metrovancouver
SERVICES AND SOLUTIONS FOR A LIVABLE REGION

To: Zero Waste Committee

From: Brent Kirkpatrick, Lead Senior Engineer, Solid Waste Operations, Solid Waste Services

Date: July 9, 2020 Meeting Date: July 17, 2020

Subject: **Waste-to-Energy Facility Environmental Monitoring and Reporting, 2019 Update**

RECOMMENDATION

That the Zero Waste Committee receive for information the report dated July 9, 2020, titled "Waste-to-Energy Facility Environmental Monitoring and Reporting, 2019 Update."

EXECUTIVE SUMMARY

The Metro Vancouver Waste-to-Energy Facility operates well within environmental standards and limits. All air emission related parameters monitored during 2019 were in compliance with Operational Certificate 107051. Continuous emissions monitoring data and all compliance reports are available on the Metro Vancouver website. Metro Vancouver has applied to the Ministry of Environment and Climate Change Strategy to defer a reduction in acid gas emission parameters to allow additional monitoring of ambient air quality in the vicinity of the Waste-to-Energy Facility. Metro Vancouver's existing ambient air monitoring system will be supplemented with new equipment at an existing monitoring station near to the Waste-to-Energy Facility and a new station will be installed immediately adjacent to the Waste-to-Energy Facility.

PURPOSE

The purpose of this report is to provide the Zero Waste Committee with an overview of the Waste-to-Energy Facility's environmental monitoring program and implementation of Operational Certificate requirements.

BACKGROUND

Metro Vancouver continuously monitors the environmental performance of the Metro Vancouver Waste-to-Energy Facility and since 2010, annual environmental performance summaries have been provided to the Zero Waste Committee for information.

This report provides updates on the facility's 2019 environmental performance and the implementation of the Waste-to-Energy Facility Operational Certificate requirements. The report is identified in the Zero Waste Committee annual work plan and as such is being brought forward at this time.

ENVIRONMENTAL MONITORING AND REPORTING UPDATE

Since the Waste-to-Energy Facility opened in 1988, Metro Vancouver has strived to continually reduce emissions through assessment, operational and plant infrastructure improvements and environmental controls. The Waste-to-Energy Facility is certified, on an annual basis, by the International Standards Organization to meet their Environmental Standard 14001. The certification requires an independent review of continuous improvement and compliance with all environmental regulations. In addition to satisfying regulatory requirements, environmental monitoring provides

Metro Vancouver with valuable data to assess existing plant operations and potential capital improvements.

To assess regulatory compliance, measurements from the environmental monitoring program are compared to the regulatory limits specified in the Waste-to-Energy Facility Operational Certificate 107051 issued by the BC Ministry of Environment and Climate Change Strategy. Results are reported in the following ways:

- Monthly compliance reports, which provide a summary of all air emissions monitoring results for each month, are provided to the BC Ministry of Environment and Climate Change Strategy, the City of Burnaby and the Fraser Health Authority, and are posted publicly on the Metro Vancouver website;
- Manual stack testing is conducted by an independent stack testing company four times a year for particulate matter, trace metals, total hydrocarbons, and hydrogen fluoride; and results are provided to the BC Ministry of Environment and Climate Change Strategy, City of Burnaby, Fraser Health Authority and posted publicly on the Metro Vancouver website;
- Stack testing for semi-volatile organic compounds is conducted once a year, and results are provided to the BC Ministry of Environment and Climate Change Strategy, City of Burnaby and Fraser Health Authority, and are posted publicly on the Metro Vancouver website;
- Annual reporting of greenhouse gas emissions is provided to both the BC Ministry of Environment and Climate Change Strategy and Environment and Climate Change Canada; and
- Annual reporting of substances emitted to air and contained in ash transferred for off-site disposal is provided to Environment and Climate Change Canada for the National Pollutant Release Inventory.

