8000	53.4	0.0	0.0	0.0	0.0	63.9	51.3	-2.5	0.0	0.0	18.0	0.0	0.0	-77.3
708	713101.69	4908210.94	10.50	1	DEN	63	53.3	0.0	0.0	0.0	0.0	64.3	0.1	-3.7	0.0	0.0	4.9	0.0	1.0	-13.4
708	713101.69	4908210.94	10.50	1	DEN	125	65.4	0.0	0.0	0.0	0.0	64.3	0.2	-1.9	0.0	0.0	5.2	0.0	1.0	-3.5
708	713101.69	4908210.94	10.50	1	DEN	250	65.9	0.0	0.0	0.0	0.0	64.3	0.5	-0.8	0.0	0.0	5.9	0.0	1.0	-5.0
708	713101.69	4908210.94	10.50	1	DEN	500	69.8	0.0	0.0	0.0	0.0	64.3	0.9	-1.3	0.0	0.0	6.9	0.0	1.0	-2.0
708	713101.69	4908210.94	10.50	1	DEN	1000	71.5	0.0	0.0	0.0	0.0	64.3	1.7	-2.4	0.0	0.0	8.4	0.0	1.0	-1.5
708	713101.69	4908210.94	10.50	1	DEN	2000	67.7	0.0	0.0	0.0	0.0	64.3	4.5	-2.6	0.0	0.0	10.4	0.0	1.0	-9.9
708	713101.69	4908210.94	10.50	1	DEN	4000	62.5	0.0	0.0	0.0	0.0	64.3	15.2	-2.6	0.0	0.0	12.8	0.0	1.0	-28.2
708	713101.69	4908210.94	10.50	1	DEN	8000	53.4	0.0	0.0	0.0	0.0	64.3	54.2	-2.6	0.0	0.0	15.4	0.0	1.0	-78.9
710	713101.69	4908210.94	10.50	1	DEN	125	65.4	0.0	0.0	0.0	0.0	65.2	0.2	-2.0	0.0	0.0	12.4	0.0	1.0	-11.5
710	713101.69	4908210.94	10.50	1	DEN	250	65.9	0.0	0.0	0.0	0.0	65.2	0.5	-1.0	0.0	0.0	15.1	0.0	1.0	-14.9
710	713101.69	4908210.94	10.50	1	DEN	500	69.8	0.0	0.0	0.0	0.0	65.2	1.0	-1.5	0.0	0.0	17.9	0.0	1.0	-13.7
710	713101.69	4908210.94	10.50	1	DEN	1000	71.5	0.0	0.0	0.0	0.0	65.2	1.9	-2.6	0.0	0.0	20.8	0.0	1.0	-14.7
710	713101.69	4908210.94	10.50	1	DEN	2000	67.7	0.0	0.0	0.0	0.0	65.2	4.9	-2.8	0.0	0.0	23.8	0.0	1.0	-24.4
710	713101.69	4908210.94	10.50	1	DEN	4000	62.5	0.0	0.0	0.0	0.0	65.2	16.7	-2.8	0.0	0.0	25.0	0.0	1.0	-42.6
710	713101.69	4908210.94	10.50	1	DEN	8000	53.4	0.0	0.0	0.0	0.0	65.2	59.7	-2.8	0.0	0.0	25.0	0.0	1.0	-94.7

Point Source, ISO 9613, Name: "", ID: "src_ge_B8E_HVAC2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
717	713105.39	4908207.66	10.50	0	DEN	32	-39.4	0.0	0.0	0.0	0.0	63.9	0.0	-3.6	0.0	0.0	4.8	0.0	0.0	-104.6
717	713105.39	4908207.66	10.50	0	DEN	63	53.3	0.0	0.0	0.0	0.0	63.9	0.1	-3.6	0.0	0.0	5.1	0.0	0.0	-12.2
717	713105.39	4908207.66	10.50	0	DEN	125	65.4	0.0	0.0	0.0	0.0	63.9	0.2	-1.9	0.0	0.0	5.7	0.0	0.0	-2.6
717	713105.39	4908207.66	10.50	0	DEN	250	65.9	0.0	0.0	0.0	0.0	63.9	0.5	-0.8	0.0	0.0	6.7	0.0	0.0	-4.4
717	713105.39	4908207.66	10.50	0	DEN	500	69.8	0.0	0.0	0.0	0.0	63.9	0.9	-1.3	0.0	0.0	8.1	0.0	0.0	-1.8
717	713105.39	4908207.66	10.50	0	DEN	1000	71.5	0.0	0.0	0.0	0.0	63.9	1.6	-2.4	0.0	0.0	10.0	0.0	0.0	-1.7
717	713105.39	4908207.66	10.50	0	DEN	2000	67.7	0.0	0.0	0.0	0.0	63.9	4.3	-2.5	0.0	0.0	12.3	0.0	0.0	-10.3
717	713105.39	4908207.66	10.50	0	DEN	4000	62.5	0.0	0.0	0.0	0.0	63.9	14.5	-2.5	0.0	0.0	15.0	0.0	0.0	-28.4
717	713105.39	4908207.66	10.50	0	DEN	8000	53.4	0.0	0.0	0.0	0.0	63.9	51.8	-2.5	0.0	0.0	17.8	0.0	0.0	-77.6
723	713105.39	4908207.66	10.50	1	DEN	63	53.3	0.0	0.0	0.0	0.0	64.3	0.1	-3.7	0.0	0.0	5.0	0.0	1.0	-13.4
723	713105.39	4908207.66	10.50	1	DEN	125	65.4	0.0	0.0	0.0	0.0	64.3	0.2	-1.9	0.0	0.0	5.4	0.0	1.0	-3.6
723	713105.39	4908207.66	10.50	1	DEN	250	65.9	0.0	0.0	0.0	0.0	64.3	0.5	-0.8	0.0	0.0	6.1	0.0	1.0	-5.1
723	713105.39	4908207.66	10.50	1	DEN	500	69.8	0.0	0.0	0.0	0.0	64.3	0.9	-1.3	0.0	0.0	7.1	0.0	1.0	-2.2
723	713105.39	4908207.66	10.50	1	DEN	1000	71.5	0.0	0.0	0.0	0.0	64.3	1.7	-2.4	0.0	0.0	8.7	0.0	1.0	-1.8
723	713105.39	4908207.66	10.50	1	DEN	2000	67.7	0.0	0.0	0.0	0.0	64.3	4.5	-2.6	0.0	0.0	10.7	0.0	1.0	-10.3
723	713105.39	4908207.66	10.50	1	DEN	4000	62.5	0.0	0.0	0.0	0.0	64.3	15.2	-2.6	0.0	0.0	13.2	0.0	1.0	-28.6
723	713105.39	4908207.66	10.50	1	DEN	8000	53.4	0.0	0.0	0.0	0.0	64.3	54.2	-2.6	0.0	0.0	15.9	0.0	1.0	-79.4
730	713105.39	4908207.66	10.50	1	DEN	125	65.4	0.0	0.0	0.0	0.0	65.2	0.2	-2.0	0.0	0.0	13.2	0.0	1.0	-12.2
730	713105.39	4908207.66	10.50	1	DEN	250	65.9	0.0	0.0	0.0	0.0	65.2	0.5	-1.0	0.0	0.0	15.9	0.0	1.0	-15.6
730	713105.39	4908207.66	10.50	1	DEN	500	69.8	0.0	0.0	0.0	0.0	65.2	1.0	-1.5	0.0	0.0	18.7	0.0	1.0	-14.5
730	713105.39	4908207.66	10.50	1	DEN	1000	71.5	0.0	0.0	0.0	0.0	65.2	1.9	-2.6	0.0	0.0	21.6	0.0	1.0	-15.6
730	713105.39	4908207.66	10.50	1	DEN	2000	67.7	0.0	0.0	0.0	0.0	65.2	4.9	-2.8	0.0	0.0	24.6	0.0	1.0	-25.2
730	713105.39	4908207.66	10.50	1	DEN	4000	62.5	0.0	0.0	0.0	0.0	65.2	16.7	-2.8	0.0	0.0	25.0	0.0	1.0	-42.6
730	713105.39	4908207.66	10.50	1	DEN	8000	53.4	0.0	0.0	0.0	0.0	65.2	59.6	-2.8	0.0	0.0	25.0	0.0	1.0	-94.6

