



**City of Hamilton**  
**PUBLIC HEALTH COMMITTEE**  
**AGENDA**

**Meeting #:** 24-004  
**Date:** April 29, 2024  
**Time:** 9:30 a.m.  
**Location:** Council Chambers  
Hamilton City Hall  
71 Main Street West

Matt Gauthier, Legislative Coordinator (905) 546-2424 ext. 6437

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**1. CEREMONIAL ACTIVITIES**

**2. APPROVAL OF AGENDA**

(Added Items, if applicable, will be noted with \*)

**3. DECLARATIONS OF INTEREST**

**4. APPROVAL OF MINUTES OF PREVIOUS MEETING**

**5. COMMUNICATIONS**

**6. DELEGATION REQUESTS**

**7. DELEGATIONS**

**8. STAFF PRESENTATIONS**

**9. CONSENT ITEMS**

- 9.1 Third-Party Air Monitoring for Green for Life Stoney Creek Landfill (BOH24008)  
(Wards 5 and 9) (Outstanding Business List Item)

*At the April 10, 2024, Council meeting, staff were directed to publish this report one week prior to regular agenda publishing. The remainder of the April 29, 2024 Public Health Committee agenda will be published on Wednesday April 24, 2024*

10. DISCUSSION ITEMS
11. MOTIONS
12. NOTICES OF MOTION
13. GENERAL INFORMATION / OTHER BUSINESS
14. PRIVATE AND CONFIDENTIAL
15. ADJOURNMENT



# INFORMATION REPORT

<b>TO:</b>	Mayor and Members Public Health Committee
<b>COMMITTEE DATE:</b>	April 29, 2024
<b>SUBJECT/REPORT NO:</b>	Third-Party Air Monitoring for Green for Life Stoney Creek Landfill (BOH24008) (Wards 5 and 9) <b>(Outstanding Business List Item)</b>
<b>WARD(S) AFFECTED:</b>	Wards 5 and 9
<b>PREPARED BY:</b>	Matthew Lawson (905) 545-2424 Ext. 5823 Manal Chaudhry (905) 546-2424 Ext. 7134
<b>SUBMITTED BY:</b>	Kevin McDonald Director, Healthy Environments Division Public Health Services
<b>SIGNATURE:</b>	

## COUNCIL DIRECTION

At its meeting on September 27, 2024 Council approved the following motion:

“That staff be directed to explore the ways and means to provide independent third-party air monitoring for a minimum seven-day period at GFL Stoney Creek Landfill to be funded by the Stoney Creek Compensation Royalties (GFL Landfill) Reserve 117036 and report back to the Public Health Committee.”

This information report satisfies the requirement for Item 2023-I, respecting Independent Third Party Air Monitoring at GFL Stoney Creek Landfill, and can be removed from the Public Health Committee Outstanding Business List.

## INFORMATION

The purpose of this report is a response to Board of Health’s direction to explore third-party air monitoring in close proximity to the Green For Life Stoney Creek Landfill located at 65 Green Mountain Road, Stoney Creek. AtkinsRéalisis was identified through the City’s Roster Program as a vendor that can support the development of a feasibility report with options for air monitoring at Green For Life Stoney Creek Landfill (the Site).

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## **Background**

In response to residents' odour complaints and concerns regarding potential contaminants and impacts from odour, the Ontario Ministry of Environment, Conservation, and Parks (the Ministry) conducted two air monitoring assessments in August and September 2023.

The Ministry assessments included monitoring of the following compounds: benzene, trichloroethylene, toluene, tetrachloroethylene, chlorobenzene, ethylbenzene, styrene, 1,2,4 trimethylbenzene, naphthalene, nitrogen oxides (NO<sub>x</sub>), including nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>), total reduced sulfur compounds (TRS) and sulfur dioxide (SO<sub>2</sub>), as well as odour measurements through a nasal ranger. The Ministry assessments found several instances of elevated odours, and twenty-nine (29) 10-minute Total Reduced Sulphur O. Reg. 419/05 Standard exceedances at various locations around the Green For Life Site in September 2023. The Ministry has identified the Green For Life Site and leachate pond as the most likely source of odour and recorded Total Reduced Sulphur exceedances. The Ministry's air monitoring assessments assumed that Total Reduced Sulphur measured around the Green For Life Site is composed of hydrogen sulphide (H<sub>2</sub>S).

As a result of the exceedances of Total Reduced Sulphur and the continued odour from the site, the Ministry issued a Provincial Officer's Order to Green For Life on October 17, 2023. Under the Order, Green For Life is mandated to retain the services of a qualified third-party to submit an air monitoring plan for the Stoney Creek Landfill to the Ministry for approval. This plan should monitor Total Reduced Sulphur, ammonia, and other contaminants that may contribute to odours at the Site.

Although hydrogen sulfide (H<sub>2</sub>S) has not been known to cause cancer,<sup>1</sup> prolonged exposure to low concentrations of Total Reduced Sulphur compounds such as hydrogen sulfide (H<sub>2</sub>S) may cause headaches, tiredness, and nausea.<sup>1</sup> This is consistent with community concerns raised regarding their lived experience with the

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<sup>1</sup> Canadian Centre for Occupational Health and Safety (CCOHS), 2023. Hydrogen Sulfide. Available from:

[https://www.ccohs.ca/oshanswers/chemicals/chem\\_profiles/hydrogen\\_sulfide.html](https://www.ccohs.ca/oshanswers/chemicals/chem_profiles/hydrogen_sulfide.html)

odour emanating from the Facility impacting their quality of life<sup>2, 3, 4, 5</sup> which research confirms can trigger an individual's stress response.<sup>6</sup>

As a part of the City's efforts to address public concerns regarding air quality and odours, Hamilton City Council directed Public Health Services to explore options to provide independent third-party air monitoring in close proximity to the Green For Life Site for a minimum of seven days.

### **Sampling Plans Provided in Feasibility Report**

AtkinsRéalis submitted a feasibility report to the City outlining three sampling plans for third-party air monitoring in close proximity to the Green For Life Stoney Creek Landfill (see Appendix "A" to Public Health Committee Report BOH24008). The sampling plans, a brief description, and the associated costs are provided in Table 1 below.

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<sup>2</sup> Aatamila M., Verkasalo P. K., Korhonen M. J., Suominen A. L., Hirvonen M. R., Viluksela M. K., et al. 2011 Odour annoyance and physical symptoms among residents living near waste treatment centres *Environ Res* 111 1 164 -170 Available from: <https://pubmed.ncbi.nlm.nih.gov/21130986/>

<sup>3</sup> Baldacci S., Maio S., Martini F., Silvi P., Sarno G., Cerrai S., et al. 2015 Odor annoyance perception and health effects in an Italian general population sample *Eur Respir J* PA1115 Available from: [https://erj.ersjournals.com/content/46/suppl\\_59/PA1115](https://erj.ersjournals.com/content/46/suppl_59/PA1115)

<sup>4</sup> Blanes-Vidal V. 2015 Air pollution from biodegradable wastes and non-specific health symptoms among residents: Direct or annoyance-mediated associations? *Chemosphere* 120 371 -377 Available from: <https://pubmed.ncbi.nlm.nih.gov/25192839/>

<sup>5</sup> Hooiveld M., van Dijk C. E., van der Sman-De Beer F., Smit L. A. M., Vogelaar M., Wouters I. M., et al. 2015 Odour annoyance in the neighbourhood of livestock farming – Perceived health and health care seeking behaviour *Ann Agric Environ Med* 22 1 55 -61 Available from: <https://pubmed.ncbi.nlm.nih.gov/25780829/>

<sup>6</sup> Hirasawa Y., Shirasu M., Okamoto M., and Touhara K. 2019 Subjective unpleasantness of malodors induces a stress response *Psychoneuroendocrinology* 106 206 -215 Available from: <https://www.sciencedirect.com/science/article/abs/pii/S0306453018312125>

Table 1: Sampling Plans Proposed in AtkinsRéalis Feasibility Report

<b>Sampling Plan</b>	<b>Description</b>	<b>Contaminants Sampled</b>	<b>Number of Sampling Locations</b>	<b>Estimated Cost (including laboratory, equipment, staff)</b>
Mobile Continuous Sampling	Mobile analysis vehicle or trailer that is deployed with continuous sampling equipment	Sulphur compounds and Volatile Organic Compounds	Not Applicable	>\$1 million
Long-term Fixed Location Passive Sampling	Non-continuous air monitoring through tube/cartridge analysis in fixed positions for a period of seven to fourteen days.	Hydrogen Sulphide and Volatile Organic Compounds	Ten fixed locations over seven to 14 days.	Roughly \$20,000
Short-term Fixed Location Canister Sampling	Non-continuous air monitoring through canisters set in fixed locations, which can sample up to eight hours or 24-hours for a period of seven days. Supplemented by 10-minute sampling cannisters.	Sulphur compounds and Volatile Organic Compounds	Five fixed locations per day for 8-hour or 24-hour analysis. Four portable cannisters per day for 10-minute samples.	Roughly \$62,000 for a 7-day campaign

The results of the seven-day monitoring would be shared with the Ministry for consideration and appropriate action, if any.

- **Mobile Continuous Sampling;**

The proposed mobile continuous sampling plan would require the construction and outfitting of a mobile-based laboratory with various continuous samplers, with a power source to support the sampling equipment. This would result in a mobile sampling unit similar to the one operated by and used by the Ministry for air monitoring assessments.

This option is cost-prohibitive as well as time consuming, as sourcing the

equipment and building the unit will take upwards of six months. This would not allow for any sampling to occur in the warmer months of 2024 when odours may be exacerbated.

It should be noted that if Public Health Services were to invest in a mobile air monitoring unit, the unit should be procured directly and owned by the City of Hamilton as opposed to a third-party. A business case for a mobile air monitoring unit would have to be further explored to determine the value of the unit.

- **Long-term Fixed Location Passive Sampling;**

The proposed long-term passive sampling involves using air sampling equipment (a tube or cartridge with an open inlet) at a fixed location over the sampling period. The equipment proposed by AtkinsRéalis is capable of sampling for hydrogen sulphide (H<sub>2</sub>S) and Volatile Organic Compounds. Samples are analysed by a laboratory at the end of the sampling period and the laboratory returns an average concentration. The sampling sites will be based on predominant wind directions and residential locations.

The concentrations of hydrogen sulphide (H<sub>2</sub>S) and Volatile Organic Compounds returned through this sampling method are an average over the entire sampling period of seven to fourteen days. As such, this method does not capture any short-term peaks in contaminant concentrations. However, the Ministry air monitoring assessment conducted in September 2023 shows that exceedances of Total Reduced Sulphur around the Green For Life Site were short-term in nature. In addition, the passive sampling equipment is capable of measuring hydrogen sulphide, but not Total Reduced Sulphur. Therefore, this sampling method will not provide an indication of exceedances of Total Reduced Sulphur levels near the Green For Life Site.

This sampling plan may be better suited to determine long-term exposures to contaminants. However, the results from this sampling plan are not directly comparable to Ontario's health based Ambient Air Quality Criteria, as the averaging period in the criteria are 10-minutes, 8-hour, 24-hour, 30-day, and annual.

- **Short-term Fixed Location Canister Sampling;**

The proposed short-term fixed location canister sampling plan uses canisters that are set up at fixed locations for a short period during which the air is drawn into the sampler. The sampling plan proposes four locations for 8-hour sampling periods. AtkinsRéalis has indicated that this sampling period can be extended to 24-hours, and that the laboratory is also able to provide Total Reduced Sulphur concentrations from the sample which can then be compared to the 24-hour health-based Ambient Air Quality Criteria for Total Reduced Sulphur. Similar to

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the long-term sampling plan, the sampling equipment will be sited based on wind directions and the location of residential neighbourhoods.

This sampling plan also includes additional portable samples that can take 10-minute samples to compare to the odour based Ambient Air Quality Criteria for Total Reduced Sulphur. The locations of the 10-minute samplers can be determined based on odour observations by third-party staff or based on residential complaints. While results from this sampling plan can be compared to the 10-minute and 24-hour Ontario Ambient Air Quality Criteria, the sampling methodology is not approved by the Ministry.

Both the long-term and short-term monitoring plan require a minimum of two weeks for preparation, and results from the laboratory may take up to 10 days or more for turn-around time. This timeline may be further prolonged if sampling equipment is not available at the laboratory. In addition, unmanned stations can be tampered with.