Environmental Monitoring Program

The 2019 Waste-to-Energy Facility environmental monitoring program consisted of the following:

- Air Emissions Monitoring – Continuous Emission Monitoring System:
    - The Waste-to-Energy Facility is equipped with a real-time flue gas continuous emission monitoring system that measures and records emission parameters at the exit of the air pollution control plant 24 hours per day, seven days a week, using a United States Environmental Protection Agency certified and auditable tracking system.
    - The following parameters are measured: sulphur dioxide, nitrogen oxides, carbon monoxide, carbon dioxide, hydrogen chloride, total hydrocarbons, and opacity.
    - The following key operational parameters are also monitored: furnace temperature, total flue gas flow, flue gas moisture and flue gas oxygen. This monitoring provides an indication of plant conditions and helps confirm that emissions monitored by manual stack testing are representative of year round conditions.

- Air Emissions Monitoring – Periodic Manual Stack Testing:
    - Four tests are conducted annually, one per quarter, in triplicate on each of the three plant lines to monitor for particulate matter, trace metals, total hydrocarbons and hydrogen fluoride.
    - A single test is conducted annually on one boiler (rotating between boilers each year) in triplicate to monitor for semi-volatile organic compounds, including dioxins and

furans, chlorobenzenes, chlorophenols, polychlorinated biphenyls and polycyclic aromatic hydrocarbons.

Fly and Bottom Ash Monitoring:

- Each fly ash load is tested prior to transport and disposal.
- Bottom ash samples are collected from each truck which is loaded with bottom ash for transport and disposal. Individual samples collected through the week are combined to form a composite sample which is tested weekly.

2019 Results

All air emission related parameters monitored during 2019 were in compliance with the requirements of Operational Certificate 107051. A summary of historic annual emission performance, including 2019 data, is included in the attachment.

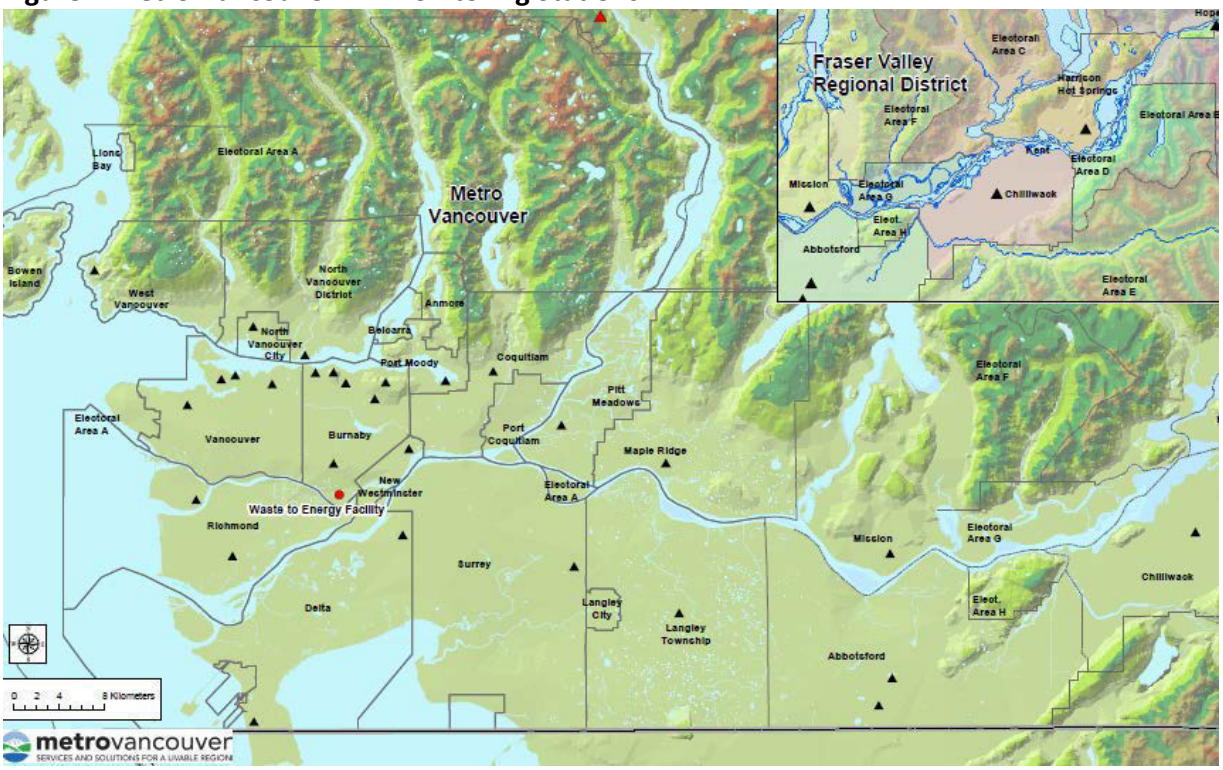
A non-ferrous recovery system was implemented in 2018 and has improved the physical and chemical characteristics of the bottom ash, increasing options for beneficial use of this material. As noted in this month's manager's report, procurement is underway for a business case for the beneficial use of bottom ash as an aggregate substitute to reduce regional disposal requirements by about 5%.