Point Source, ISO 9613, Name: "", ID: "src_ge_B16 unitheater1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
738	713029.01	4907996.41	6.50	0	DEN	32	32.3	0.0	0.0	0.0	0.0	64.1	0.0	-4.4	0.0	0.0	16.8	0.0	0.0	-44.3
738	713029.01	4907996.41	6.50	0	DEN	63	43.0	0.0	0.0	0.0	0.0	64.1	0.1	-4.4	0.0	0.0	19.8	0.0	0.0	-36.6
738	713029.01	4907996.41	6.50	0	DEN	125	53.2	0.0	0.0	0.0	0.0	64.1	0.2	-2.0	0.0	0.0	22.7	0.0	0.0	-31.8
738	713029.01	4907996.41	6.50	0	DEN	250	63.2	0.0	0.0	0.0	0.0	64.1	0.5	-1.5	0.0	0.0	25.0	0.0	0.0	-24.9
738	713029.01	4907996.41	6.50	0	DEN	500	67.6	0.0	0.0	0.0	0.0	64.1	0.9	-2.0	0.0	0.0	25.0	0.0	0.0	-20.3
738	713029.01	4907996.41	6.50	0	DEN	1000	65.2	0.0	0.0	0.0	0.0	64.1	1.7	-3.1	0.0	0.0	25.0	0.0	0.0	-22.5
738	713029.01	4907996.41	6.50	0	DEN	2000	66.3	0.0	0.0	0.0	0.0	64.1	4.4	-3.3	0.0	0.0	25.0	0.0	0.0	-23.9

Point Source, ISO 9613, Name: "", ID: "src_ge_B16 unitheater1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
738	713029.01	4907996.41	6.50	0	DEN	4000	57.8	0.0	0.0	0.0	0.0	64.1	14.8	-3.3	0.0	0.0	25.0	0.0	0.0	-42.9
738	713029.01	4907996.41	6.50	0	DEN	8000	54.1	0.0	0.0	0.0	0.0	64.1	52.9	-3.3	0.0	0.0	25.0	0.0	0.0	-84.6
744	713029.01	4907996.41	6.50	1	DEN	250	63.2	0.0	0.0	0.0	0.0	65.0	0.5	-1.5	0.0	0.0	25.0	0.0	1.0	-26.8
744	713029.01	4907996.41	6.50	1	DEN	500	67.6	0.0	0.0	0.0	0.0	65.0	1.0	-2.1	0.0	0.0	25.0	0.0	1.0	-22.3
744	713029.01	4907996.41	6.50	1	DEN	1000	65.2	0.0	0.0	0.0	0.0	65.0	1.8	-3.1	0.0	0.0	25.0	0.0	1.0	-24.5
744	713029.01	4907996.41	6.50	1	DEN	2000	66.3	0.0	0.0	0.0	0.0	65.0	4.8	-3.3	0.0	0.0	25.0	0.0	1.0	-26.2
744	713029.01	4907996.41	6.50	1	DEN	4000	57.8	0.0	0.0	0.0	0.0	65.0	16.4	-3.3	0.0	0.0	25.0	0.0	1.0	-46.3
744	713029.01	4907996.41	6.50	1	DEN	8000	54.1	0.0	0.0	0.0	0.0	65.0	58.6	-3.3	0.0	0.0	25.0	0.0	1.0	-92.1

Point Source, ISO 9613, Name: "", ID: "src_ge_B16A_1"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
762	713015.13	4908005.44	12.00	0	DEN	32	55.0	0.0	0.0	0.0	0.0	63.8	0.0	-3.2	0.0	0.0	7.2	0.0	0.0	-12.8
762	713015.13	4908005.44	12.00	0	DEN	63	57.6	0.0	0.0	0.0	0.0	63.8	0.1	-3.2	0.0	0.0	8.8	0.0	0.0	-11.8
762	713015.13	4908005.44	12.00	0	DEN	125	68.3	0.0	0.0	0.0	0.0	63.8	0.2	-1.7	0.0	0.0	11.0	0.0	0.0	-5.0
762	713015.13	4908005.44	12.00	0	DEN	250	65.6	0.0	0.0	0.0	0.0	63.8	0.5	-0.6	0.0	0.0	14.1	0.0	0.0	-12.1
762	713015.13	4908005.44	12.00	0	DEN	500	56.6	0.0	0.0	0.0	0.0	63.8	0.8	-1.1	0.0	0.0	18.2	0.0	0.0	-25.1
762	713015.13	4908005.44	12.00	0	DEN	1000	44.9	0.0	0.0	0.0	0.0	63.8	1.6	-2.2	0.0	0.0	22.5	0.0	0.0	-40.8
762	713015.13	4908005.44	12.00	0	DEN	2000	57.7	0.0	0.0	0.0	0.0	63.8	4.2	-2.4	0.0	0.0	25.0	0.0	0.0	-32.9
762	713015.13	4908005.44	12.00	0	DEN	4000	57.0	0.0	0.0	0.0	0.0	63.8	14.3	-2.4	0.0	0.0	25.0	0.0	0.0	-43.7
762	713015.13	4908005.44	12.00	0	DEN	8000	56.8	0.0	0.0	0.0	0.0	63.8	50.9	-2.4	0.0	0.0	25.0	0.0	0.0	-80.5
768	713015.13	4908005.44	12.00	1	DEN	32	55.0	0.0	0.0	0.0	0.0	63.8	0.0	-3.2	0.0	0.0	7.2	0.0	1.0	-13.8
768	713015.13	4908005.44	12.00	1	DEN	63	57.6	0.0	0.0	0.0	0.0	63.8	0.1	-3.2	0.0	0.0	8.8	0.0	1.0	-12.8
768	713015.13	4908005.44	12.00	1	DEN	125	68.3	0.0	0.0	0.0	0.0	63.8	0.2	-1.7	0.0	0.0	11.0	0.0	1.0	-5.9
768	713015.13	4908005.44	12.00	1	DEN	250	65.6	0.0	0.0	0.0	0.0	63.8	0.5	-0.6	0.0	0.0	13.9	0.0	1.0	-13.0
768	713015.13	4908005.44	12.00	1	DEN	500	56.6	0.0	0.0	0.0	0.0	63.8	0.8	-1.2	0.0	0.0	18.0	0.0	1.0	-25.9
768	713015.13	4908005.44	12.00	1	DEN	1000	44.9	0.0	0.0	0.0	0.0	63.8	1.6	-2.2	0.0	0.0	22.3	0.0	1.0	-41.6
768	713015.13	4908005.44	12.00	1	DEN	2000	57.7	0.0	0.0	0.0	0.0	63.8	4.2	-2.4	0.0	0.0	25.0	0.0	1.0	-33.9
768	713015.13	4908005.44	12.00	1	DEN	4000	57.0	0.0	0.0	0.0	0.0	63.8	14.3	-2.4	0.0	0.0	25.0	0.0	1.0	-44.8
768	713015.13	4908005.44	12.00	1	DEN	8000	56.8	0.0	0.0	0.0	0.0	63.8	51.1	-2.4	0.0	0.0	25.0	0.0	1.0	-81.7
770	713015.13	4908005.44	12.00	1	DEN	250	65.6	0.0	0.0	0.0	0.0	64.9	0.5	-0.8	0.0	0.0	21.0	0.0	1.0	-21.1
770	713015.13	4908005.44	12.00	1	DEN	500	56.6	0.0	0.0	0.0	0.0	64.9	1.0	-1.3	0.0	0.0	24.0	0.0	1.0	-33.0
770	713015.13	4908005.44	12.00	1	DEN	1000	44.9	0.0	0.0	0.0	0.0	64.9	1.8	-2.4	0.0	0.0	25.0	0.0	1.0	-45.5
770	713015.13	4908005.44	12.00	1	DEN	2000	57.7	0.0	0.0	0.0	0.0	64.9	4.8	-2.6	0.0	0.0	25.0	0.0	1.0	-35.5
770	713015.13	4908005.44	12.00	1	DEN	4000	57.0	0.0	0.0	0.0	0.0	64.9	16.3	-2.6	0.0	0.0	25.0	0.0	1.0	-47.7
770	713015.13	4908005.44	12.00	1	DEN	8000	56.8	0.0	0.0	0.0	0.0	64.9	58.1	-2.6	0.0	0.0	25.0	0.0	1.0	-89.7