- **Ministry Order to Green For Life for Independent Third-Party Air Monitoring**  
The Ministry's September 2023 air monitoring assessment at Green For Life Stoney Creek Landfill found twenty-nine (29) exceedances of Total Reduced Sulphur in the community surrounding the Site. Following this assessment, the Ministry issued an order to Green For Life on October 17, 2023 (see Appendix "B" to Public Health Committee Report BOH24008). Part of this order includes Green For Life hiring an independent third-party to submit an air monitoring plan for Total Reduced Sulphur, ammonia, and any other odour causing contaminants on the Site. The order is included as an appendix to this report.

This monitoring plan will include daily fence-line monitoring for Total Reduced Sulphur and ammonia at the Green For Life site, with sufficient data to compare to the on-site 10-minute and 24-hour standards set out in O.Reg 419/05. The plan must also include odour monitoring in the surrounding community and a plan to communicate monitoring results to the public. Once the monitoring plan is approved by the Ministry and monitoring is underway at the Site, both short-term and long-term Total Reduced Sulphur concentrations will be monitored at the Site.

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**APPENDICES AND SCHEDULES ATTACHED**

Appendix "A" to Report BOH24008: Feasibility Assessment for Odour Monitoring at Green For Life Landfill for City of Hamilton

Appendix "B" to Report BOH24008: Provincial Officer's Order Issued to Green For Life Environmental Inc.

TO: Matthew Lawson (City of Hamilton)

# Feasibility Assessment for Odour Monitoring at GFL Landfill for City of Hamilton

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**C.C.**

Rob Conley, Roster Captain (City of Hamilton), Paul Mulholland (City of Hamilton), Darren Dickson (AtkinsRéalis), Jenny Vieira (AtkinsRéalis)

**DATE**

April 11, 2024

**FROM**

Chris Bestfather (AtkinsRéalis), Yamara Moya (AtkinsRéalis), Nicholas Hakala (AtkinsRéalis)

**REF.**

699580

**SUBJECT**

Feasibility Review Technical Document

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## 1. Notice to Reader

This report has been prepared and the work referred to in this report has been undertaken by AtkinsRéalis Canada Inc. (AtkinsRéalis) for the exclusive use of the City of Hamilton (the Client), who has been party to the development of the scope of work and understands its limitations. The methodology, findings, conclusions, and recommendations in this report are based solely upon the scope of work and subject to the time and budgetary considerations described in the proposal and/or contract pursuant to which this report was issued. Any use, reliance on, or decision made by a third party based on this report is the sole responsibility of such third party. AtkinsRéalis accepts no liability or responsibility for any damages that may be suffered or incurred by any third party because of the use of, reliance on, or any decision made based on this report.

The findings, conclusions, and recommendations in this report (i) have been developed in a manner consistent with the level of skill normally exercised by professionals currently practicing under similar conditions in the area, and (ii) reflect AtkinsRéalis best judgment based on information available at the time of preparation of this report. No other warranties, either expressed or implied, are made as to the professional services provided under the terms of our original contract and included in this report. The findings and conclusions contained in this report are valid only as of the date of this report and may be based, in part, upon information provided by others. If any of the information is inaccurate, new information is discovered, site conditions change, or applicable standards are amended, modifications to this report may be necessary.

This report must be read as a whole, as sections taken out of context may be misleading. If discrepancies occur between the preliminary (draft) and final versions of this report, it is the final version that takes precedence. Nothing in this report is intended to constitute or provide a legal opinion.

# FEASIBILITY REVIEW TECHNICAL DOCUMENT

The contents of this report are confidential and proprietary. Other than by the Client, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of the Client and AtkinsRéalis.

## 2. Introduction

AtkinsRéalis is pleased to provide this technical memorandum to the City of Hamilton (the "City") describing alternate options and costs to complete air monitoring at the Green for Life (GFL) Environmental Inc. Landfill in Stoney Creek as per our Proposed Feasibility Assessment for Odour Monitoring at GFL Landfill (December 8, 2023).

Developing this memo falls under the existing City of Hamilton's Contract C12 13 21 for provision of Professional and Consultant Services under the 2022-2024 Roster for Category 08, Solid Waste Management. The City has requested an evaluation of different options for air quality monitoring in proximity to GFL's contaminated soil landfill in Stoney Creek. The evaluation includes a summary of the advantages and disadvantages of the different methods and provides approximate budgets to complete each of the items. The recommendations of the review can be taken to the City's Committee or Council for review and approval for implementation beginning in the spring of 2024.

## 3. Background

Following submission of several public resident complaints regarding air quality and odour issues in the neighbourhoods surrounding the GFL Stoney Creek contaminated soil landfill, the Ministry of the Environment, Conservation and Parks (MECP) completed two rounds of air quality monitoring, for discontinuous periods of 9 and 6 days, in the summer and fall of 2023. Land use parcels around GFL Stoney Creek area are shown in Appendix A in Figure 1 (obtained from MECP report). Their findings were inconclusive, with limited numbers of compounds identified that could have health related impacts, although sulphur-based compounds were identified during the second monitoring event. Following ongoing concerns identified by neighbourhood associations, Hamilton Public Health Services (HPHS) were directed by Hamilton Council to "... explore the ways and means to provide independent third-party air monitoring for a minimum seven-day period at GFL Stoney Creek Landfill..."

### 3.1 Summary of MECP 2023 Sampling

In 2023 the MECP conducted two air monitoring assessments in August (August 8, 9, 10, 16, 17, 21, 24, 25, and 28) and September (September 1, 14, 15, 22, 28, 29) to quantify ground level concentrations of various harmful pollutants and to quantify odour levels surrounding the GFL site and in the impacted neighbourhoods. Numerous measurement sites both upstream and downstream of the facility were selected for monitoring during these periods based on wind metrics for the area. Wind data was collected from the on-site meteorological tower STN29247 during the sampling periods.

These surveys were conducted utilizing the MECP's mobile air monitoring vehicle equipped with a portable Gas Chromatograph/Mass Spectrometer (GC/MS) unit for the measurement of volatile organic compounds (VOC), also known as the HAPSITE ER Chemical Identification System. The HAPSITE is a discrete sampling system that draws a known volume of air into the GC/MS over two minutes, followed by a 10-minute analysis. Once the analysis is complete, another sample is taken. The HAPSITE was calibrated to quantify the presence and concentrations of the following VOCs: Benzene, Trichloroethylene, Toluene, Tetrachloroethylene, Chlorobenzene, Ethylbenzene, Styrene, 1,2,4-trimethylbenzene, and Naphthalene.

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Other compounds that were measured during the air monitoring surveys in September and August include: Nitrogen Oxides [NO<sub>x</sub> includes nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>)], hydrogen sulphide (H<sub>2</sub>S), total reduced sulphur compounds (TRS), fine particulates (PM<sub>2.5</sub> and PM<sub>10</sub>), and sulphur dioxide (SO<sub>2</sub>) which were measured continuously with individual analysers during each of the air monitoring events, however due to power constraints not all of these were measured continuously, with priority given to SO<sub>2</sub> and TRS.

A St. Croix Sensory Nasal Ranger was used to quantify odour strength in the ambient air. All measurements were reported in Dilution-to-Threshold (D/T), which is a measurement of the number of dilutions needed to make the odourous ambient air "not-detectable" with D/T measurements ranging from <2 to 60. Results with a D/T <2 mean an odour was detected by the technician without equipment but was not quantifiable by the nasal ranger. Staff using this equipment were trained before the start of the odour assessment.

The following conclusions are summarized from each study:

## August 8-25 Campaign:

Detected odours in the September campaign were described as garbage, leachate, musty, natural gas, sweet, sour, wet diaper, and urine. Odours were noted on 5 days; however, they were only quantifiable with the nasal ranger on August 28 ( $7 < D/T < 15$ ). See Figure 10 from MECP report in Appendix A. The leachate pond and facility were identified as likely sources. VOC's and respective H<sub>2</sub>S and TRS concentrations measured in ambient air at the receptor points were found to be below their respective MECP limits while the odours were detected.

## September 1-29 Campaign:

Odours identified each day were described as raw sulphur, leachate, herb, garbage, solvent chemical, burnt, rotten eggs and odour masking agents. The Nasal Ranger identified dilution ratios as high as D/T <15. See Figure 5 in Appendix A from the MECP report. Over the course of all sampling days, the survey suggests that the leachate pond and the GFL facility are likely the sources of the identified odours. VOC concentrations measured in the ambient air at the odour receptor points were found to be below their respective MECP limits while the odours were detected.

Measured 10-minute TRS exceedances were noted around the GFL facility and within residential areas with the highest 10-minute TRS concentrations measured immediately west of the leachate pond. See Figure 12 in Appendix A from MECP report. As measurements were not conducted over 24-hours it is possible that short-term peaks above the 10-minute limits is a common occurrence outside of the monitoring periods. The MECP report recommends evaluation using continuous 24-hour TRS monitoring to compare with the 24-hour TRS standard for health effects.

As discussed during scoping meetings between AtkinsRéalis and HPHS, exactly replicating the MECP methodology (as per *Operations Manual for Air Quality Monitoring in Ontario*) and recommended 24-hour monitoring for TRS would be expected to be inordinately expensive as it would require construction of a mobile monitoring unit equipped with multiple continuous monitoring devices. Also, exactly replicating MECP methodology may not be required to determine whether there are potential health related impacts, particularly if the suite of parameters being reviewed is narrowed. As such on Monday, December 4, 2023, Hamilton's Public Health Committee approved the following recommendation: That Public Health Services Staff be directed to work with AtkinsRéalis to develop a feasibility study with options to perform air monitoring for a minimum seven-day period at the Green for Life Environmental Inc. Landfill, Stoney Creek...and report back to the Public Health Committee in Q1, 2024.

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## 4. Sampling Plan Development

The sampling plans presented herein were developed with a focus on odour health limits (e.g., H<sub>2</sub>S, TRS) and the impacts at the sensitive receivers (i.e., the residential areas located to the north and south of the GFL facility). These plans assume the MECP sampling reports accurately identify the odour sources as the GFL landfill and leachate pond and that their reported results are representative for screening in appropriate potential odour related compounds. The purpose of each of the air quality assessment plans is to provide options that could monitor concentrations in the vicinity of the landfill for selected hazardous contaminants that will allow an assessment of whether potential impacts to neighbouring properties represent a health risk or only an odour nuisance.

### 4.1 General Principles

Given the previously stated focus and assumptions, the sampling plan scope includes the following:

- Identify sources and most impacted receptors based on meteorology.
- Quantify measured concentrations for selected parameters at the sensitive receptor (ground) level.
- Assess health impacts with MECP limits.
- Justify and inform locations for future monitoring and which pollutants are of interest.

Listed studies should be scheduled seasonally, to reflect changing conditions, and are recommended to be initiated after ground thawing has occurred. The different ambient temperatures, wind patterns and receptor usage will be reflected by completing multiple seasonal sampling events and this will prevent conclusions from being drawn from the conditions encountered during a single event. Some thought should also be given to different times of day as to when maximum exposures are likely, such as coming home from school or work.

Sampling locations will be planned based on the results of the 2023 MECP monitoring campaigns and local meteorological station data to quantify upstream and downstream effects from the landfill and its operations. Air quality monitoring locations can also be situated based on field staff olfactory observations. Sampling durations shall be determined based on the program/technology selected and the applicable limits and averaging periods.

Listed programs shall be selected based on the pollutants of concern related to odours, and health concerns, and will be compared to their regulatory limits.

### 4.2 Sampling Plans

Each Sampling plan in this section will be compared based on the following criteria:

1. Preparation and quantity.
2. Sampling Method, including media and lab analysis.
3. Contaminants of Concern and detection limits.
4. Labour Requirements.
5. Timing and Frequency of the campaign.

Example pictures of sampling equipment and field set-up are provided in Appendix C.

# FEASIBILITY REVIEW TECHNICAL DOCUMENT

## 4.2.1 Mobile Continuous Sampling

Mobile continuous sampling similar to the MECP monitoring was recommended which would apply the requirements in the *Operations Manual for Air Quality Monitoring in Ontario*.