Operational Certificate Implementation

The Operational Certificate for the Waste-to-Energy Facility was issued by the BC Ministry of Environment and Climate Change Strategy on December 15, 2016. It includes response limits, discharge limits and other requirements.

Metro Vancouver has applied to the Ministry of Environment and Climate Change Strategy to amend the Operational Certificate for the Waste-to-Energy Facility. The amendment defers a reduction in discharge limits for sulphur dioxide and hydrogen chloride from December 31, 2022 to March 3, 2025. Dispersion modelling and a health risk assessment showed that at current Operational Certificate emission levels, sulphur dioxide and hydrogen chloride are not expected to exceed ambient air criteria. Delaying the reduction of limits for sulphur dioxide and hydrogen chloride would allow for further air monitoring to confirm ambient concentrations. By mid-2020, Metro Vancouver will install a new ambient air quality monitoring station at the Waste-to-Energy Facility site, and will install a hydrogen chloride monitor at the existing Burnaby South Monitoring Station to monitor ambient concentrations of emissions from the Waste-to-Energy Facility. A map of the 31 existing monitoring stations and the location of the new station at the Waste-to-Energy Facility is included in Figure 1. The draft amended Operational Certificate was posted for public comment in the Vancouver Sun and the Province on June 25 and July 6, 2020 and is available online at metrovancouver.org. Any feedback on the draft Operational Certificate will be reported back to the Board and the Ministry of Environment and Climate Change Strategy.

Figure 1 Metro Vancouver Air Monitoring Stations



Greenhouse Gas Emissions Reporting

In mid-2009, the federal and provincial governments each enacted legislation for mandatory reporting of greenhouse gas emissions for facilities with annual emissions above specified thresholds (50,000 (federal) and 10,000 (provincial) tonnes of carbon dioxide equivalent per year). Based on these thresholds, the Waste-to-Energy Facility is subject to federal and provincial reporting on both biogenic (renewable) and anthropogenic (man-made or non-renewable) greenhouse gas emissions.

2019 greenhouse gas emissions were verified by PwC Canada, and reported to the provincial and federal governments. Greenhouse gas emissions from the Waste-to-Energy Facility are comprised mainly of carbon dioxide with small amounts of methane and nitrous oxides. Total emissions are reported as carbon dioxide equivalents. Total 2019 greenhouse gas emissions were 274,151 tonnes, a decrease of approximately 1% compared to 2018. Of these emissions, 43% are anthropogenic and 57% are biogenic.

Anthropogenic greenhouse gas emissions for 2019 were 121,503 tonnes. Over the past three years, the anthropogenic portion of greenhouse gas emissions has ranged from 40% to 45%. As in past reporting years, the Waste-to-Energy Facility accounted for less than one percent of all anthropogenic greenhouse gas emissions in the region.

National Pollutant Release Inventory Reporting

The National Pollutant Release Inventory is Canada's legislated, publicly accessible inventory of pollutant releases to air, water and land, as well as from disposal and transfer for recycling. The National Pollutant Release Inventory is managed by Environment and Climate Change Canada and currently tracks over 300 substances and groups of substances. Metro Vancouver is required to

report air emissions (e.g., particulate matter, metals, organic compounds and acid gases) and substances transported for off-site disposal in fly ash and bottom ash for the preceding calendar year to the National Pollutant Release Inventory. The following table summarizes the 2019 National Pollutant Release Inventory reporting.