Point Source, ISO 9613, Name: "", ID: "src_ge_B8 unitheater2b"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
773	713195.59	4908068.69	15.50	0	DEN	32	32.3	0.0	0.0	0.0	0.0	66.0	0.0	-3.3	0.0	0.0	10.2	0.0	0.0	-40.7
773	713195.59	4908068.69	15.50	0	DEN	63	43.0	0.0	0.0	0.0	0.0	66.0	0.1	-3.3	0.0	0.0	12.7	0.0	0.0	-32.5
773	713195.59	4908068.69	15.50	0	DEN	125	53.2	0.0	0.0	0.0	0.0	66.0	0.2	-1.5	0.0	0.0	15.3	0.0	0.0	-26.9
773	713195.59	4908068.69	15.50	0	DEN	250	63.2	0.0	0.0	0.0	0.0	66.0	0.6	-0.6	0.0	0.0	18.2	0.0	0.0	-21.0
773	713195.59	4908068.69	15.50	0	DEN	500	67.6	0.0	0.0	0.0	0.0	66.0	1.1	-1.2	0.0	0.0	21.1	0.0	0.0	-19.5
773	713195.59	4908068.69	15.50	0	DEN	1000	65.2	0.0	0.0	0.0	0.0	66.0	2.1	-2.2	0.0	0.0	24.0	0.0	0.0	-24.7
773	713195.59	4908068.69	15.50	0	DEN	2000	66.3	0.0	0.0	0.0	0.0	66.0	5.5	-2.4	0.0	0.0	25.0	0.0	0.0	-27.8
773	713195.59	4908068.69	15.50	0	DEN	4000	57.8	0.0	0.0	0.0	0.0	66.0	18.5	-2.4	0.0	0.0	25.0	0.0	0.0	-49.4
773	713195.59	4908068.69	15.50	0	DEN	8000	54.1	0.0	0.0	0.0	0.0	66.0	66.1	-2.4	0.0	0.0	25.0	0.0	0.0	-100.6

Point Source, ISO 9613, Name: "", ID: "src_ge_B8 unitheater2a"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
777	713198.14	4908063.03	15.50	0	DEN	32	32.3	0.0	0.0	0.0	0.0	66.1	0.0	-3.3	0.0	0.0	10.2	0.0	0.0	-40.8
777	713198.14	4908063.03	15.50	0	DEN	63	43.0	0.0	0.0	0.0	0.0	66.1	0.1	-3.3	0.0	0.0	12.7	0.0	0.0	-32.6
777	713198.14	4908063.03	15.50	0	DEN	125	53.2	0.0	0.0	0.0	0.0	66.1	0.2	-1.5	0.0	0.0	15.4	0.0	0.0	-27.0
777	713198.14	4908063.03	15.50	0	DEN	250	63.2	0.0	0.0	0.0	0.0	66.1	0.6	-0.7	0.0	0.0	18.2	0.0	0.0	-21.0
777	713198.14	4908063.03	15.50	0	DEN	500	67.6	0.0	0.0	0.0	0.0	66.1	1.1	-1.2	0.0	0.0	21.1	0.0	0.0	-19.6
777	713198.14	4908063.03	15.50	0	DEN	1000	65.2	0.0	0.0	0.0	0.0	66.1	2.1	-2.2	0.0	0.0	24.1	0.0	0.0	-24.8
777	713198.14	4908063.03	15.50	0	DEN	2000	66.3	0.0	0.0	0.0	0.0	66.1	5.5	-2.4	0.0	0.0	25.0	0.0	0.0	-27.9
777	713198.14	4908063.03	15.50	0	DEN	4000	57.8	0.0	0.0	0.0	0.0	66.1	18.7	-2.4	0.0	0.0	25.0	0.0	0.0	-49.6
777	713198.14	4908063.03	15.50	0	DEN	8000	54.1	0.0	0.0	0.0	0.0	66.1	66.6	-2.4	0.0	0.0	25.0	0.0	0.0	-101.2

Point Source, ISO 9613, Name: "GETS Air Stripper Discharge", ID: "gets_air_strip"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
792	713100.14	4908023.18	6.10	0	DEN	63	43.5	0.0	0.0	3.0	0.0	64.9	0.1	-4.6	0.0	0.0	17.3	0.0	0.0	-31.2
792	713100.14	4908023.18	6.10	0	DEN	125	51.6	0.0	0.0	3.0	0.0	64.9	0.2	-1.9	0.0	0.0	20.2	0.0	0.0	-28.8
792	713100.14	4908023.18	6.10	0	DEN	250	59.1	0.0	0.0	3.0	0.0	64.9	0.5	-1.5	0.0	0.0	23.1	0.0	0.0	-25.0
792	713100.14	4908023.18	6.10	0	DEN	500	60.5	0.0	0.0	3.0	0.0	64.9	1.0	-2.1	0.0	0.0	25.0	0.0	0.0	-25.3
792	713100.14	4908023.18	6.10	0	DEN	1000	57.7	0.0	0.0	3.0	0.0	64.9	1.8	-3.2	0.0	0.0	25.0	0.0	0.0	-27.9
792	713100.14	4908023.18	6.10	0	DEN	2000	54.9	0.0	0.0	3.0	0.0	64.9	4.8	-3.4	0.0	0.0	25.0	0.0	0.0	-33.5
792	713100.14	4908023.18	6.10	0	DEN	4000	51.7	0.0	0.0	3.0	0.0	64.9	16.3	-3.4	0.0	0.0	25.0	0.0	0.0	-48.2
792	713100.14	4908023.18	6.10	0	DEN	8000	43.6	0.0	0.0	3.0	0.0	64.9	58.2	-3.4	0.0	0.0	25.0	0.0	0.0	-98.1
799	713100.14	4908023.18	6.10	1	DEN	250	59.1	0.0	0.0	3.0	0.0	66.8	0.6	-1.7	0.0	0.0	21.4	0.0	1.0	-26.0
799	713100.14	4908023.18	6.10	1	DEN	500	60.5	0.0	0.0	3.0	0.0	66.8	1.2	-2.3	0.0	0.0	24.4	0.0	1.0	-27.5
799	713100.14	4908023.18	6.10	1	DEN	1000	57.7	0.0	0.0	3.0	0.0	66.8	2.3	-3.4	0.0	0.0	25.0	0.0	1.0	-31.0
799	713100.14	4908023.18	6.10	1	DEN	2000	54.9	0.0	0.0	3.0	0.0	66.8	6.0	-3.6	0.0	0.0	25.0	0.0	1.0	-37.3
799	713100.14	4908023.18	6.10	1	DEN	4000	51.7	0.0	0.0	3.0	0.0	66.8	20.2	-3.6	0.0	0.0	25.0	0.0	1.0	-54.8
799	713100.14	4908023.18	6.10	1	DEN	8000	43.6	0.0	0.0	3.0	0.0	66.8	72.2	-3.6	0.0	0.0	25.0	0.0	1.0	-114.8