Parameter	Comment
Sample Method	Continuous similar to HAPSITE using GC/MS
Number of Samples	Daily with discrete sampling frequency and analysis within 15-min intervals
Contaminants of Concern	VOCs and Sulphur
Frequency and Duration	Daily as required
Results	Available same day

1. Preparation requirements include the construction and outfitting of a mobile-based laboratory with various continuous samplers. This equipment may be installed inside a vehicle itself or a trailer to allow for relocation of sampling points upwind and downwind of the source. A power source is required to support the sampling equipment.
2. The analysis vehicle may intake continuous samples of air and conduct analysis utilizing the suite of analysis equipment onboard. Significant calibration and quality assurance would be required to satisfy all requirements of the MECP operations manual.
3. Analysis capability for this purpose would include those compounds identified as detectable in the MECP studies: VOCs and odorous compounds (H<sub>2</sub>S, TRS, etc.). detection limits and sampling periods for the contaminants of concern depend on the health-based limits (e.g., 10-minute, and 24-hour).
4. Operation of the mobile lab and maintenance of the equipment onboard requires dedicated technicians and operators that understand how to troubleshoot and interpret results. Correct operation and analysis require expert users.
5. The mobility of the lab allows for sampling in numerous different settings provided the vehicle can access the area. Provided there is time for calibration of the equipment and sufficient resources available sampling can be done quickly and respond to specific complaints.

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## 4.2.2 Short-Term Fixed Location Canister Sampling

Short-term sampling with vacuum canisters is employed to characterize the air quality in a fixed location over periods of less than 24-hours. Samples are analysed by laboratory and provide an average concentration for several parameters.

Parameter	Value	Comments
Sample Method	Evacuated Canister with flow controller on inlet and tripod to elevate sample (~1.5 m above ground).	Initial pressure -29 in of Hg Final pressure -5 to -10 in of Hg
Number of Samples	4 fixed locations/day Sulphur analysis*	6L canister 8-hour sample Analysis Method ASTM D5504 (S630)
	1 fixed location/day VOC analysis*	6L canister 8-hour sample Analysis Method EPA TO-15 (S621B)
	4 portable samples deployed per day (Location to be determined based on odour observations or residential complaints) Sulphur analysis*	1.4L canisters for 10-min samples Analysis Method ASTM D5504 (S630)
Frequency and Duration	Daily for period of 7-days Total of 70 canister samples (includes 7 duplicates)	To capture daily variation in air quality. Can be repeated monthly or quarterly.
Results	Available within 10 business days (standard turnaround time)	Quicker turn-around times are available at additional costs.

\*See list of sulphurous compounds and VOCs in Appendix B. Analysis is a sample GC scan for these compounds (not all may be detected).

1. Preparation for this sampling methodology requires several laboratory supplied air sampling canisters which are in the selected sampling locations. Planning is required to identify the periods of time and locations likely to measure the most significant air quality impacts. The proposed sampling plan includes up to 5 fixed locations, 4 portable canisters (varied locations) with samples repeated over a period of 7 continuous days (e.g., Monday to Sunday).
2. Air samples are drawn into the canisters and sent for laboratory analysis. The recommended sampling periods for VOCs and odourous compounds in questions are non-continuous samples taken over periods of 8-hour as well as 10-minute; canisters would be picked up and distributed each day by air technicians.
3. Contaminants are screened by the laboratory and detection limits depend on the sample quality (See Appendix B).
4. Minimal training is required to setup each device and results interpretation is completed by a third party.
5. As these are non-continuous samples, the results present an average concentration over the sampling period, as such peaks in contaminant concentrations are not reported. However, 10-minute samples collected during the day (total of 20) are included to capture peaks (to be deployed based on observations in field). Generally, results are available in ten business days following laboratory receipt.

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## 4.2.3 Long-Term Fixed Location Passive Sampling

Long-term sampling with passive sampling media is employed to characterize the air quality in a fixed location over periods of multiple days. Samples are analysed by laboratory and provide an average concentration for several parameters.

Parameter	Value	Comment
Sample Method	Adsorbent tube/cartridge with diffusion inlet (remains open for sample period).	Sampling media elevated and attached to pole/fence with weather shelter.
Number of Samples	8 fixed locations H <sub>2</sub> S analysis* for period of 1-15 days	Initial siting and installation by tech., unsupervised for sampling period. Analysis Method Radiello 170 (RAD 170)
	2 fixed locations VOC analysis* for a period of 2-14 days	Duplicate samples for QA/QC. Analysis Method EPA TO-17 (S620D)
Frequency and Duration	Multiple days (e.g., 14 days) Total of 15 samples (includes 5 duplicates).	To capture long-term trends in air quality. Can be repeated monthly or quarterly.
Results	Available within 10 business days (standard turnaround time)	Quicker turn-around times are available at additional costs.

\*See list of sulphurous compounds and VOCs in Appendix B.

1. Adsorbent samples are placed in various locations; these are set and forget type of devices that don't require forced air or flow through them to capture samples.
2. Samples are taken in ambient air through diffusion processes in the adsorbent device (24-hours-2 weeks), each device is then collected at the end of the sampling period and dropped off for laboratory analysis.
3. Adsorbent devices are designed to capture specific contaminants and have been recommended to capture the specific contaminants identified. Because these devices utilize diffusion processes to capture pollutants, there is some sensitivity to environmental conditions (temperature) that must be considered.
4. Replacement tube/cartridges are simple to set up and require little time. Minimal Training is required, and results analysis is done by a third party.
5. As these are non-continuous samples only an average concentration over the sampling period would be reported. As such peaks during the sampling period are not reported.

The proposed sampling plans presented above are compared in TABLE 1 based on the quality of information provided, the timeliness, and approximate costs. The costs include basic, factual reporting but do not include extensive interpretation, public consultation, regulator meetings, presentations to committee or council, etc., each of which could be discussed as part of a detailed proposal.



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Table 1: Comparison of Sampling Methods

Sampling Plan	Description	Advantages	Disadvantages	Approximate Costs*
<i>Mobile Continuous Sampling</i>	Mobile analysis vehicle or trailer that is deployed with continuous sampling equipment.	<ul style="list-style-type: none"> <li>• Accurate and reliable information.</li> <li>• Vehicle or trailer can be relocated to any accessible location.</li> <li>• Provides near instantaneous results.</li> <li>• Can sample multiple locations.</li> <li>• Sampling equipment can be re-purposed for specific pollutants or for monitoring other sources.</li> </ul>	<ul style="list-style-type: none"> <li>• Significant upfront costs and ongoing costs to operate analysis equipment and vehicle.</li> <li>• Ongoing maintenance fees to calibrate and repair analysis equipment.</li> <li>• Requires repeated monitoring and specialized staff to justify costs.</li> <li>• Limited market to sell equipment and recover expenses.</li> </ul>	<ul style="list-style-type: none"> <li>• On the order of &gt;\$1M for capital costs for vehicle/trailer, measurement equipment, power supply plus roughly \$100,000 for staff and disbursements to operate the mobile detection unit for a period of 6 months.</li> </ul>
<i>Short-Term Fixed Location Canister Sampling</i>	Canisters set in fixed sampling positions to characterized air quality. Non-continuous sampling periods for 8-hours and 10-minutes. Locations selected based on prevailing winds and sensitivity of receptors.	<ul style="list-style-type: none"> <li>• Affordable and can be repeated.</li> <li>• No supporting infrastructure required.</li> <li>• Air samples can be analyzed for numerous pollutants.</li> <li>• No calibration requirements.</li> <li>• Minimal preparation time.</li> <li>• Limited staff time (pick-up and drop off) with staff available to make air quality observations and supervise sampling.</li> </ul>	<ul style="list-style-type: none"> <li>• Fixed monitoring locations (subject to meteorological effects).</li> <li>• Unmanned stations can be tampered with or subject to background source impacts (e.g., traffic)</li> <li>• 8-hour samples provide average concentration during periods (exclude 10 min peaks).</li> <li>• 10-day turn around time on results.</li> <li>• Limited supply on equipment and canister preparation time (2 weeks).</li> <li>• Relatively small sample volumes impact detection limits.</li> </ul>	<ul style="list-style-type: none"> <li>• Roughly \$62,000 for 7-day sampling campaign with 70 total samples (costs include laboratory, equipment and staff fees).</li> </ul>
<i>Long-Term Fixed Location Passive Sampling</i>	Tube/cartridge analysis in fixed positions for long periods of time to measure long-term exposures. Non-continuous sampling for periods of 1-2 weeks. Locations selected based on prevailing winds and sensitivity of receptors	<ul style="list-style-type: none"> <li>• Affordable</li> <li>• No supporting infrastructure apart from weather shelter</li> <li>• Monitors in daytime and nighttime conditions.</li> <li>• Minimal preparation time.</li> <li>• No calibration requirements.</li> <li>• Very little day to day staff time required after installation.</li> <li>• Media can be deployed and picked up periodically.</li> <li>• Results can be used to inform preferred locations for additional fixed continuous monitoring stations or future campaigns.</li> <li>• Complimentary to short-term sampling.</li> </ul>	<ul style="list-style-type: none"> <li>• Fixed monitoring locations (subject to meteorological effects)</li> <li>• Unmanned samplers can be tampered with or subject to background source impacts (e.g., traffic).</li> <li>• Average concentrations of air quality during period (excludes peaks).</li> <li>• High values difficult to explain (limited observations).</li> <li>• Results available several days after sampling.</li> <li>• Fixed sampling period.</li> <li>• Relatively small sampling volumes can impact detection limits and reduce analyte screening list.</li> <li>• Atmospheric effects may impact accuracy of measured results (temperature and diffusion rate).</li> </ul>	<ul style="list-style-type: none"> <li>• Roughly \$20,000 for sampling campaign with 10 total samples (costs include laboratory, equipment and staff fees).</li> </ul>

\*Approximate costs based on sampling plan assumptions and typical approaches. Detailed cost estimates can be provided based on requirements and schedule.

#### 4.2.4 Short-Term Ammonia Fixed Location Sampling

In addition to the program described in the preceding sections that focusses on sulphurous compounds, H<sub>2</sub>S and VOCs, the Provincial Officer's Order included continuous monitoring of ammonia in the Air monitoring plan (i.e., potential odour source concern). There is a MECP 24-hour limit for ammonia with a health-based limit; however, the MECP didn't include sampling for ammonia during the ambient air monitoring surveys that were completed in the fall of 2023. Short-duration ammonia sampling requires a different methodology and equipment than either; grab samples for immediate and short-duration monitoring for sulphurous compounds and VOCs (SUMMA canisters) or; the longer-term passive sampling (adsorbent tubes). Short-duration ammonia sampling uses adsorbent tubes coupled with pumps to collect samples (a more detailed methodology can be provided upon request). Ammonia sampling of this nature would be employed to characterize the air quality in a fixed location over the daytime (i.e., 8 to 12 hour) period, with the results adjusted to align with the 24-hour health limit. Samples are analysed by laboratory and provide an average concentration for several parameters.

Parameter	Value	Comment
Sample Method	Adsorbent tube/cartridge with active collection (pump draws air for sample period).	Sampling media elevated and attached to pole/fence with battery powered pump.
Number of Samples	1 fixed location per day Ammonia analysis for period of 8-hours	Initial siting and installation by tech., unsupervised for sampling period. Analysis Method NIOSH 6015 Duplicate samples for QA/QC.
Frequency and Duration	Multiple single day samples. Total of 14 samples (includes 7 duplicates).	To capture short-term trends in air quality. Can be repeated monthly or quarterly.
Results	Available within 10 business days (standard turnaround time)	Quicker turn-around times are available at additional costs.

1. Adsorbent sample tubes are attached to a sampling pump with tubing and located in selected locations. The operation of the pump is checked periodically during the sample period. The proposed sampling plan includes up to 1 fixed location per day, with samples repeated over a period of 7 continuous days (e.g., Monday to Sunday).
2. Samples are taken in ambient air through an active air sampling process in the adsorbent tube (8-hours), each device is then collected at the end of the sampling period and dropped off for laboratory analysis.
3. Adsorbent devices are designed to capture specific contaminants and the NIOSH method is designed to measure ammonia.
4. Replacement tube/cartridges are simple to set up and require little time. Minimal Training is required, and results analysis is done by a third party.
5. As these are non-continuous samples only an average concentration over the sampling period would be reported. As such, peaks during the sampling period are not reported. 8-hour samples would be compared to the MECP 24-hour limit for ammonia.