Table 1: 2019 National Pollutant Release Inventory Substance Reporting Summary

	Reported Quantity (tonnes)	
Substance	**Stack Emissions**	**Ash Disposal**
Nitrogen Oxides	221.1	N/A
Carbon Monoxide	48.3	N/A
Sulphur Dioxide	118.7	N/A
Hydrogen Chloride/Hydrochloric Acid	103.9	N/A
Aluminum (dust)	0.012	N/A
Arsenic	0.00065	1.79
Cadmium	0.00014	1.70
Cobalt	0.00014	1.37
Copper	0.00092	102.6
Lead	0.0015	31.8
Manganese	0.0013	30.4
Mercury	0.0016	0.072
Phosphorus	0.0020	559.1
Zinc	0.0059	245.3
Particulate Matter ≤ 10µm	1.1	N/A
Particulate Matter ≤ 2.5µm	0.90	N/A
Dioxins and Furans	N/A	N/A
Hexachlorobenzene	N/A	N/A

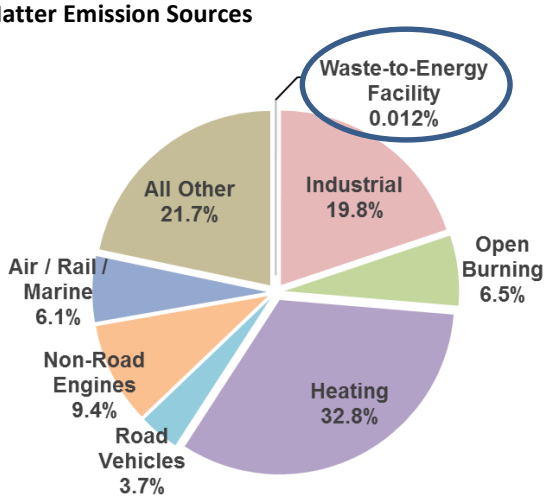
Notes:
- All other substances are below the National Pollutant Release Inventory level of quantification and are not required to be reported.
- 'N/A' indicates value is either below the level of quantification, below the detection limit, or the substance is not found in ash.
- Ash tonnages reported on a dry basis.

Waste-to-Energy Facility in a Regional Context

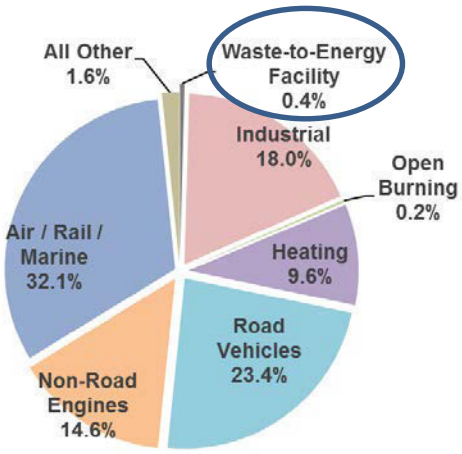
Figure 2 compares Waste-to-Energy Facility emissions to total emissions from all regional sources for two key air contaminants in the Lower Fraser Valley – fine particulate matter and nitrogen oxides (a key smog forming pollutant). In 2019, the Waste-to-Energy Facility accounted for 0.012% of regional fine particulate matter emissions and 0.4% of regional nitrogen oxide emissions. The Nitrogen Oxide Reduction Project, completed in October 2014, reduced nitrogen oxide emissions from 0.9% of the regional total in 2013 to 0.4% in 2019.

Figure 2: Regional Emissions Distribution (2019) – Fine Particulate Matter and Nitrogen Oxides

2019 Lower Fraser Valley Fine Particulate Matter Emission Sources



2019 Lower Fraser Valley Nitrogen Oxide Emission Sources



ALTERNATIVES

This is an information report. No alternatives are presented.

FINANCIAL IMPLICATIONS

Activities related to emissions monitoring and reporting are included in the approved Solid Waste Services operational budget.