Point Source, ISO 9613, Name: "", ID: "src_ge_B16A_2"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
801	713017.41	4908000.15	11.00	0	DEN	32	50.6	0.0	0.0	0.0	0.0	63.9	0.0	-3.4	0.0	0.0	7.3	0.0	0.0	-17.1
801	713017.41	4908000.15	11.00	0	DEN	63	56.3	0.0	0.0	0.0	0.0	63.9	0.1	-3.4	0.0	0.0	8.9	0.0	0.0	-13.1
801	713017.41	4908000.15	11.00	0	DEN	125	57.3	0.0	0.0	0.0	0.0	63.9	0.2	-1.9	0.0	0.0	11.1	0.0	0.0	-16.0
801	713017.41	4908000.15	11.00	0	DEN	250	32.9	0.0	0.0	0.0	0.0	63.9	0.5	-0.8	0.0	0.0	14.4	0.0	0.0	-45.0
801	713017.41	4908000.15	11.00	0	DEN	500	45.4	0.0	0.0	0.0	0.0	63.9	0.8	-1.3	0.0	0.0	18.6	0.0	0.0	-36.6
801	713017.41	4908000.15	11.00	0	DEN	1000	44.3	0.0	0.0	0.0	0.0	63.9	1.6	-2.4	0.0	0.0	22.7	0.0	0.0	-41.5
801	713017.41	4908000.15	11.00	0	DEN	2000	62.3	0.0	0.0	0.0	0.0	63.9	4.3	-2.6	0.0	0.0	25.0	0.0	0.0	-28.3
801	713017.41	4908000.15	11.00	0	DEN	4000	53.4	0.0	0.0	0.0	0.0	63.9	14.4	-2.6	0.0	0.0	25.0	0.0	0.0	-47.4
801	713017.41	4908000.15	11.00	0	DEN	8000	60.2	0.0	0.0	0.0	0.0	63.9	51.5	-2.6	0.0	0.0	25.0	0.0	0.0	-77.7
803	713017.41	4908000.15	11.00	1	DEN	32	50.6	0.0	0.0	0.0	0.0	63.9	0.0	-3.5	0.0	0.0	7.2	0.0	1.0	-18.1
803	713017.41	4908000.15	11.00	1	DEN	63	56.3	0.0	0.0	0.0	0.0	63.9	0.1	-3.5	0.0	0.0	8.9	0.0	1.0	-14.1
803	713017.41	4908000.15	11.00	1	DEN	125	57.3	0.0	0.0	0.0	0.0	63.9	0.2	-1.9	0.0	0.0	11.1	0.0	1.0	-17.0
803	713017.41	4908000.15	11.00	1	DEN	250	32.9	0.0	0.0	0.0	0.0	63.9	0.5	-0.8	0.0	0.0	14.2	0.0	1.0	-45.9
803	713017.41	4908000.15	11.00	1	DEN	500	45.4	0.0	0.0	0.0	0.0	63.9	0.9	-1.3	0.0	0.0	18.4	0.0	1.0	-37.4
803	713017.41	4908000.15	11.00	1	DEN	1000	44.3	0.0	0.0	0.0	0.0	63.9	1.6	-2.4	0.0	0.0	22.6	0.0	1.0	-42.4
803	713017.41	4908000.15	11.00	1	DEN	2000	62.3	0.0	0.0	0.0	0.0	63.9	4.3	-2.6	0.0	0.0	25.0	0.0	1.0	-29.3
803	713017.41	4908000.15	11.00	1	DEN	4000	53.4	0.0	0.0	0.0	0.0	63.9	14.5	-2.6	0.0	0.0	25.0	0.0	1.0	-48.4
803	713017.41	4908000.15	11.00	1	DEN	8000	60.2	0.0	0.0	0.0	0.0	63.9	51.7	-2.6	0.0	0.0	25.0	0.0	1.0	-78.8
805	713017.41	4908000.15	11.00	1	DEN	250	32.9	0.0	0.0	0.0	0.0	65.0	0.5	-0.9	0.0	0.0	22.0	0.0	1.0	-54.7
805	713017.41	4908000.15	11.00	1	DEN	500	45.4	0.0	0.0	0.0	0.0	65.0	1.0	-1.5	0.0	0.0	25.0	0.0	1.0	-45.1
805	713017.41	4908000.15	11.00	1	DEN	1000	44.3	0.0	0.0	0.0	0.0	65.0	1.8	-2.5	0.0	0.0	25.0	0.0	1.0	-46.0
805	713017.41	4908000.15	11.00	1	DEN	2000	62.3	0.0	0.0	0.0	0.0	65.0	4.8	-2.7	0.0	0.0	25.0	0.0	1.0	-30.8
805	713017.41	4908000.15	11.00	1	DEN	4000	53.4	0.0	0.0	0.0	0.0	65.0	16.4	-2.7	0.0	0.0	25.0	0.0	1.0	-51.3
805	713017.41	4908000.15	11.00	1	DEN	8000	60.2	0.0	0.0	0.0	0.0	65.0	58.6	-2.7	0.0	0.0	25.0	0.0	1.0	-86.7

Point Source, ISO 9613, Name: "GETS Hood", ID: "gets_hood"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
814	713104.07	4908025.10	2.30	0	DEN	63	51.0	0.0	0.0	3.0	0.0	65.0	0.1	-5.3	0.0	0.0	19.5	0.0	0.0	-25.2
814	713104.07	4908025.10	2.30	0	DEN	125	55.1	0.0	0.0	3.0	0.0	65.0	0.2	-2.4	0.0	0.0	22.4	0.0	0.0	-27.1
814	713104.07	4908025.10	2.30	0	DEN	250	60.6	0.0	0.0	3.0	0.0	65.0	0.5	-0.8	0.0	0.0	25.0	0.0	0.0	-26.1
814	713104.07	4908025.10	2.30	0	DEN	500	56.0	0.0	0.0	3.0	0.0	65.0	1.0	-2.3	0.0	0.0	25.0	0.0	0.0	-29.6
814	713104.07	4908025.10	2.30	0	DEN	1000	51.2	0.0	0.0	3.0	0.0	65.0	1.8	-3.7	0.0	0.0	25.0	0.0	0.0	-33.9
814	713104.07	4908025.10	2.30	0	DEN	2000	49.4	0.0	0.0	3.0	0.0	65.0	4.8	-3.9	0.0	0.0	25.0	0.0	0.0	-38.5
814	713104.07	4908025.10	2.30	0	DEN	4000	52.2	0.0	0.0	3.0	0.0	65.0	16.4	-3.9	0.0	0.0	25.0	0.0	0.0	-47.3
814	713104.07	4908025.10	2.30	0	DEN	8000	45.1	0.0	0.0	3.0	0.0	65.0	58.4	-3.9	0.0	0.0	25.0	0.0	0.0	-96.4
829	713104.07	4908025.10	2.30	1	DEN	250	60.6	0.0	0.0	3.0	0.0	66.8	0.6	-0.9	0.0	0.0	24.6	0.0	1.0	-28.6
829	713104.07	4908025.10	2.30	1	DEN	500	56.0	0.0	0.0	3.0	0.0	66.8	1.2	-2.4	0.0	0.0	25.0	0.0	1.0	-32.5
829	713104.07	4908025.10	2.30	1	DEN	1000	51.2	0.0	0.0	3.0	0.0	66.8	2.2	-3.8	0.0	0.0	25.0	0.0	1.0	-37.0
829	713104.07	4908025.10	2.30	1	DEN	2000	49.4	0.0	0.0	3.0	0.0	66.8	5.9	-4.0	0.0	0.0	25.0	0.0	1.0	-42.3
829	713104.07	4908025.10	2.30	1	DEN	4000	52.2	0.0	0.0	3.0	0.0	66.8	20.1	-4.0	0.0	0.0	25.0	0.0	1.0	-53.7
829	713104.07	4908025.10	2.30	1	DEN	8000	45.1	0.0	0.0	3.0	0.0	66.8	71.8	-4.0	0.0	0.0	25.0	0.0	1.0	-112.4

Point Source, ISO 9613, Name: "GETS Hood_In", ID: "gets_hood"																			
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Di	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
837	713094.79	4908021.73	2.30	0	DEN	32	-39.4	0.0	0.0	3.0	0.0	64.9	0.0	-5.3	0.0	0.0	17.6	0.0	0.0	-113.6
837	713094.79	4908021.73	2.30	0	DEN	63	50.9	0.0	0.0	3.0	0.0	64.9	0.1	-5.3	0.0	0.0	20.6	0.0	0.0	-26.3
837	713094.79	4908021.73	2.30	0	DEN	125	52.5	0.0	0.0	3.0	0.0	64.9	0.2	-2.4	0.0	0.0	23.6	0.0	0.0	-30.7
837	713094.79	4908021.73	2.30	0	DEN	250	61.2	0.0	0.0	3.0	0.0	64.9	0.5	-0.8	0.0	0.0	25.0	0.0	0.0	-25.4
837	713094.79	4908021.73	2.30	0	DEN	500	56.9	0.0	0.0	3.0	0.0	64.9	1.0	-2.3	0.0	0.0	25.0	0.0	0.0	-28.6
837	713094.79	4908021.73	2.30	0	DEN	1000	51.8	0.0	0.0	3.0	0.0	64.9	1.8	-3.7	0.0	0.0	25.0	0.0	0.0	-33.2
837	713094.79	4908021.73	2.30	0	DEN	2000	46.4	0.0	0.0	3.0	0.0	64.9	4.8	-3.9	0.0	0.0	25.0	0.0	0.0	-41.4
837	713094.79	4908021.73	2.30	0	DEN	4000	45.5	0.0	0.0	3.0	0.0	64.9	16.2	-3.9	0.0	0.0	25.0	0.0	0.0	-53.7
837	713094.79	4908021.73	2.30	0	DEN	8000	38.8	0.0	0.0	3.0	0.0	64.9	57.7	-3.9	0.0	0.0	25.0	0.0	0.0	-101.9
845	713094.79	4908021.73	2.30	1	DEN	500	56.9	0.0	0.0	3.0	0.0	66.9	1.2	-2.4	0.0	0.0	25.0	0.0	1.0	-31.7
845	713094.79	4908021.73	2.30	1	DEN	1000	51.8	0.0	0.0	3.0	0.0	66.9	2.3	-3.8	0.0	0.0	25.0	0.0	1.0	-36.5
845	713094.79	4908021.73	2.30	1	DEN	2000	46.4	0.0	0.0	3.0	0.0	66.9	6.0	-4.0	0.0	0.0	25.0	0.0	1.0	-45.5
845	713094.79	4908021.73	2.30	1	DEN	4000	45.5	0.0	0.0	3.0	0.0	66.9	20.4	-4.0	0.0	0.0	25.0	0.0	1.0	-60.7
845	713094.79	4908021.73	2.30	1	DEN	8000	38.8	0.0	0.0	3.0	0.0	66.9	72.7	-4.0	0.0	0.0	25.0	0.0	1.0	-119.7