Short-Term Ammonia Fixed Location Sampling has similar advantages and disadvantages as Long-Term Fixed Location Passive Sampling described in Table 1.

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## Approximate Costs

Roughly \$6,000 for a 7-day sampling campaign with 14 total samples (costs include laboratory and equipment excluding staff fees). Assuming that the ammonia sampling is combined with the Short-Term Fixed Location Canister Sampling, the total costs of the combined cannister and ammonia sampling plan would be approximately \$68,000.

## 5. Limitations

The sampling plans described are based on assumptions and the following limitations are noted.

- Requesting MECP review or comment on the final sampling methodology prior to completing the work is recommended if the data is to be submitted to the MECP (i.e., consultation to deviate from the Operations Manual requirements) for use in enforcement or to supplement their own sampling events.
- The sampling plans are designed with a focus on MECP health-based limits, which differ from odour sampling plans. Odours can be subjective and not all public react similarly; as such they are considered a nuisance which can impede ability to enjoy property.
- It was assumed the parameters not detected in significant quantities in the 2023 MECP monitoring campaigns were not required to be included in the proposed sampling plans (e.g., NO<sub>x</sub>, PM<sub>2.5</sub>, PM<sub>10</sub>, and SO<sub>2</sub>), although this could be added at additional cost.
- Although planning can anticipate patterns in wind directions and changes in the intensity of odour emissions; the results of fixed location monitoring campaigns are limited to the period and locations monitored (i.e., results may not reflect peak concentrations). Repeated sampling campaigns (e.g., seasonally; before and after GFL landfill modifications, etc.) would allow measurement of the range and change in air quality.
- Lab costs and analysis are based on quotes and discussions with ALS Global (Environmental Services) which is accredited by the Standards Council of Canada (SCC). The timeline and media requirements include: seven business days advance notice to prepare/deliver media (up to 35 canisters/tubes), for bigger orders a 10-day notice is required.
- The listed prices are approximate values only, actual costs will be detailed in a cost estimate following the selection of a preferred sampling plan. Costs for labour assume typical industry rates (i.e., similar for an open bid call); however, if awarded costs can be updated to City Roster rates. Quotes from labs may differ depending on equipment availability, and staffing availability.
- Installation of a local meteorological station is available as an alternative for collecting weather data during the sampling campaigns if Hamilton Air Monitoring Network meteorological tower ([HAMN STN29247](#) GFL Facility) is unavailable or has quality or other issues with data.

## 6. Conclusions and Recommendations

Three sampling plans are outlined in this technical memo for the purposes of determining health impacts in the areas surrounding the GFL Landfill. These alternative air quality monitoring plans provide a measured approach to quantifying

# FEASIBILITY REVIEW TECHNICAL DOCUMENT

the air quality on short-term and long-term time scales. The advantages and disadvantages of these methods are outlined as well as the approximate costs.

The proposed sampling plans are provided based on the results of the MECP 2023 monitoring, best practices, and discussions with the City of Hamilton; however alternative plans can be developed upon request. For example, the short-term canister and long-term passive sampling plans could be combined to include both daily canister monitoring and long-term passive sampling. Such a comprehensive plan would provide combined information about short-term (daily) impacts as well as long-term exposures.

Although the MECP identified ammonia as a potential leachate odour source in the Provincial Officer's Order, they did not perform ammonia monitoring during their Ambient Air Monitoring Assessment Surveys. Short-term ammonia fixed location sampling is therefore only provided as a complimentary option that could be combined with the short-term fixed location canister sampling program.

The recommended sampling plan for the City to implement as an initial screening is the short-term fixed location canister sampling program. This method would measure air quality for a 7-day period which could be implemented in the spring when landfill odours are expected to become significant. For the results of the study to be statistically significant additional sampling campaigns are recommended with a minimum of three per year (e.g., one week in spring, summer, and fall) to measure and compare seasonality of air quality. Depending on the results of the sampling campaign(s), the subsequent sampling plans can be adapted (e.g., number of samples, analytes, locations, period between sampling campaigns, etc.) and the usefulness of long-term tube/cartridge sampling can be evaluated.

## 7. References

GFL Environmental August 2023 Air Monitoring On-Site Assessment Survey, Stoney Creek, Ontario; Ministry of the Environment, Conservation and Parks; September 1, 2023.

GFL Environmental September 2023 Ambient Air Monitoring Assessment Survey, Stoney Creek, Ontario; Ministry of the Environment, Conservation and Parks; October 5, 2023.

Provincial Officer's Order; Issued to GFL Environmental Inc., Order number 1-237438590; Tamara Posadowski, October 17, 2023.

Operations Manual for Air Quality Monitoring in Ontario; Ministry of the Environment, Conservation and Parks; July 1 2018

<https://www.ontario.ca/document/operations-manual-air-quality-monitoring-ontario-0>

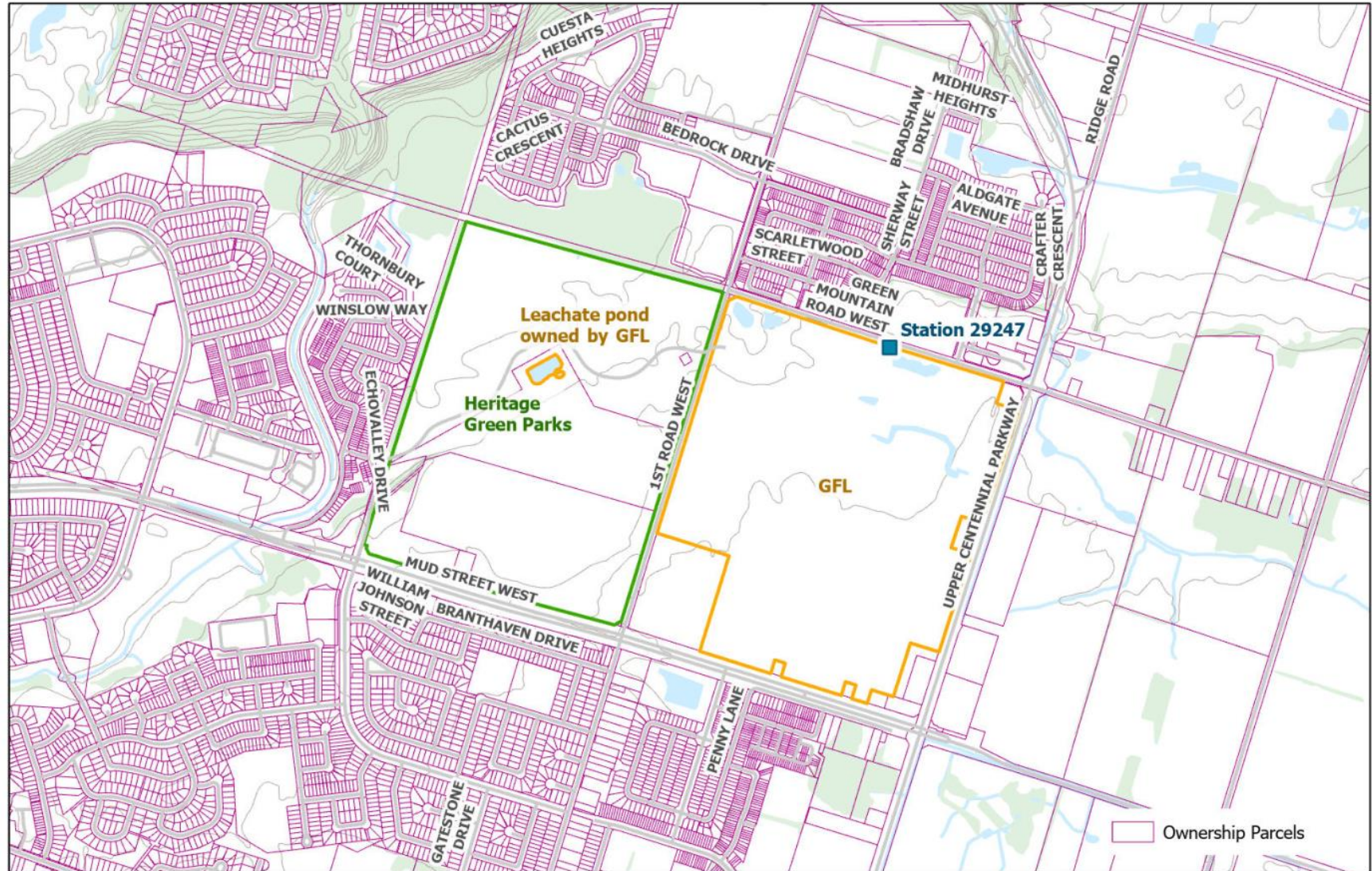
# Appendix A

## Figures from MECP Reports



Figure 1 - GFL Environmental September 2023

Ministry of the Environment  
Conservation and Parks



Information provided by:  
Ministry of the Environment and Climate Change  
Ministry of Natural Resources and Forestry  
  
Coordinate System: NAD 1983 UTM Zone 17N  
Projection: Transverse Mercator  
Datum: North American 1983

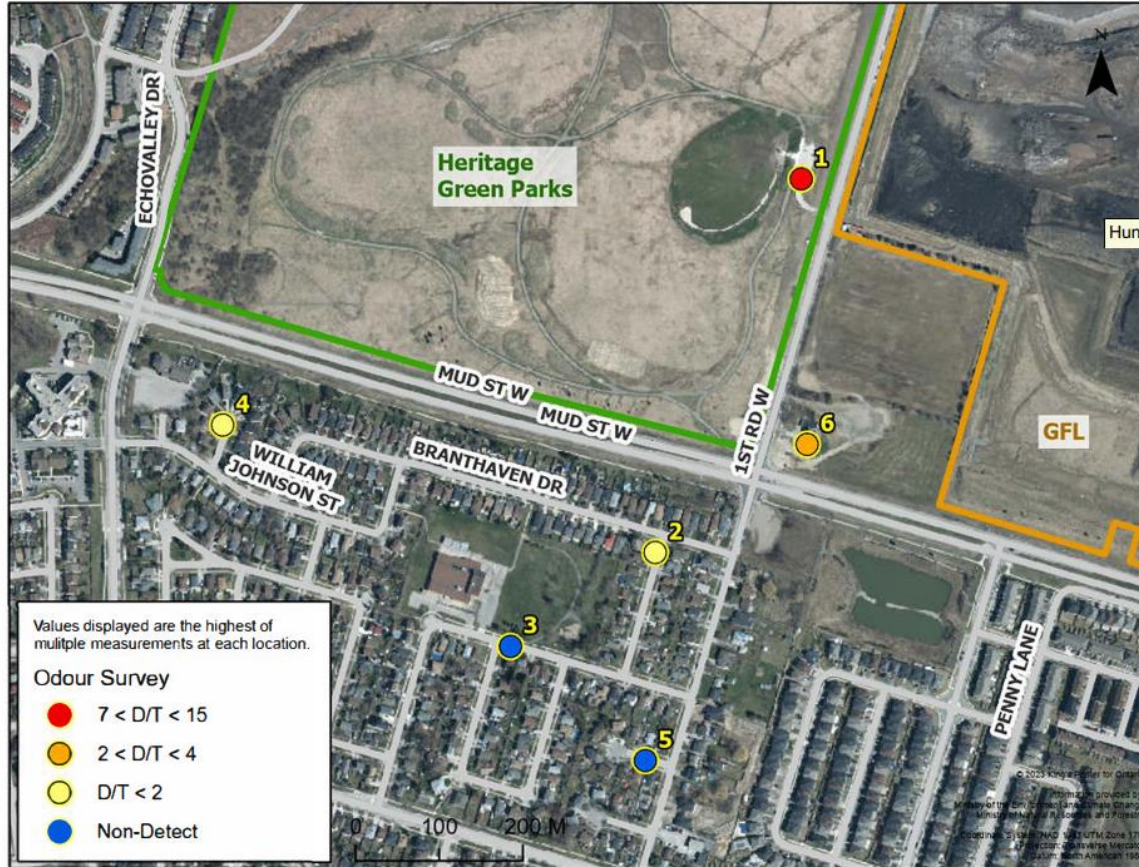
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**Figure 10 - GFL Environmental August 2023  
Air Monitoring On-Site Assessment Survey - Aug 28, 2023**

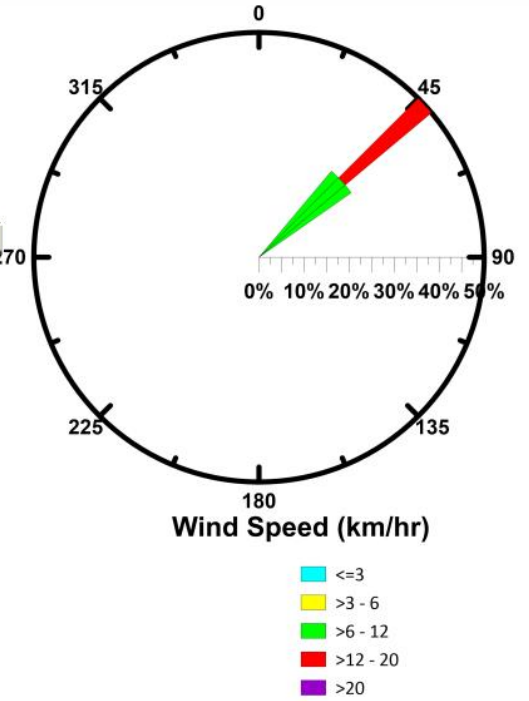
Ministry of the Environment  
Conservation and Parks



Values displayed are the highest of multiple measurements at each location.