CONCLUSION

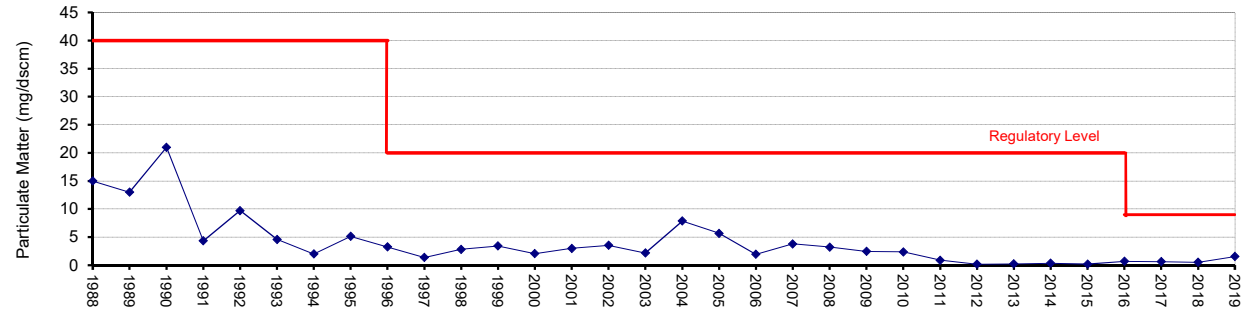
The Waste-to-Energy Facility operates well within environmental standards and limits. A range of projects that continuously improve the facility's environmental performance have been completed or are underway. All air emission related parameters monitored during 2019 were in compliance with Operational Certificate 107051. Continuous emissions monitoring data and all compliance reports are available on the Metro Vancouver website.

Attachment *(Orbit 40146003)*
Metro Vancouver Waste-to-Energy Facility Summary of Air and Metals Emissions 1988-2019