Existing Scenario Noise Impact Table - 1

ID	Result. PWL Day (dBA)	Correction / Penalty	Coordinates X (m)	Coordinates Y (m)		R01_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R02_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R03_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R04_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R04_OPR	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)
					X(m):	712666				712846				712886				712930				712932			
					Y(m):	4908267				4908328				4908338				4908362				4908358			
		0	713060	4908247		394	32	0	0	229	42	0	0	197	42	0	0	174	45	0	0	170	44	0	0
		0	713066	4908227		402	29	29	29	242	31	31	31	212	34	34	34	192	37	37	37	188	35	35	35
		0	713095	4908237		429	19	19	19	265	27	27	27	232	27	27	27	207	33	33	33	203	32	32	32
		0	713136	4908124		491	5	5	5	355	14	14	14	330	11	11	11	315	23	23	23	311	20	20	20
		0	713152	4908086		518	6	6	6	390	14	14	14	367	13	13	13	355	25	25	25	350	21	21	21
		0	713040	4908066		424	11	11	11	325	18	18	18	313	13	13	13	316	12	12	12	311	11	11	11
		0	713031	4908187		374	21	21	21	233	32	32	32	210	34	34	34	202	37	37	37	198	35	35	35
		0	713092	4908020		492	0	0	0	394	0	0	0	379	0	0	0	378	0	0	0	374	0	0	0
		0	713029	4907996		452	-14	-14	-14	379	-15	-15	-15	371	-14	-14	-14	379	-15	-15	-15	375	-15	-15	-15
		0	712943	4908221		281	33	33	33	144	39	39	39	130	42	42	42	142	29	29	29	137	28	28	28
		0	712953	4908225		290	35	35	35	149	40	40	40	132	35	35	35	139	20	20	20	135	19	19	19
		0	712964	4908229		301	28	28	28	154	33	33	33	135	27	27	27	138	30	30	30	133	27	27	27
		0	712979	4908234		314	28	28	28	163	29	29	29	140	27	27	27	138	36	36	36	133	35	35	35
		0	713015	4908005		436	0	0	0	364	8	8	8	357	5	5	5	367	-3	-3	-3	363	-5	-5	-5
		0	713017	4908000		441	-8	-8	-8	370	1	1	1	363	-1	-1	-1	373	-5	-5	-5	368	-12	-12	-12
		0	713257	4908166		599	12	12	12	441	15	15	15	409	13	13	13	381	13	13	13	378	11	11	11
		0	713271	4908170		612	3	3	3	453	8	8	8	420	3	3	3	391	5	5	5	388	3	3	3
		0	712897	4908083		295	10	10	10	251	27	27	27	256	24	24	24	282	26	26	26	278	24	24	24
		0	712878	4908115		261	11	11	11	215	29	29	29	223	24	24	24	252	25	25	25	249	22	22	22
		0	712868	4908174		222	20	20	20	155	31	31	31	165	27	27	27	198	37	37	37	195	35	35	35
		0	713186	4908092		549	3	3	3	414	-9	-9	-9	389	-9	-9	-9	373	-7	-7	-7	369	-7	-7	-7
		0	713198	4908063		570	-16	-16	-16	441	0	0	0	416	-9	-9	-9	402	4	4	4	398	1	1	1
		0	713196	4908069		565	-16	-16	-16	435	0	0	0	411	-9	-9	-9	396	4	4	4	392	1	1	1
		0	713132	4908262		466	14	0	0	293	19	0	0	258	19	0	0	225	23	0	0	222	21	0	0
		0	713165	4908172		508	15	15	15	355	16	16	16	325	20	20	20	302	21	21	21	298	17	17	17
		0	713123	4908195		462	18	18	18	307	20	20	20	277	24	24	24	255	27	27	27	251	24	24	24
		0	713138	4908159		484	18	18	18	337	18	18	18	309	22	22	22	291	24	24	24	287	23	23	23
		0	713128	4908209		466	13	13	13	306	18	18	18	275	18	18	18	250	20	20	20	247	19	19	19
		0	713152	4908142		502	22	22	22	358	26	26	26	331	30	30	30	313	33	33	33	309	32	32	32
		0	713102	4908211		439	7	7	7	281	12	12	12	251	12	12	12	229	16	16	16	225	15	15	15
		0	713105	4908208		443	7	7	7	286	11	11	11	256	12	12	12	234	16	16	16	230	14	14	14
		0	712985	4908291		320	25	25	25	144	32	32	32	110	33	33	33	90	37	37	37	86	36	36	36
		0	713095	4908022		494	-21	-21	-21	394	-18	-18	-18	379	-19	-19	-19	378	-18	-18	-18	374	-18	-18	-18
		0	713095	4908022		494	-21	-21	-21	394	-18	-18	-18	379	-19	-19	-19	378	-18	-18	-18	374	-18	-18	-18
		0	713100	4908023		497	-18	-18	-18	397	-17	-17	-17	381	-18	-18	-18	379	-16	-16	-16	375	-17	-17	-17