**Odour Survey**

- 7 < D/T < 15
- 2 < D/T < 4
- D/T < 2
- Non-Detect

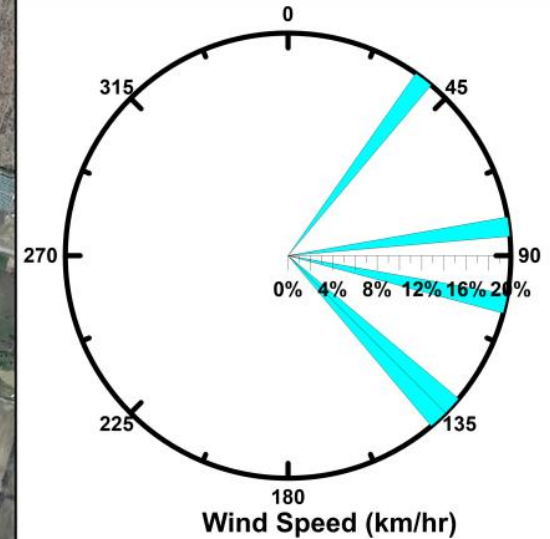


Date	Time (Location)	Name	HAPSITE Comments:	Other compounds (PM, H <sub>2</sub> S, Nox, CO or SO <sub>2</sub> )	Odours observations	General Comments
28-Aug-23	12:33	1	Toluene: 8.7 ug/m3 1-3-dimethylbenzene: 3.6 ug/m3	Slightly elevated H2S	Yes	Odour Survey Conducted. Odours detected
	12:55		No Compounds Detected	Measured H2S concentrations as high as 8.4 ppb	Yes	
	13:12	2	No Compounds Detected	-	No	
	13:28		No Compounds Detected	-	Yes	
	13:47		No Compounds Detected	-	No	
	14:05	3	No Compounds Detected	-	Yes	
	14:22	4	No Compounds Detected	-	No	
	14:47	5	No Compounds Detected	-	Yes	
15:03	6	No Compounds Detected	-	Yes		



**Figure 5 - GFL Environmental September 2023**  
**Ambient Air Monitoring Assessment - Odour Survey - Sep 22, 2023**

Ministry of the Environment  
Conservation and Parks



Where multiple measurements were recorded at a location the highest value is displayed.

- Odour Survey**
- 7<D/T<15
  - 4<D/T<7
  - 2<D/T<4
  - D/T<2
  - Non-Detect

Due to equipment limitations, wind directions with wind speeds <3km/hr are unreliable

Date	Time (Location)	Name	Odours observations	D/T Ratio	General Comments
22-Sep-23	0:10	A	No	-	Complainant House #1
	0:20	B	Yes	D/T<2	Complainant House #2 - Sour smell
	0:30	C	Yes	4<D/T<7	Inside GFL Facility - Reference only - Rotten eggs
	0:40	D	Yes	4<D/T<7	Inside GFL Facility - Reference only - Rotten eggs
	0:55	E	Yes	4<D/T<7	Inside GFL Facility - Reference only - Rotten eggs
	1:28	F	Yes	D/T<2	GFL mist machine - deodorizer/ sweet
	1:43	G	No	-	Complainant House #3
	1:54	H	No	-	Complainant House #4
	2:06	I	No	-	Complainant House #5
	2:13	J	No	-	Complainant House #6
	2:30	K	No	-	Complainant House #7
	2:52	L	Yes	D/T<2	GFL mist machine - deodorizer/ sweet
	3:15	M	Yes	D/T<2	Sour smell
	3:32	N	Yes	2<D/T<4	Sour smell
	4:08	O	Yes	D/T<2	Sour smell
	4:25	P	Yes	2<D/T<4	Leachate/ waste
	4:43	Q	Yes	4<D/T<7	Rotten Eggs
	4:51	R	Yes	7<D/T<15	Rotten Eggs
4:58	S	Yes	2<D/T<4	Rotten Eggs	





**Figure 12 - GFL Environmental September 2023  
Summary of 10-min TRS Exceedance locations**

Ministry of the Environment  
Conservation and Parks



Information provided by:  
Ministry of the Environment and Climate Change  
Ministry of Natural Resources and Forestry  
Coordinates System: NAD 1983 UTM Zone 17N  
Projection: Transverse Mercator  
Datum: North American 1983

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# Appendix B

## List of Analytes and Detection Limits

### Canister Sampling Analyte List

VOCs Compounds using canister	Method S621 RDL- ppbv	RDL- $\mu\text{g}/\text{m}^3$
Acetone	1	2.4
Benzyl chloride	0.2	1
Bromodichloromethane	0.2	1.3
Dibromochloromethane	0.2	1.7
Dichloropropylene, cis-1,3-	0.2	0.91
Dioxane, 1,4-	0.2	0.72
Hexachlorobutadiene	0.2	2.1
Isopropylbenzene	0.2	0.98
Methyl-tert-butyl ether [MTBE]	0.2	0.72
Propylene	0.2	0.34
Styrene	0.2	0.85
Tetrachloroethane, 1,1,2,2-	0.2	1.4
Trichlorofluoromethane	0.2	1.1
Vinyl bromide	0.2	0.87
Vinyl chloride	0.2	0.51
Allyl chloride	0.2	0.63
Benzene	0.1	0.32
Bromoform	0.2	2.1
Bromomethane	0.2	0.78
BTEX, total	0.3	1.2
Butadiene, 1,3-	0.2	0.44
Carbon disulfide	0.5	1.6
Carbon tetrachloride	0.2	1.3
Chlorobenzene	0.2	0.92
Chloroethane	0.2	0.53
Chloroform	0.2	0.98
Chloromethane	0.2	0.41
Cyclohexane	0.2	0.69
Dibromoethane, 1,2-	0.2	1.5
Dichlorobenzene, 1,2-	0.2	1.2

Sulphur Compounds using canister	Method S630 RDL- ppbv	RDL- $\mu\text{g}/\text{m}^3$
Carbon disulfide	2	6.2
Carbonyl sulfide	4	9.8
Diethyl disulfide	2	10
Diethyl sulfide	4	15
Dimethyl disulfide	2	7.7
Dimethyl sulfide	4	10
Dimethylthiophene, 2,5-	4	18
Ethyl mercaptan	4	10
Ethyl methyl sulfide	4	12
Ethylthiophene, 2-	4	18
Hydrogen sulfide	4	5.6
Isobutyl mercaptan	4	15
Isopropyl mercaptan	4	12
Methyl mercaptan	4	7.9
Methylthiophene, 2-	4	16
Methylthiophene, 3-	4	16
n-Butyl mercaptan	4	15
Propyl mercaptan	4	12
sec-butyl mercaptan + thiophene	6	14
t-Butyl mercaptan	4	15
Tetrahydrothiophene	4	14
<b>Total compounds</b>	<b>22</b>	<b>22</b>
<b>Lowest RDL</b>	<b>2 ppbv</b>	<b>5.6 <math>\mu\text{g}/\text{m}^3</math></b>
<b>Max RDL</b>	<b>6</b>	<b>18</b>

<b>Sulfur, total reduced (as H2S), 22 compounds</b>	<b>25</b>
---	-----------

Dichlorobenzene, 1,3-	0.2	1.2
Dichlorobenzene, 1,4-	0.2	1.2
Dichlorodifluoromethane	0.2	0.99
Dichloroethane, 1,1-	0.2	0.81
Dichloroethane, 1,2-	0.2	0.81
Dichloroethylene, 1,1-	0.2	0.79
Dichloroethylene, cis-1,2-	0.2	0.79
Dichloroethylene, trans-1,2-	0.2	0.79
Dichloromethane	0.2	0.69
Dichloropropane, 1,2-	0.2	0.92
Dichloropropylene, cis+trans-1,3-	0.3	1.29
Dichloropropylene, trans- 1,3-	0.2	0.91
Dichlorotetrafluoroethane, 1,2- [Freon 114]	0.2	1.4
Ethyl acetate	0.2	0.72
Ethylbenzene	0.1	0.43
Ethyltoluene, 4-	0.2	0.98
Heptane, n-	0.2	0.82
Hexane, n-	0.2	0.7
Hexanone, 2-	1	4.1
Methyl ethyl ketone [MEK]	0.2	0.59
Methyl isobutyl ketone [MIBK]	0.2	0.82
Naphthalene	0.1	0.52
Tetrachloroethylene	0.2	1.4
Tetrahydrofuran	0.2	0.59
Toluene	0.1	0.38
Trichloro-1,2,2- trifluoroethane, 1,1,2- [Freon 113]	0.2	1.5
Trichlorobenzene, 1,2,4-	0.2	1.5
Trichloroethane, 1,1,1-	0.2	1.1
Trichloroethane, 1,1,2-	0.2	1.1
Trichloroethylene	0.2	1.1
Trimethylbenzene, 1,2,4-	0.2	0.98
Trimethylbenzene, 1,3,5-	0.2	0.98
Trimethylpentane, 2,2,4-	0.2	0.93
Vinyl acetate	0.5	1.8
Xylene, m+p-	0.2	0.87

Xylene, o-	0.1	0.43
Xylenes, total	0.3	1.3
<b>Total VOCs to analyze</b>	<b>67</b>	<b>67</b>
	ppbv	µg/m <sup>3</sup>
<b>Lowest RDL</b>	<b>0.1</b>	<b>0.32</b>
<b>Max RDL</b>	<b>1</b>	<b>4.1</b>

## Passive Tube Analyte List

VOCs Compounds	Method S620D RDL- µg/sample	RDL- µg/m <sup>3</sup>
Allyl chloride	0.01	0.973
Benzene	0.004	0.301
BTEX, total	0.015	1.16
Butadiene, 1,3-	0.004	0.325
Chlorobenzene	0.004	0.389
Dichlorobenzene, 1,2-	0.004	0.441
Dichlorobenzene, 1,3-	0.004	0.451
Dichlorobenzene, 1,4-	0.004	0.441
Dichloroethane, 1,1-	0.004	0.348
Dichloroethane, 1,2-	0.004	0.348
Dichloroethylene, 1,1-	0.02	1.741
Dichloroethylene, cis-1,2-	0.02	1.711
Dichloropropane, 1,2-	0.004	0.382
Ethylbenzene	0.004	0.431
Ethyltoluene, 4-	0.004	0.484
Styrene	0.004	0.397
Tetrachloroethylene	0.004	0.413
Toluene	0.004	0.382
Trichloroethane, 1,1,1-	0.004	0.389
Trichloroethylene	0.004	0.397
Trimethylbenzene, 1,3,5-	0.004	0.484
Xylene, m+p-	0.008	0.863
Xylene, o-	0.004	0.431
Xylenes, total	0.01	0.965
<b>Total VOCs to analyze</b>	<b>24</b>	<b>24</b>
	µg/sample	µg/m <sup>3</sup>
<b>Lowest RDL</b>	<b>0.004</b>	<b>0.301</b>
<b>Max RDL</b>	<b>0.02</b>	<b>1.741</b>
<b>Analysis Method Radiello 170</b>	<b>RDL</b>	
H <sub>2</sub> S	0.57	ppb