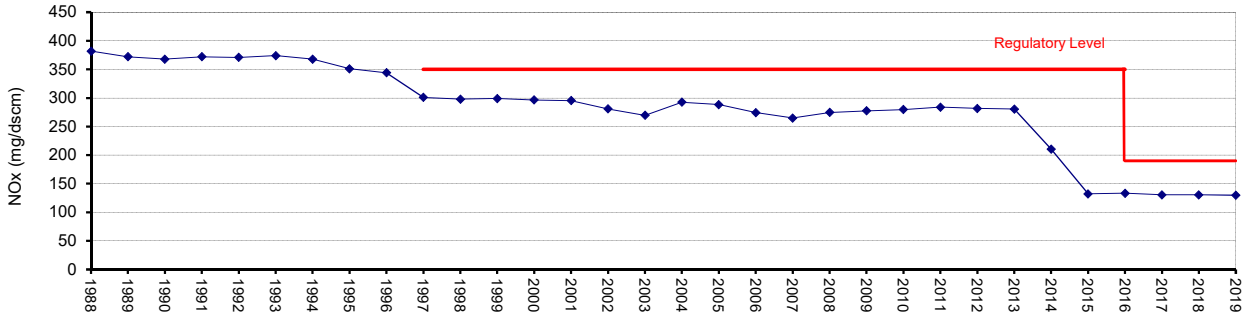
39797540

Metro Vancouver Waste-To-Energy Facility Summary of Air Emissions 1988 - 2019

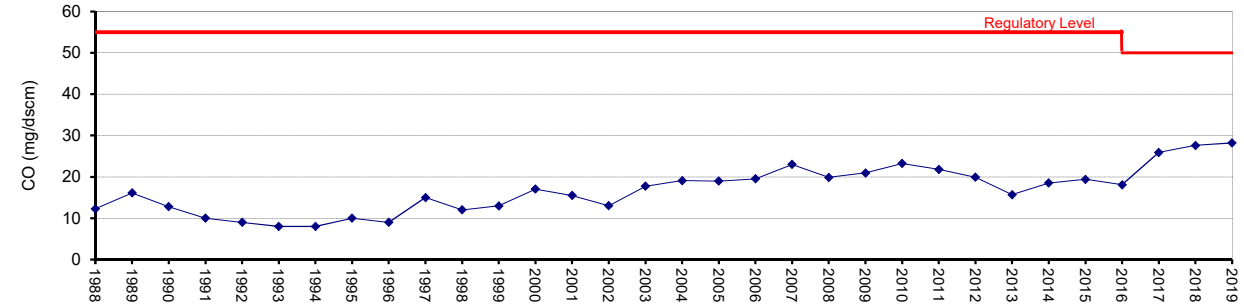
Particulate Matter



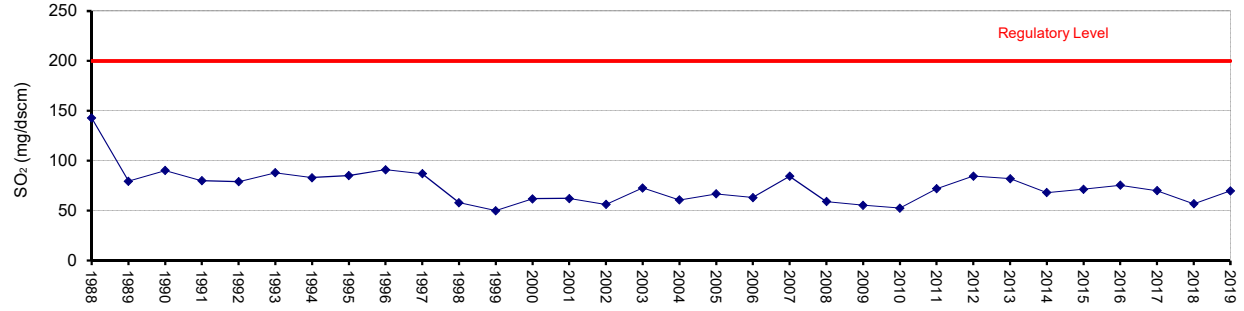
Nitrogen Oxides



Carbon Monoxide

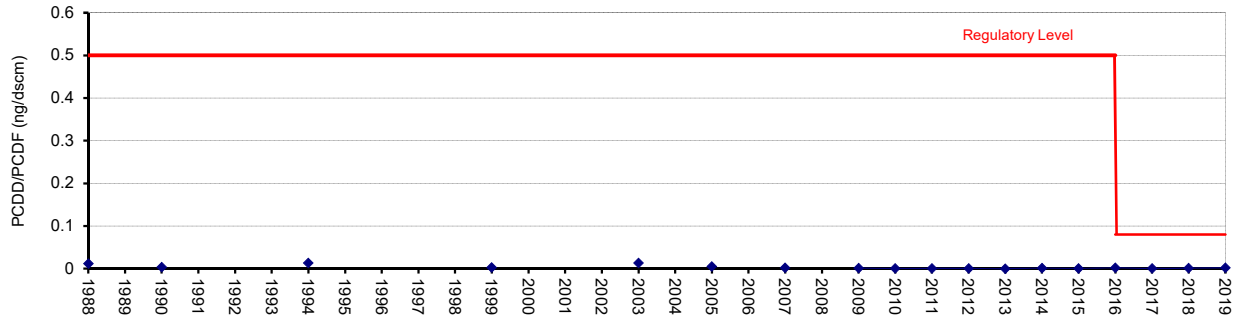


Sulfur Dioxide

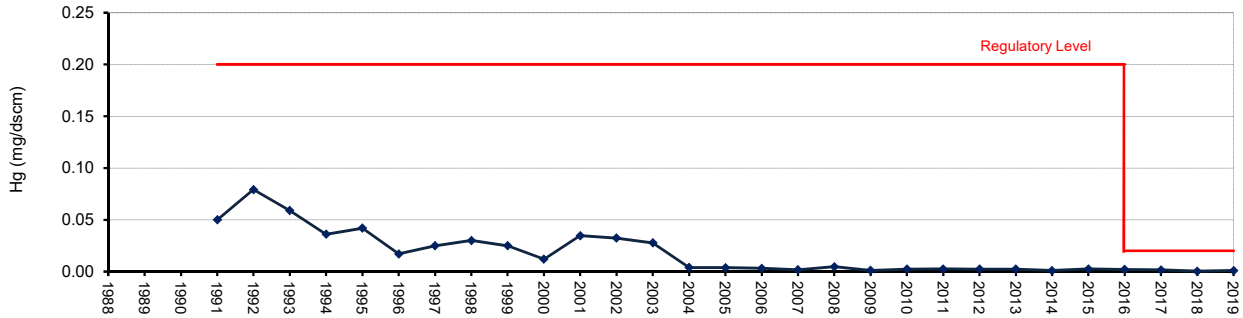


Metro Vancouver Waste-To-Energy Facility Summary of Air Emissions 1988 - 2019

Dioxins/Furans



Mercury



Cadmium