Existing Scenario Noise Impact Table - 2

[redacted]	Result. PWL Day (dBA)	Correction / Penalty	Coordinates X (m)	Coordinates Y (m)		R05_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R05_OPR	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R06_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R07_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R08_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)
					X(m):	713080				713081				713216				713101				713039			
					Y(m):	4908418				4908414				4908043				4907996				4907974			
		0	713060	4908247		172	48	0	0	168	44	0	0	257	31	0	0	254	30	0	0	274	20	0	0
		0	713066	4908227		191	37	37	37	187	35	35	35	237	26	26	26	234	25	25	25	255	14	14	14
		0	713095	4908237		182	19	19	19	178	17	17	17	229	25	25	25	241	18	18	18	269	13	13	13
		0	713136	4908124		299	26	26	26	296	24	24	24	113	21	21	21	132	27	27	27	178	15	15	15
		0	713152	4908086		340	22	22	22	336	18	18	18	77	23	23	23	103	33	33	33	159	18	18	18
		0	713040	4908066		354	15	15	15	350	15	15	15	177	22	22	22	93	23	23	23	93	23	23	23
		0	713031	4908187		236	38	38	38	232	36	36	36	234	17	17	17	203	20	20	20	214	14	14	14
		0	713092	4908020		397	0	0	0	394	0	0	0	126	0	0	0	26	0	0	0	70	0	0	0
		0	713029	4907996		424	-16	-16	-16	421	-17	-17	-17	192	19	19	19	72	28	28	28	25	37	37	37
		0	712943	4908221		239	24	24	24	237	24	24	24	326	7	7	7	275	11	11	11	266	19	19	19
		0	712953	4908225		230	28	28	28	228	27	27	27	319	10	10	10	272	12	12	12	266	15	15	15
		0	712964	4908229		221	32	32	32	219	30	30	30	313	17	17	17	270	17	17	17	266	14	14	14
		0	712979	4908234		210	32	32	32	207	30	30	30	304	15	15	15	267	15	15	15	267	8	8	8
		0	713015	4908005		417	-3	-3	-3	414	-4	-4	-4	204	3	3	3	87	11	11	11	40	23	23	23
		0	713017	4908000		422	-13	-13	-13	419	-13	-13	-13	203	-5	-5	-5	84	5	5	5	34	18	18	18
		0	713257	4908166		308	21	21	21	304	20	20	20	130	22	22	22	230	15	15	15	290	6	6	6
		0	713271	4908170		313	21	21	21	309	20	20	20	138	14	14	14	242	9	9	9	303	2	2	2
		0	712897	4908083		382	19	19	19	379	16	16	16	321	16	16	16	222	16	16	16	179	20	20	20
		0	712878	4908115		363	18	18	18	361	12	12	12	345	12	12	12	253	12	12	12	214	14	14	14
		0	712868	4908174		323	21	21	21	321	19	19	19	372	16	16	16	294	17	17	17	264	19	19	19
		0	713186	4908092		343	4	4	4	339	4	4	4	57	35	35	35	128	5	5	5	189	2	2	2
		0	713198	4908063		374	5	5	5	370	3	3	3	27	34	34	34	118	19	19	19	182	13	13	13
		0	713196	4908069		368	6	6	6	364	4	4	4	33	32	32	32	119	14	14	14	183	10	10	10
		0	713132	4908262		164	44	0	0	160	43	0	0	235	20	0	0	268	19	0	0	303	15	0	0
		0	713165	4908172		260	21	21	21	256	19	19	19	139	33	33	33	187	19	19	19	235	9	9	9
		0	713123	4908195		227	23	23	23	223	23	23	23	178	25	25	25	200	20	20	20	237	15	15	15
		0	713138	4908159		265	25	25	25	261	24	24	24	140	25	25	25	167	23	23	23	210	16	16	16
		0	713128	4908209		214	29	29	29	210	28	28	28	188	38	38	38	215	28	28	28	252	23	23	23
		0	713152	4908142		285	37	37	37	281	34	34	34	118	33	33	33	154	26	26	26	203	21	21	21
		0	713102	4908211		208	17	17	17	204	16	16	16	203	5	5	5	215	4	4	4	245	0	0	0
		0	713105	4908208		212	17	17	17	208	16	16	16	198	5	5	5	212	4	4	4	243	0	0	0
		0	712985	4908291		158	32	32	32	156	31	31	31	339	5	5	5	317	4	4	4	322	2	2	2
		0	713095	4908022		396	-15	-15	-15	393	-16	-16	-16	123	16	16	16	26	24	24	24	73	-2	-2	-2
		0	713095	4908022		396	-15	-15	-15	393	-16	-16	-16	123	16	16	16	26	24	24	24	73	-2	-2	-2
		0	713100	4908023		395	-13	-13	-13	391	-15	-15	-15	117	21	21	21	27	32	32	32	78	15	15	15

Existing Scenario Noise Impact Table - 3

ID	Result. PWL Day (dBA)	Correction / Penalty	Coordinates X (m)	Coordinates Y (m)		R09_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R10_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R11_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R11_OPR	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)
					X(m):	713247				712693				712874				712857			
					Y(m):	4908321				4907831				4907914				4907901			
		0	713060	4908247		201	44	0	0	555	29	0	0	382	31	0	0	402	28	0	0
		0	713066	4908227		203	37	37	37	544	22	22	22	368	20	20	20	388	17	17	17
		0	713095	4908237		174	20	20	20	570	12	12	12	391	15	15	15	411	13	13	13
		0	713136	4908124		226	29	29	29	531	15	15	15	336	20	20	20	357	17	17	17
		0	713152	4908086		253	25	25	25	525	19	19	19	327	20	20	20	348	18	18	18
		0	713040	4908066		328	21	21	21	419	15	15	15	226	22	22	22	247	20	20	20
		0	713031	4908187		254	31	31	31	491	10	10	10	316	12	12	12	335	10	10	10
		0	713092	4908020		338	0	0	0	441	0	0	0	243	0	0	0	264	0	0	0
		0	713029	4907996		391	-15	-15	-15	374	13	13	13	176	21	21	21	197	19	19	19
		0	712943	4908221		320	12	12	12	463	24	24	24	315	22	22	22	332	20	20	20
		0	712953	4908225		309	10	10	10	472	24	24	24	321	22	22	22	338	20	20	20
		0	712964	4908229		297	25	25	25	482	19	19	19	328	23	23	23	345	21	21	21
		0	712979	4908234		282	25	25	25	494	19	19	19	337	23	23	23	355	21	21	21
		0	713015	4908005		391	-2	-2	-2	366	12	12	12	169	20	20	20	190	18	18	18
		0	713017	4908000		394	-13	-13	-13	366	5	5	5	168	13	13	13	189	12	12	12
		0	713257	4908166		155	25	25	25	655	10	10	10	459	13	13	13	480	11	11	11
		0	713271	4908170		153	28	28	28	669	4	4	4	472	6	6	6	493	4	4	4
		0	712897	4908083		423	18	18	18	324	20	20	20	170	29	29	29	186	27	27	27
		0	712878	4908115		422	14	14	14	339	15	15	15	201	19	19	19	215	14	14	14
		0	712868	4908174		406	22	22	22	385	26	26	26	261	32	32	32	274	20	20	20
		0	713186	4908092		237	12	12	12	558	-7	-7	-7	360	-4	-4	-4	381	-4	-4	-4
		0	713198	4908063		262	11	11	11	556	2	2	2	357	7	7	7	378	6	6	6
		0	713196	4908069		257	12	12	12	556	1	1	1	357	6	6	6	378	5	5	5
		0	713132	4908262		129	47	0	0	615	10	0	0	434	14	0	0	454	12	0	0
		0	713165	4908172		169	32	32	32	582	11	11	11	389	13	13	13	411	11	11	11
		0	713123	4908195		177	30	30	30	563	16	16	16	376	18	18	18	397	16	16	16
		0	713138	4908159		195	33	33	33	552	16	16	16	360	18	18	18	381	16	16	16
		0	713128	4908209		163	31	31	31	576	24	24	24	390	26	26	26	411	24	24	24
		0	713152	4908142		202	43	43	43	554	22	22	22	360	25	25	25	381	22	22	22
		0	713102	4908211		182	6	6	6	558	-1	-1	-1	375	4	4	4	395	2	2	2
		0	713105	4908208		181	6	6	6	558	-4	-4	-4	374	2	2	2	395	-1	-1	-1
		0	712985	4908291		264	29	29	29	545	1	1	1	393	5	5	5	411	4	4	4
		0	713095	4908022		335	-14	-14	-14	445	-17	-17	-17	246	-13	-13	-13	267	-13	-13	-13
		0	713095	4908022		335	-14	-14	-14	445	-17	-17	-17	246	-13	-13	-13	267	-13	-13	-13
		0	713100	4908023		332	-11	-11	-11	450	-6	-6	-6	252	-1	-1	-1	272	-1	-1	-1

Future Scenario Noise Impact Table - 1

ID	Result. PWL Day (dBA)	Correction / Penalty	Coordinates X (m)	Coordinates Y (m)		R01_POW 712666 4908267	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R02_POW 712846 4908328	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R03_POW 712886 4908338	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R04_POW 712930 4908362	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R04_OPR 712932 4908358	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)
[redacted]		0	713095	4908022		494	-9	-9	-	394	5	5	-	379	4	4	-	378	6	6	-	374	5	5	-
		0	713095	4908022		494	-9	-9	-	394	5	5	-	379	4	4	-	378	6	6	-	374	5	5	-
		0	713100	4908023		497	-11	-11	-	397	6	6	-	381	5	5	-	379	7	7	-	375	6	6	-
		0	713257	4908166		599	16	16	-	441	20	20	-	409	18	18	-	381	14	14	-	378	12	12	-
		0	713271	4908170		612	9	9	-	453	11	11	-	420	3	3	-	391	7	7	-	388	5	5	-