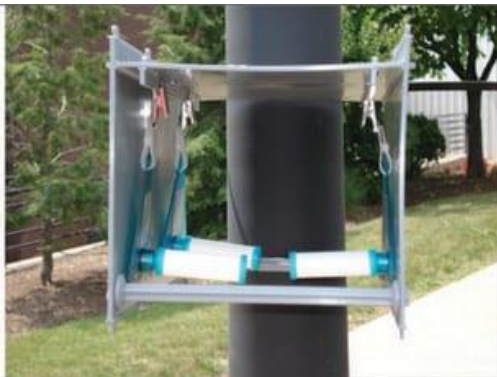
# Appendix C

## Examples of Sampling Equipment and Field Set-up

Short-Term Fixed Location Canister Sampling Equipment



Long-Term Fixed Location Passive Sampling Equipment



Continuous Sampling Equipment



HAPSITE



St. Croix Sensory Nasal Ranger (Nasal Ranger)



## Provincial Officer's Order

Order Number

1-237438590

### Order Issued To

GFL ENVIRONMENTAL INC.  
100 NEW PARK PL UNIT 500, VAUGHAN, ON, L4K 0H9

### Site

GFL Stoney Creek Regional Facility  
65 GREEN MOUNTAIN RD W, HAMILTON, ON, L8J 1X5

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

### PART A - WORK ORDERED

Pursuant to my authority under **EPA | 157.1, EPA | 157**, I order you to do the following:

**Item No. 1**      **Compliance Due Date:** Nov-01-2023

By November 1, 2023, the Owner shall remove leachate from the Site, at a rate exceeding 500,000 litres per week, using an approved waste management system (e.g. waste hauler(s)) authorized to collect, handle, store and transport the leachate, and dispose of the leachate at a waste disposal site(s) approved to accept the leachate under the EPA, until the level of standing leachate on the liner is less than 0.5 metres, or until advised in writing by the undersigned Provincial Officer.

**Item No. 2**      **Compliance Due Date:** Nov-01-2023

By November 1, 2023, the Owner shall provide written confirmation to the undersigned Provincial Officer by email to Tamara.Posadowski@ontario.ca that work described in Item No. 1 has commenced.

**Item No. 3**      **Compliance Due Date:** Oct-19-2023

Commencing on October 19, 2023, and by noon (12:00 hrs) on each Thursday thereafter until notified in writing by the undersigned Provincial Officer, the Owner shall provide a weekly progress report to the undersigned Provincial Officer by email to Tamara.Posadowski@ontario.ca, which includes, but is not limited to the following information:

Leachate



- a) The current volume of leachate at the Site;
- b) The level of standing leachate on the liner;
- c) The volume of leachate removed from the Site over the past week;
- d) Method and location of leachate disposal, to include: volume discharged to sanitary sewer, volume transported off-site for disposal at an approved waste disposal site(s), including the name, location and ECA number of the site;
- e) Detailed list of changes to the treatment of leachate at the Site, including:
  - I. Any changes to the physical or chemical treatment that has occurred;
  - II. Dates and times of these changes;
  - III. Specific details for each change, including chemical dosing rates, location of chemical dosing, flow rates, etc.;
  - IV. List of changes or adjustments planned or expected for the coming week; and
  - V. Parameters being monitored to inform the Owner's decisions regarding any changes being made to the leachate treatment system.

#### Odour Mitigation Measures

- f) Details of the odour mitigation measures employed over the past week for each major odour source at the Site.
- g) Assessment of the effectiveness of the odour mitigation measures and the methodology that is being used to determine the effectiveness.
- h) Detailed list of any changes to odour mitigation measures that has occurred since the previous week and a list of any proposed changes for the week ahead.

#### Complaints

- i) A summary of the complaints received by the Owner over the past week, including, but not limited to:
  - i. The number of complaints;
  - ii. Summary of actions taken by the Owner in response to the complaints;
  - iii. Copies of: the odour complaint reports, odour inspection logs genera

#### **Item No. 4**      **Compliance Due Date:** Oct-17-2023

Upon service of this Order, the Owner shall implement the Communication Plan, as outlined in section 4 of their report "Response to MECP Information Request, GFL Stoney Creek Regional Facility" dated September 21, 2023 and provided to the undersigned Provincial Officer, and as amended in their follow-up report dated October 13, 2023 "Response to MECP Information Request Following Review of Odour Mitigation Letter (GHD, September 21, 2023)".

#### **Item No. 5**      **Compliance Due Date:** Oct-20-2023

By October 20, 2023, the Owner shall retain the services of a Qualified Person and have the Qualified Person submit an air monitoring plan to the

undersigned Provincial Officer by email to Tamara.Posadowski@ontario.ca for acceptance, to monitor contaminant concentrations for total reduced sulphur, ammonia and other contaminants that may contribute to odour concerns from the Site. The air monitoring program shall include but not be limited to:

- a) Daily fence line monitoring for total reduced sulphur, ammonia, and any other parameters recommended by the Qualified Person. The monitoring data shall be sufficient to assess against the Ministry's 10-minute and 24-hour standards as set out in Schedule 3 of Ontario Regulation 419/05 (Air Pollution – Local Air Quality);
- b) Odour monitoring in the surrounding community; and,
- c) A plan to communicate results to the public.

**Item No. 6**      **Compliance Due Date:** Oct-18-2023

Within 24 hours of service of this Order, the Owner shall post a copy of this Order on their website so that it is publicly accessible.

## **PART B - PROVINCIAL OFFICER'S REPORT**

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

### **Definitions**

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

"ECA" means an Environmental Compliance Approval.

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

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

"Order" means this Provincial Officer's Order No. 1-237438590 as it may be amended.

"Owner" means GFL Environmental Inc.

"Provincial Officer" means the undersigned provincial officer or, in the event that the undersigned officer is unable to act, any other provincial officer authorized to act pursuant to the EPA.

"Qualified Person" means a consultant, contractor or other person satisfactory to the Provincial Officer 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 in this Order.

"Site" means the property listed above in the Site section and further described below in the section entitled Description of the Site and/or System/Facility.

### **Description of Person(s) Subject to the Order**

GFL Environmental Inc. (GFL) is the registered owner of the Site. GFL Environmental Inc. is an active Ontario corporation with Ontario Corporation Number 1000399619, that was amalgamated on January 1, 2023. GFL operates a waste disposal site (landfilling site) at the Site.

### **Description of the Site and/or System/Facility**

The Site includes the property municipally known as 65 Green Mountain Rd. W., Hamilton, Ontario, L8J 1X5. For the purpose of this Order, the Site also includes the leachate pond, which is located to the west of the active landfill operations, in the Heritage Green Sports Park.

The legal description of this property for the landfilling operations is: PART LOTS 25,26 CON 6 SALTFLEET AS IN CD511860 EXCEPT PTS 4,5,6 EXPROPRIATION PLAN VM159853; EXCEPT PART 2 62R17754, PART 1 62R20381 SUBJECT TO AN EASEMENT OVER PART 2 2R21475 IN FAVOUR OF PART LOT 25 CON 6 SF, PART 1 62R10207, PARTS 3-5 62R5367

& AS IN VM200810 AS IN WE1469446 CITY OF HAMILTON, being all of PIN 170972071.

The legal description of the property upon which the leachate pond is situated is: PT LT 27 & 28, CON 6 SALTFLEET BEING PT 4, 10 & 11 ON 62R-16022; EXCEPT PARTS 2 AND 3 PL 62R20687 TOGETHER WITH AN EASEMENT OVER PT LT 27 & 28, CON 6 SALTFLEET BEING PTS 1,2,& 3 ON 62R16022 AS IN WE766756 CITY OF HAMILTON, being all of PIN 170972822.

The Site is subject to Environmental Compliance Approval No. A181008 in respect of a waste disposal site. The landfilling site is approved to receive and dispose of solid, non-hazardous waste. No hazardous, liquid industrial, or putrescible wastes may be received at the Site. The Site is 79.3 hectares in size with an approved landfilling area of 59.1 hectares. The leachate pond is located west of the active landfilling operations at 65 Green Mountain Road West and it stores treated leachate from the landfilling operations before it is discharged to municipal sanitary sewers. The leachate pond is surrounded by the Heritage Green Sports Park and the Heritage Green Community Dog Park.

To the north and south of the Site there are residential neighbourhoods, and also to the west of the leachate pond. To the east of the Site, there is agricultural lands, various recreational activities and additional residences.

### **Reasons for the Order**

On August 25, 2023, I took over this file from Provincial Officer Joanne Placko. The off-site odour impacts caused by operations at the Site were already ongoing at this time. I spoke with Provincial Officer Placko and reviewed the complaint data received at the Ministry and determined that odour complaints about the Site started as early as April 2023, have consistently been received from residents in the surrounding community since July 2023 and are continuing up to the date of this Order. Between April 2023 and October 2023, there has been over 900 odour complaints received at the Hamilton District Office in relation to odours being generated from operations at the Site and which have impacted residents in the surrounding residential communities.

GFL has stated that they currently have elevated levels of leachate being generated at the Site. Leachate is the liquid that forms when rainwater filters through wastes placed in a landfill. When this liquid comes in contact with buried wastes, it can leach, or draw out, chemicals or constituents from those wastes. The elevated leachate levels have resulted in above-ground pooling of leachate within the waste cells, as well as a change in the chemistry and characteristics of the leachate. The exposed leachate on the Site and the leachate pond have been identified as the main source of odours impacting the surrounding residential neighbourhoods. I have detected odours from these odour sources during multiple site visits in August, September and October, 2023. I have also detected strong odours around the temporary biofilter at the Interim Leachate Pump Station and it is my opinion that these operations are also a significant source of odour emissions.

Environmental Officers from the Hamilton District Office have been completing daily odour surveys around the Site in response to the number of complaints being received, along with multiple after-hours Emergency Response Program callouts. Odour surveys are completed in

response to odour complaints when received and involve identifying and confirming the odour source (in this situation the exposed leachate and leachate pond) and checking upwind and downwind locations of the source to determine if there are any other potential odour sources. The surveys also include recording observations of odours being detected off-site away from the source, the intensity of the odours and a description of the odour. Odours of varying intensities (mild, moderate and high) have been detected at, near and away from the identified odour sources, while some odour surveys have yielded no odours being detected. Odours are typically described as a rotten egg/sulphur smell which are typical of the odour being generated by the exposed leachate and leachate pond. When I completed my odour surveys, and odours were detected around the Site and in residential neighbourhoods and/or local parks, I would also go onto the Site and have confirmed the sources of the odours, which include the leachate pond, the exposed leachate and the biofilter. Given the nature of the odour (sulphur/rotten egg), even mild odours would be considered a nuisance given the tendency of the odour to linger and have the potential to cause an adverse effect in the surrounding residential communities.

GFL has implemented the following actions to mitigate odours from the Site:

- operating an odour treatment control system (bio-filter) at the interim leachate pump station to mitigate odours during the processing of leachate prior to discharge to the sanitary system;
- deployed multiple odour neutralizing systems (misting system) at the Site;
- applying a foam surfactant to the exposed leachate blanket and to the leachate pond;
- as exposed leachate levels go down, the areas are being covered with soil to reduce the potential for any residual odours; and
- continues to explore other available odour mitigation methods.

Actions that GFL implemented that are no longer occurring:

- having leachate pumped and hauled off-site to a licenced receiving site for treatment and disposal; and,
- treating exposed leachate present onsite with ferric sulphate.

GFL informed me that the hauling of leachate off-site stopped on September 22, 2023, due to high H<sub>2</sub>S concentrations in the hauling trucks and the receiving site refused to accept any more loads until some kind of treatment could be done to the leachate prior to receiving anymore. The treating of exposed leachate with ferric sulphate was halted after a meeting on September 15, 2023, as GFL's consultant (GHD) believed it may not be helping with the odours.

Following the meeting that occurred on September 15, 2023, between Ministry staff, GFL and their consultant GHD, I sent an email to GFL requesting additional information as follow-up. GFL had GHD prepare a report in response to my email and this report was received on September 21, 2023. After I reviewed the report, I sent a letter to GFL via email on October 5, 2023, requesting additional supporting information. An additional report was received from GFL on October 13, 2023.