Future Scenario Noise Impact Table - 2

ID	Result. PWL Day (dBA)	Correction / Penalty	Coordinates X (m)	Coordinates Y (m)		R05_POW 713080 4908418	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R05_OPR 713081 4908414	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R06_POW 713216 4908043	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R07_POW 713101 4907996	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R08_POW 713039 4907974	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)
[redacted]		0	713095	4908022		396	5	5	-	393	4	4	-	123	10	10	-	26	21	21	-	73	14	14	-
		0	713095	4908022		396	5	5	-	393	4	4	-	123	10	10	-	26	21	21	-	73	14	14	-
		0	713100	4908023		395	6	6	-	391	5	5	-	117	17	17	-	27	30	30	-	78	20	20	-
		0	713257	4908166		308	21	21	-	304	20	20	-	130	22	22	-	230	27	27	-	290	24	24	-
		0	713271	4908170		313	21	21	-	309	20	20	-	138	14	14	-	242	16	16	-	303	13	13	-

Future Scenario Noise Impact Table - 3

ID	Result. PWL Day (dBA)	Correction / Penalty	Coordinates X (m)	Coordinates Y (m)		R09_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R10_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R11_POW	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)	R11_OPR	Day Leq (dBA)	Eve Leq (dBA)	Night Leq (dBA)
					X(m):	713247				712693				712874				712857			
					Y(m):	4908321				4907831				4907914				4907901			
[redacted]		0	713095	4908022		335	6	6	-	445	1	1	-	246	6	6	-	267	5	5	-
		0	713095	4908022		335	6	6	-	445	1	1	-	246	6	6	-	267	5	5	-
		0	713100	4908023		332	8	8	-	450	5	5	-	252	10	10	-	272	9	9	-
		0	713257	4908166		155	25	25	-	655	14	14	-	459	20	20	-	480	19	19	-
		0	713271	4908170		153	28	28	-	669	8	8	-	472	11	11	-	493	10	10	-

Appendix E

Acoustic Assessment Report Checklist

Ontario

Ministry of the Environment, Conservation and Parks

Acoustic Assessment Report Check-List

Company Name

GEPR Energy Canada Inc.

Company Address

Unit Number	Street Number	Street Name	PO Box
	107	Park Street North	

City/Town	Province	Postal Code
Peterborough	Ontario	K9J 3V6

Location of Facility

107 Park Street North, Peterborough, Ontario, K9J 3V6

The attached Acoustic Assessment Report was prepared in accordance with the guidance in the ministry document "Information to be Submitted for Approval of Stationary Sources of Sound" (NPC-233) dated October 1995 and the minimum required information identified in the check-list on the reverse of this sheet has been submitted.

Company Contact

☑ By checking this each of the undersigned acknowledge that in providing their name on the applicable line below in electronic form will constitute a signature for the purposes of the *Electronic Commerce Act, 2000*, S.O. 2000, c. 17.

Company Contact

John Jankowski

Last Name	First Name	Middle Initial
Jankowski	John	

Title	Telephone Number
Site Operations Leader	705-748-7579

Signature	Date (yyyy/mm/dd)
	2025/03/05

Technical Contact

☑ By checking this each of the undersigned acknowledge that in providing their name on the applicable line below in electronic form will constitute a signature for the purposes of the *Electronic Commerce Act, 2000*, S.O. 2000, c. 17.

Technical Contact

AECOM Canada Ltd.

Last Name	First Name	Middle Initial
Jo-Daria	Joseph	

Representing	Telephone Number
GEPR Energy Canada Inc.	905-305-1283

Signature	Date (yyyy/mm/dd)
	2025/03/05

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	Required Information	Submitted	Explanation/Reference
1.0	**Introduction (Project Background and Overview)**	☑ Yes	Section 1
2.0	**Facility Description**		
	2.1 Operating hours of Facility and significant Noise Sources	☑ Yes	Section 2
	2.2 Site Plan identifying all significant Noise Sources	☑ Yes	Figure 2
3.0	**Noise Source Summary**		
	3.1 Noise Source Summary Table	☑ Yes	Table 6
	3.2 Source noise emissions specifications	☑ Yes	Table 6 Appendix B / C
	3.3 Source power/capacity ratings	☑ Yes	Table 6 Appendix B / C
	3.4 Noise control equipment description and acoustical specifications	☐ Yes	N/A
4.0	**Point of Reception Noise Impact Calculations**		
	4.1 Point of Reception Noise Impact Table	☑ Yes	Appendix D
	4.2 Point(s) of Reception (POR) list and description	☑ Yes	Section 3
	4.3 Land-use Zoning Plan	☑ Yes	Appendix A
	4.4 Scaled Area Location Plan	☑ Yes	Figure 1
	4.5 Procedure used to assess noise impacts at each POR	☑ Yes	Section 6
	4.6 List of parameters/assumptions used in calculations	☑ Yes	Appendix D
5.0	**Acoustic Assessment Summary**		
	5.1 Acoustic Assessment Summary Table	☑ Yes	Table 7
	5.2 Rationale for selecting applicable noise guideline limits	☑ Yes	Section 4
	5.3 Predictable Worst Case Impacts Operating Scenario	☑ Yes	Section 6
6.0	**Conclusions**		
	6.1 Statement of compliance with the selected noise performance limits	☑ Yes	Section 7
7.0	**Appendices (Provide details such as)**		
	Listing of Insignificant Noise Sources	☐ Yes	N/A
	Manufacturer's Noise Specifications	☑ Yes	Appendix B
	Calculations	☑ Yes	Appendix C / D
	Instrumentation	☐ Yes	N/A
	Meteorology during Sound Level Measurements	☐ Yes	N/A
	Raw Data from Measurements	☐ Yes	N/A
	Drawings (Facility / Equipment)	☑ Yes	Appendix B

AECOM Canada ULC
900-5090 Explorer Drive
Mississauga, ON L4W 4T9
Canada

T: 905 238 0007
aecom.com

Appendix 10: GEPR Energy Canada Inc., “Request for Notice Under s.7(1) of Local Air Quality Regulation for Use of a Specified Dispersion Model”

Ontario

Ministry of the Environment and Climate Change

Request for Notice Under s. 7(1) of Local Air Quality Regulation for Use of a Specified Dispersion Model

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 the use of a specified dispersion model under s.7 of Ontario Regulation 419/05: Air Pollution – Local Air Quality (the Regulation) made under the EPA. Incomplete forms will be returned to the requestor. Even if this form is accepted as compete, the Ministry of the Environment and Climate Change (Ministry) may request additional information during the review of this request.

1. Technical questions regarding the suitability of specific meteorological data sets or meteorological observations should be directed to the Environmental Monitoring and Reporting Branch (EMRB). Questions regarding completion and submission of this request should be directed to EMRB at the address below or to the local 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 at www.ontario.ca/environment-and-energy/ministry-environment-and-climate-change-district-locator.
2. This form and any supporting data and calculations must be submitted electronically to the following email address: MetDataENE@ontario.ca. If electronic submission is not possible, two copies of this form must be submitted to the Ministry.

   The original should be sent to:

   Ministry of the Environment and Climate Change
   Director, Local Air Quality Regulation, s.7
   Environmental Monitoring and Reporting Branch
   125 Resources Road
   Toronto (Etobicoke) Ontario M9P 3V6
   Phone: 416-235-6300

   A copy of this form should also be sent to the local 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 at www.ontario.ca/environment-and-energy/ministry-environment-and-climate-change-district-locator.
3. 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* (FOIPPA) and the EBR. If you do not claim confidentiality at the time of submitting the information, the Ministry may make the information available to the public without further notice to you.

Instructions

This form should be used to request the use of a specified dispersion model and should be accompanied by a description of the circumstances surrounding the request. In accordance with s. 7(1) of the Regulation, the Director may issue a written notice indicating that a specified model or combination of models would assess concentrations of contaminants discharged from the property at least as accurately as an approved dispersion model set out in s.6 (1) of the Regulation. For more information about air dispersion modelling, please refer to the "Air Dispersion Modelling Guideline for Ontario". This document and other related publications are available on the Ministry Internet site at www.ontario.ca/environment-and-energy/rules-air-quality-and-pollution.