The following reports were received from GFL and are included in the Attachment Section of this Order:

Report 1: "Response to MECP Information Request, GFL Stoney Creek Regional Facility" received on September 21, 2023 and prepared by GHD on behalf of GFL.

Report 2: "Response to MECP Information Request Following Review of Odour Mitigation Letter

(GHD, September 21, 2023) received on October 13, 2023 and prepared by GHD on behalf of GFL.

These reports will now be referred to as Report 1 and Report 2 for the rest of this Order.

Work Ordered Item No. 1 requires the hauling of leachate via trucks to recommence. As per GFL's Report 1, section 2.1.2 states that an average of 214,370L of leachate were hauled off-site on the days the trucks were operating (additional details in Report 1, Attachment 1 - Daily Leachate Pumping Rates and Volumes). So, I believe that a minimum of 500,000L per week is a reasonable expectation based on previous trucking rates.

In GFL's Report 2, item #8 states that "It is recommended to limit the level of standing leachate on the liner to 0.5 m at any one time to be consistent with the design and operating concept." The 0.5m level referenced in Work Ordered Item No. 1 is based off this recommendation. If new information becomes available that odour issues from the Site have been mitigated, I will consider revising Work Ordered Item No. 1 as necessary.

In GFL's Report 1, section 4 outlines their communications plan and commits to "The Weekly Online Community Updates and Monthly Virtual Community Update Meetings will continue until the odour issues have been deemed resolved by GFL in consultation with the Ministry of the Environment, Conservation and Parks." Amendments to the communications plan were received in GFL's Report 2, and are found under item #16 in that report. This amendment identifies the following monthly meeting dates: October 18, November 16, and December 14, 2023, and ensures written notification is provided to all residents within 3 kilometres of the Site. It is my expectation that these monthly meetings continue until the ministry is satisfied that the odour issues have been resolved.

The Hamilton District Office engaged the assistance of MECP Regional Technical Support Group to conduct air monitoring in the vicinity of the GFL landfill in response to odour concerns from nearby residents. Ambient air monitoring was completed August 8, 9, 10, 16, 17, 21, 24, 25, and 28, 2023, as well as September 1, 14, 15, 22, 28 and 29, 2023.

For the August monitoring period, no exceedances of the MECP's air standards for a contaminant set out in Schedule 3 of O.Reg. 419/05 (Air Pollution – Local Air Quality) were measured. Air monitoring in August was conducted during the daytime hours. In response to public complaints, which indicated odours were worse during the evening and early morning hours, additional monitoring during those times of concerns were planned for September. During the September monitoring period, a total of twenty-nine (29) exceedances of the Ministry's 10-minute standard for total reduced sulphur (TRS) compounds were measured (as per item 95.2 in Schedule 3, and contrary to s.20 of O.Reg. 419/05). The Ministry's 10-minute standard for TRS, as seen in Schedule 3 of Ontario Regulation 419/05, is 13µg/m<sup>3</sup>. TRS exceedances were measured at many locations surrounding the GFL facility, including in residential areas. During the September 2023 GFL Community Liaison Committee meeting, GFL's consultant, GHD, stated that the leachate odours are primarily sulphur compounds and/or ammonia. Based on this and the MECP's air monitoring results, is the reason for identifying TRS and ammonia in Work Ordered Item No. 5.

Even with the actions being implemented by GFL, the odours have been persisting and the number of complaints from residents has been increasing. Local residents have been reporting adverse effects including loss of enjoyment of property and health effects from the ongoing odours in contravention of s. 14 of the EPA. Condition 5.17 of ECA A181008 states "The Site shall be operated and maintained such that vermin, vectors, dust, litter, odour, noise and traffic do not create a nuisance." Based on the complaints being received, and the observations of multiple Environmental Officers from the Hamilton District Office, there are odours consistently being generated by the GFL Site which are causing a nuisance to the surrounding residential communities in contravention of their ECA condition.

### Authority to Issue the Order

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

This Order is issued pursuant to EPA s. 157 and section 157.1.

I reasonably believe that GFL Environmental Inc. has contravened or is contravening those provisions of s. 14, s. 186(3) of the EPA and s. 20 of Ontario Regulation 419/05 as outlined in the Contraventions section below.

I further reasonably believe that the requirements specified in this Order are necessary or advisable so as to prevent or reduce the risk of a discharge of a contaminant, namely odours from leachate, into the natural environment from the undertaking at the Site, or to prevent, decrease or eliminate an adverse effect that may result from (i) the discharge of a contaminant from the undertaking, or (ii) the presence or discharge of a contaminant in, on or under the property.

### Contraventions

EPA   14   (1)	(1) Subject to subsection (2) but despite any other provision of this Act or the regulations, a person shall not discharge a contaminant or cause or permit the discharge of a contaminant into the natural environment, if the discharge causes or may cause an adverse effect.
EPA   186   (3)	(3) Every person who fails to comply with the terms and conditions of an environmental compliance approval, certificate of property use or renewable energy approval or of a licence or permit under this Act or who fails to comply with the terms of a report under section 29 is guilty of an offence.
EPA   O. Reg. 419/05   20   (2.2)	(2.2) A person shall not discharge or cause or permit the discharge of a contaminant listed in Schedule 3 into the air if a standard is set out in Schedule 3 for the contaminant for a 10 minute averaging period and the discharge results in the concentration of the contaminant exceeding that standard at a point of impingement where human activities regularly occur at a time when those activities regularly occur.

## Attachments

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

Report 1: "Response to MECP Information Request, GFL Stoney Creek Regional Facility" received on September 21, 2023 and prepared by GHD on behalf of GFL.

Report 2: "Response to MECP Information Request Following Review of Odour Mitigation Letter (GHD, September 21, 2023) received on October 13, 2023 and prepared by GHD on behalf of GFL.



**ISSUING OFFICER**

**Name:** Tamara Posadowski

**Job Title:** Senior Environmental Officer

**Badge Number:** 1861

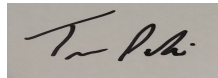
**Address:** 119 KING ST W, 9TH FLR, HAMILTON, ON

**Officer Email:** tamara.posadowski@ontario.ca

**Office Email:** Environment.Hamilton@ontario.ca

**Date:** Oct 17, 2023

**Signature:**



## REVIEW AND APPEAL INFORMATION

### REQUEST FOR REVIEW

You may request that this Order be reviewed by the Director. Your request must be made in writing or orally with written confirmation. Your written request or written confirmation of your oral request must be received by the Director within 7 days after the date this Order was served on you and must be given to the Director as indicated in the Contact Information below.

In your written request or written confirmation, you must:

- specify the portions of this Order that you wish to be reviewed;
- include any submissions to be considered by the Director with respect to issuance of this Order to you or any other person and with respect to the contents of this Order;
- apply for a stay of this Order, if necessary; and
- provide an address for service by one of the following means, in person, by mail, by commercial courier, by fax, or by email.

In response to your request, the Director may confirm, alter/amend or revoke this Order. As an intermediate step, the Director may stay this Order by providing written notice to you that additional time is required to make a decision.

The Director will serve you with a copy (written notice) of the decision to revoke this Order or of an order, a Director's Order, to confirm or alter/amend this Order, together with reasons.

### DEEMED CONFIRMATION OF THIS ORDER

If within 7 days of the Director receiving your request for review you do not receive written notice of a stay, or oral or written notice of the Director's decision on your request for review, this Order is deemed (considered) to have been confirmed by Order of the Director and deemed to have been served upon you at the expiry of those 7 days.

### APPEAL INFORMATION (REQUIRE A HEARING)

A. If this Order is deemed confirmed as explained above, you may require a hearing by the Ontario Land Tribunal on the deemed confirmed Order within 15 days of the deemed service date:

- you must serve as indicated in the Contact Information below, written notice of your appeal on the Ontario Land Tribunal and the Director within those 15 days of the deemed service date;

- your notice must state the portions of the deemed confirmed Order for which a hearing is required and the grounds on which you intend to rely at the hearing;
- unless you have leave (permission) of the Ontario Land Tribunal, you are not entitled to appeal a portion of the deemed confirmed Order or to rely on grounds of appeal that are not stated in your notice requiring the hearing; and
- written notice requiring a hearing must be served on the Ontario Land Tribunal and the Director as indicated in the Contact Information below.

B. If this Order is confirmed or altered/amended by the Director by a written order served upon you (as opposed to the deemed confirmation noted above), such Director's Order will include the appropriate instructions for appealing that order to the Ontario Land Tribunal.

## CONTACT INFORMATION

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

Registrar  
Ontario Land Tribunal  
655 BAY STREET, 15<sup>th</sup> FLOOR  
TORONTO, ON M5G 1E5  
OLT.Registrar@ontario.ca

and

Director (Provincial Officer's Orders)  
Ministry of the Environment,  
Conservation and Parks  
Hamilton District Office  
119 KING ST W, 9TH FLR  
HAMILTON, ON L8P 4Y7  
Office Email: Environment.  
Hamilton@ontario.ca  
Fax: (905) 521-7806

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](http://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 Order is made and any corresponding Service Regulation.

## ADDITIONAL INFORMATION

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

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

The requirements of this 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 Order.

The requirements of this Order are severable. If any requirement of this 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 Order.

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

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

**The procedures to request a review by the Director or require a hearing 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](http://www.ontario.ca/laws).**

# Attachments

## For Provincial Officer's Order 1-237438590

Report 1: "Response to MECP Information Request, GFL Stoney Creek Regional Facility" received on September 21, 2023 and prepared by GHD on behalf of GFL.

Report 2: "Response to MECP Information Request Following Review of Odour Mitigation Letter (GHD, September 21, 2023) received on October 13, 2023 and prepared by GHD on behalf of GFL.

**Our ref:** 11103232

**21 September 2023**

**Tamara Posadowski  
Ministry of the Environment, Conservation and Parks  
Hamilton District Office  
119 King St W  
Hamilton, ON L8P 4Y7**

**Response to MECP Information Request, GFL Stoney Creek Regional Facility**

Dear Tamara Posadowski

## **1. Background**

GFL Environmental Inc. (GFL) owns and operates the Stoney Creek Regional Facility (SCRF) located at 65 Green Mountain Road West in Stoney Creek (Site). GFL has been working to address concerns raised by various stakeholders (i.e., general public, City of Hamilton, MECP) regarding odours emanating from the Site.

On behalf of GFL, GHD has prepared this document to outline ongoing odour monitoring and mitigation efforts at the Site. This document has been prepared in response to an information request from the MECP dated September 18, 2023 (via email). Specifically, this document provides details regarding the following items:

- Additional actions that will be taken by GFL to further mitigate odours from the Site, including the exposed leachate and leachate pond.
- Technical details of the Site leachate monitoring program and additional monitoring conducted since the leachate issues commenced.
- Details on products evaluated to help mitigate odours and timeline for implementation.
- Evaluation of the effectiveness of the current leachate treatment system, including sample analysis of the system inlet and outlet and identification of potential modifications.
- Comprehensive communications plan, including weekly electronic community updates and monthly in-person updates.
- Timeline to eliminate exposed leachate, including identification of current leachate levels, plans for reducing levels, objectives, and milestones.



## 2. Odour Mitigation Actions

### 2.1 Leachate Discharge

It is understood that the odours are primarily associated with the leachate from the landfill. Continuous pumping and disposal to eliminate the exposed leachate in the active landfill cells is the primary focus for reducing the associated odours.

Leachate accumulates on the base liner system and is collected via the leachate collection system. Currently, GFL has the ability to collect leachate from three areas:

- Interim Leachate Pumping Station (ILPS) located in the southeast buffer zone.
- Permanent Leachate Pumping Station located at the low point of the base liner system in the southeast area of the landfill.
- Within the active landfill cell in the northeast portion of the Site.

The collected leachate is then discharged off-Site either through a direct connection to the City of Hamilton sanitary sewer under Mistywood Drive or loaded into tanker trucks for haulage to off-Site disposal location(s). The current leachate collection and disposal network is shown in Figure 1.



Figure 2.1 Leachate Collection and Disposal Network

#### 2.1.1 Discharge to Sanitary Sewer

Collected leachate destined for discharge to the sanitary sewer is first processed through the Leachate Treatment System (refer to Section 2.2 for additional details), then sent to the leachate lagoon in the West Landfill where it is mixed with groundwater and leachate from the West Landfill and aerated prior to discharge

to the sanitary sewer. It is noted that the aeration system in the leachate lagoon is not currently in operation since aeration currently occurs at the ILPS.