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Regulatory Authority

Subsection 7(1) of the Regulation states:

7. (1) The Director may give written notice to a person who discharges or causes or permits the discharge of a contaminant from a property stating that the Director is of the opinion that, with respect to discharges of the contaminant from that property,

(a) one or more dispersion models specified in the notice would predict concentrations of the contaminant at least as accurately as an approved dispersion model;

(b) a combination specified in the notice of two or more dispersion models would predict concentrations of the contaminant at least as accurately as an approved dispersion model;

(c) a combination specified in the notice of one or more dispersion models and one or more sampling and measuring techniques would predict concentrations of the contaminant at least as accurately as an approved dispersion model; or

(d) one or more approved dispersion models specified in the notice would predict concentrations of the contaminant less accurately than,

(i) a dispersion model or combination specified under clause (a), (b) or (c), or

(ii) another approved dispersion model.

Section 1 - Requestor Information (Owner of facility)

Requestor Name (legal name of individual or organization as evidenced by legal documents)

Last Name	First Name

Business Name (the name under which the entity is operating or trading if different from the Requestor Name - also referred to as trade name)
GEPR Energy Canada Inc.

Business Number (use business number provided for Environmental Compliance Approval (ECA) or Environmental Activity and Sector Registry (EASR))
0000 0007 3266 5401

Business Website Address
www.gevernova.com

Primary North American Industry Classification System (NAICS) Code
541330

Other NAICS Code
562910

Requestor Type

☑ Corporation ☐ Individual ☐ Partnership ☐ Sole Proprietor ☐ Federal Government
☐ Municipal Government ☐ Provincial Government ☐ Other

Other specify

Business Activity Description (a narrative description of the business endeavour, this may include products sold, services provided or machinery/equipment used, etc.)
Engineering services through an administrative building, and one water treatment system with an air stripper.

Contact Details

Last Name	First Name	Telephone Number

Section 2 - Site Information / Physical Address (location where activity takes place)

Site Name	MOECC District Office
GE Peterborough	Peterborough District Office

Civic Address

Unit Number	Street Number	Street Name	PO Box
	107	Park Street North	

City/Town	Province	Postal Code
Peterborough	Ontario	K9J 3V6

Survey Address

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

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

Municipality/Unorganized Township or Territory Upper Tier/District	Postal Code

Telephone Number ext.	Fax Number	Mobile Number	Email Address

Geo Reference (required)

Description of location	Map Datum	Zone	Accuracy Estimate	Geo-Referencing Method	UTM Easting	UTM Northing
Main entrance	NAD83	17	+/- 5 m	Google Earth	713280.74	4908158.23
Southwest corner-property	NAD83	17	+/- 5 m	Google Earth	712888.19	4907934.49

Which of the following sections of the Regulation currently applies to your facility?

☐ s.19 (Schedule 2) ☐ s.20 (Schedule 3)

Section 3 - Technical Contact

Last Name	First Name
Arsenault	Danielle

Company
AECOM Canada ULC

Address Information

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

Civic Address

Unit Number	Street Number	Street Name	PO Box
201	45	Goderich Road	

City/Town	Province	Postal Code
Hamilton	Ontario	L8E 4W8

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

Municipality/Unorganized Township or Territory	County/District	Province/State	Country	Postal Code

Telephone Number ext.	Fax Number	Mobile Number	Email Address
905-538-3021		289-527-2686	danielle.arsenault@aecom.com

Section 4 - Reason(s) for Request

The use of the specified model is being requested in regards to (check all that apply):

☑ An application for an Environmental Compliance Approval (ECA) (Please provide ECA Number or Application Reference Number) to be submitted to MECP

Is this an application for an ECA with Limited Operating Flexibility? ☐ Yes ☐ No

☐ An Emission Summary and Dispersion Modelling (ESDM) Report required by s.23, s.24 or s.25 of the Regulation

☐ An ESDM Report required by s.30 of the Regulation (exceedence of Upper Risk Thresholds)

☐ A request for a site-specific standard under s. 32 of the Regulation

☐ A request from the local District Office - abatement activity

☐ An EASR ESDM Report required by Ontario Regulation 1/17 – Registrations under Part II.2 of the Act – Activities Requiring Assessment of Air Emissions (Air Emissions EASR Regulation)

☐ Other (please indicate and attach copies of any documents specifying the modelling requirements, if applicable)

Section 5 - Information about the Specified Dispersion Model(s)

Model Name	Model Version Number
AERMOD	22112

Are the following attached or submitted?

Copies of an existing s. 7 (1) notice attached, if applicable ☐ Yes ☑ No

If no, reason?

No previous notices issued.

☑ This is a request to use a non-regulatory version of an approved dispersion model set out in subsection 6 (1) of the Regulation (see http://www.ontario.ca/environment-and-energy/rules-air-quality-and-pollution for details)

Are the following attached or submitted?

Rationale for use of the non regulatory version (i.e. a version that is different than the version adopted for the purpose of the Regulation) ☐ Yes ☑ No

If no, reason?

Current ESDM report was prepared using AERMOD v. 22112. MECP notice did not provide a rollout date in April.

☐ This is a request to use a specified model in combination with another model

Are the following attached or submitted?

Site-specific circumstance that warrant the use of the specified dispersion models ☐ Yes ☐ No

If no, reason?

Scenarios under which the combination of models would be used ☐ Yes ☐ No

If no, reason?

Copies of (1) all input and output files (2) an executable copy of the specified dispersion model ☐ Yes ☐ No

If no, reason?

☐ This is a request to use a specified model listed in the Air Dispersion Modelling Guideline for Ontario

Are the following attached or submitted?

Site-specific circumstance that warrant the use of the specified dispersion model ☐ Yes ☐ No

If no, reason?

Copies of (1) all input and output files (2) an executable copy of the specified dispersion model ☐ Yes ☐ No

If no, reason?

☐ This is a request to use a specified model not listed in the Air Dispersion Modelling Guideline for Ontario

Are the following attached or submitted?

Site-specific circumstance that warrant the use of the specified dispersion model ☐ Yes ☐ No

If no, reason?

An executable copy of the specified dispersion model (or reference to where it can be obtained) ☐ Yes ☐ No

If no, reason?

A copy of the user guide specific to the dispersion model named above ☐ Yes ☐ No

If no, reason?

A copy of any technical guidance available on the dispersion model named above ☐ Yes ☐ No

If no, reason?

A copy of any evaluation (e.g. comparison with monitoring studies, beta testing results) pertaining to the dispersion model named above ☐ Yes ☐ No

If no, reason?

☐ This is a request to use a specified dispersion model in combination with monitoring

Has there been discussion with the Ministry in regards to Combined Assessment of Modelled and Monitored Results (CAMM)? (e.g. in the context of a s. 11(1)3 approval) ☐ Yes ☐ No

If no, reason?

Has the Ministry required that a CAMM be conducted? (e.g. by way of a s. 11(2) notice) ☐ Yes ☐ No

If no, reason?

Contact the Environmental Monitoring and Reporting Branch for further information on pre-submission consultation.

Section 6 - Additional Facility Information

General Supporting Information Required	Attached or Submitted?	If No, reason?
Site Plan	☑ Yes ☐ No	
Location of Stacks & Buildings Identified	☑ Yes ☐ No	
Elevation Plan	☐ Yes ☑ No	Not available, building heights provided
Physical Location Information	☑ Yes ☐ No	
Surrounding Building Information	☐ Yes ☑ No	Not available
Local Terrain Information	☐ Yes ☑ No	Terrain data available from MECP
Downwash Effect Described (if applicable)	☐ Yes ☑ No	Not available

Section 7 - 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 3 of this form is authorized to act on my behalf for the purpose of obtaining a notice for use of a specified dispersion model under subsection 7 (1) of the Regulation.
- I have used the most recent request form (as obtained from the Ministry Internet site) at http://www.ontario.ca/environment-and-energy/rules-air-quality-and-pollution and I have included all necessary information required by the Regulation or identified on this form.

Name of Signing Authority

Last Name	First Name
Jankowski	John

Title: Site Operations Leader

Telephone Number	Fax Number	Mobile Number	Email Address
705-748-7579 ext.		705-875-0085	john.jankowski@gevernova.com

Signature  Date (yyyy/mm/dd): 2026/04/06

Address Information (if different from the site address)

Same as Site Physical Address? ☑ Yes ☐ No (If no, please provide signing authority mailing address information below)

Civic Address

Unit Number	Street Number	Street Name	PO Box
	107	Park Street North	

City/Town	Province	Postal Code
Toronto	Ontario	M5V 3C6

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

Municipality/Unorganized Township or Territory	County/District	Province/State	Country	Postal Code