Between July 1 and September 19:

- Discharge to the sanitary sewer occurred on 45 separate days.
- The pumping system was shut down on 36 separate days and no leachate was discharged to the sanitary sewer.
- The pumping system has been in continuous operation since August 18.
- An average of 638,940 litres of leachate were discharged each of those days.
- A total of 28,752,318 litres of leachate have been discharged via the sanitary sewer.

Daily leachate pumping rates and volumes discharged to the sanitary sewer between July 1 and September 19 are presented in Attachment 1.

## 2.1.2 Hauling for Off-Site Disposal

The haulage of leachate by tanker truck for off-Site disposal has been ongoing since August 4. Between August 4 and September 19.

- Tanker trucks have been actively used on 25 separate days.
- The capacities of the tanker trucks have ranged between 30,000 litres and 38,000 litres.
- An average of 8 tanker truck loads are hauled off-Site on active days.
- An average of 214,370 litres of leachate were hauled off-Site each of those days.
- A total of 5,359,250 litres of leachate have been hauled off-Site.

Daily leachate volumes hauled off-Site via tanker truck between August 4 and September 19 are presented in Attachment 1. The haulage of leachate by tanker truck for off-Site disposal is expected to continue until there is no longer any exposed leachate in the active waste cells and the leachate can be effectively managed via the ILPS for discharge to the sanitary sewer.

## 2.1.3 Pumping Rate

Current leachate pumping rates range between 71 to 255 gallons per minute (GPM). As noted above, the pump has been shutoff completely on a number of occasions since July 1. These shutdowns were due to many factors, including maintenance/repairs, system adjustments/upgrades, and as a result of discussions with the MECP and City of Hamilton. Initially, leachate was pumped at the long-term average rate of 255 GPM, however this led to a reduction in the performance of the leachate treatment system. The average leachate pumping rate since August 18 was 100 GPM. The rate was reduced while the leachate treatment system modifications discussed in Section 2.2.2 were implemented and adjusted.

Pumping has primarily been undertaken from a temporary location in the active landfill cell at the north end of the Site. A new pump has been installed at the ILPS and GFL is preparing to relocate pumping to the ILPS in the interim. With the adjustments to the leachate treatment system, it is expected that the discharge rate will be increased.

## 2.2 Leachate Treatment System

### 2.2.1 Existing Leachate Collection and Treatment System

The Site operates a leachate collection and treatment system. The collection system is installed beneath the landfilled waste, above a double liner system. Leachate is collected on the leachate collection blanket and



drains inward toward a sump at the Permanent Leachate Pumping Station location in the southeast corner of the Site.

Collected leachate is pumped to the ILPS in the southeast corner of the landfill. Hydrogen peroxide is added to the leachate within the ILPS for chemical treatment. The leachate is then gravity fed into the leachate forcemain, which conveys the leachate from the southeast corner to the northwest corner of the Active East Landfill. Impacted groundwater is collected from beneath the landfill is pumped from manhole M4 and added into the leachate forcemain prior to discharge to the leachate lagoon in the Closed West Landfill. The leachate and impacted groundwater mixture is aerated within the leachate lagoon and discharged via an overflow weir to the sanitary sewer.

## 2.2.2 Leachate Treatment System Modifications

Upon identification of odour concerns, the effectiveness of the leachate treatment system was evaluated, including potential modifications. This section identifies the modifications to the leachate treatment system that were implemented to address the odour concerns.

The chemical treatment was modified via replacement of the type of chemical. Hydrogen peroxide was replaced with ferric chloride, including bench testing to evaluate effectiveness and dosage, as described in Section 2.3.2. GFL continues to review the effectiveness of treatment with ferric chloride, while simultaneously considering the potential for use of alternate chemical treatment options. GFL continues to evaluate the effectiveness of treatment and adjusts the chemical dosage to optimize treatment.

GFL has also conducted surface application of chemical treatment media to the exposed leachate on the leachate blanket with the intent of mitigating odour production at the source.



**Figure 2** Ferric Chloride Tote

During initial trials with ferric chloride, GFL and GHD identified that insufficient mixing and retention times were being achieved within the ILPS. A weir box was installed within the leachate mixing chamber so that the system can work as a continuous stirred tank reactor (CSTR) to provide adequate mixing and retention time.



**Figure 3**      **Weir Box**

In addition to installation of the weir box, a coarse bubble aerator was installed within the ILPS to provide mixing and aeration of the leachate. GFL and GHD continue to evaluate the effectiveness of the leachate treatment system and make adjustments to the aeration rate to optimize leachate treatment.



**Figure 4**      **Coarse Bubble Aerator**

During bench testing with ferric chloride, it was noted that the reaction produced an off-gas that contained some odour. To mitigate the odour within the off-gas, a biofilter was installed to treat the off-gas prior to release to the atmosphere. The biofilter comprises wood media to host biological activity for gas treatment. Piping was installed to capture the gas from the ILPS for passage through the biofilter container. GFL is also evaluating installation of an injection port on the ILPS outlet pipe for injection of hydrogen peroxide downstream of the ferric chloride treatment.



Figure 5 Biofilter

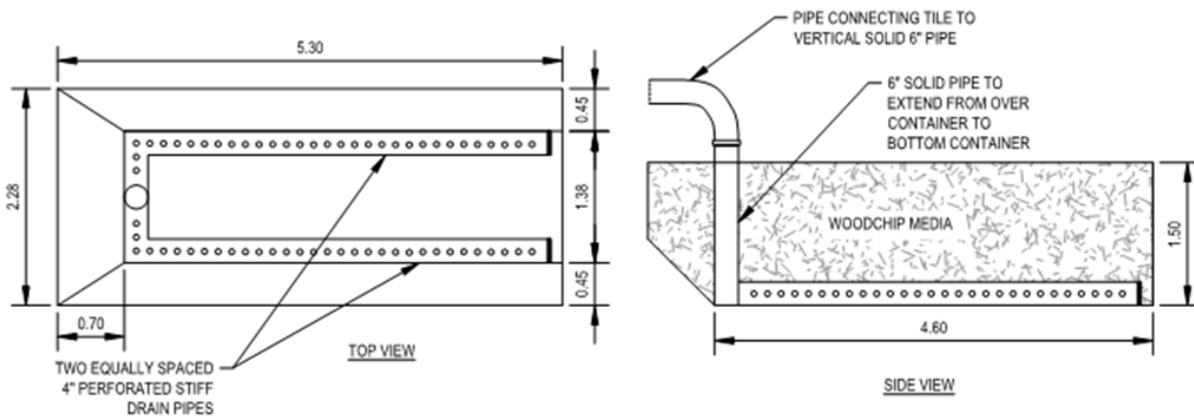


Figure 6 Biofilter Schematic

## 2.3 Leachate Monitoring

### 2.3.1 Routine Leachate Monitoring

#### 2.3.1.1 Procedure

1. Flow reading is recorded.
2. Water Level is measured at the vertical pumping station. Critical Levels for pump operation:
  - Interim Leachate Pumping Station = 20.66 m below top of casing
  - Permanent Leachate Pumping Station = 22.60 m below top of casing
3. The Environmental Technicians enter and calculate the data in the appropriate electronic spreadsheets.

#### 2.3.1.2 Quality Monitoring

1. Samples are collected at the collection point of the pumping station and sent to the lab for testing for the requirements detailed in accordance with ECA A181008.
2. Analytical results from all samples are returned to the Environmental staff.
3. The analytical results are recorded on spreadsheets for review by the Environmental Staff.
4. A copy of all analytical results is sent to the hydrogeological consultants.
5. The hydrogeological consultant summarizes the analytical results for inclusion in the Annual Report.

### 2.3.1.3 Quantity Monitoring

1. Flow is monitored by the Environmental Technicians. Flow measurements are downloaded from the data logger and temporarily stored in the computer.
2. Samples are collected at the sewer discharge point for requirements detailed in accordance with the Discharge Permit.
3. The flow data is compiled on an electronic file.
4. The flow and analytical results are forwarded to the City of Hamilton on a quarterly basis.

The sewer discharge of leachate is monitored for flow and water quality in accordance with the Sewer Permits, which ensures compliance with the Sewer Use By-laws. GFL monitoring data is provided in Attachment 2.

### 2.3.2 Supplemental Leachate Monitoring

Leachate monitoring is completed in accordance with the Site ECA, on a quarterly basis. Historical data indicates there is no significant change in leachate characteristics. Raw leachate remains alkaline with pH level above 8. Both organic and inorganic parameters were typically within the range of historical averages.

GFL and GHD conducted bench testing to evaluate alternate chemical options for treatment, to address the recent observed reduction in effectiveness of the existing treatment system (i.e., odour concerns). Hydrogen peroxide was historically the primary treatment chemical used within the ILPS. Ferric chloride was identified as a potentially viable alternate chemical treatment, based on leachate quality.

Multiple bench tests were conducted to identify the effectiveness of ferric chloride versus hydrogen peroxide. The bench tests used the following treatment media: ferric chloride; a ferric chloride and impacted groundwater mixture (40% leachate, 60% groundwater); hydrogen peroxide; and raw leachate (control). Bench testing also evaluated the dosage required to effectively treat the leachate, including mixing with impacted groundwater.

As noted above, an off gas was observed when using ferric chloride. Odours generated from ferric chloride were observed to have reduced impact with appropriate dosage and mixing with impacted groundwater. Based on the bench test results, treatment with ferric chloride commenced on a trial basis to observe effectiveness at large-scale implementation.



Figure 7 Bench Testing

## 2.4 Odour Monitoring

GFL conducts ongoing monitoring activities at the Site, including the following:

- Monitoring of weather trends and wind direction
- Site and perimeter olfactory observation (i.e., physical observation) for potential odour generation and migration
- Traveling throughout community for olfactory monitoring for odours off-Site

The MECP conducts additional monitoring, including physical observation and collection of air samples for laboratory analysis.

GHD will be conducting odour and air monitoring activities, including direct monitoring of odours around the Site and collection of air samples for laboratory analysis. This monitoring program will commence the week of September 25, 2023.

## 2.5 Odour Mitigation

In response to odour concerns, GFL and GHD have evaluated numerous alternative products and odour mitigation systems. Evaluation has included discussion with and Site visits from suppliers, product testing, and procurement and implementation of odour mitigation products. Evaluated products include:

- Misting Systems
- Solid De-Odourizers and Neutralizers
- Foam Surfactants
- Adaptive Pond Covers

GFL and GHD have engaged multiple suppliers for the above technologies, including review of technical information, requests for quotations, hosting of Site visits, procurement, and implementation. This section provides a brief description of the evaluated technologies and suppliers. Attachment 3 provides a listing of technologies evaluated, supplying companies, contact information, and product information provided by the suppliers.

### 2.5.1 Misting Systems

Misting systems comprise odour control dispersion devices that emit odour neutralizing vapours. The odour control media is supplied as a liquid concentrate that is diluted, vapourized, and dispersed to neutralize odours by reacting with the contaminants in the air.

GFL evaluated misting systems supplied by Ecolo Toronto and Odor-No-More Inc. (ONM), each with their own proprietary liquid concentrate (Attachments 3A and 3B, respectively). Ecolo Toronto performed a Site visit and provided equipment for testing purposes.

GFL has ordered and implemented multiple misting systems from Ecolo Toronto. The initial misting equipment was supplied with XStreme Vapor Solution 8015 odour neutralizer on August 3<sup>rd</sup>, 2023 and implemented immediately for use as required.



Figure 8 Misting System

## 2.5.2 Solid De-Odourizers and Neutralizers

Solid de-odourizers/neutralizers are solid or granular products that are applied directly to surfaces. These products can neutralize odours, produce scents when in contact with liquids, and absorb liquids. GFL evaluated solid application products from Bektra Corp., including Bektra Bin Balls (Attachment 3C). Bektra visited the Site and provided a sample. GFL has not pursued use of solid de-odourizers at this time, and is currently focusing on use of misting systems and foam surfactants.



Figure 9 Odour Neutralizer

## 2.5.3 Foam Surfactants

Foam surfactants comprise concentrated liquid odour control media that is mixed with water and spread in foam form to cover and neutralize odours that are generated on surfaces. The foam products provide temporary mitigation of odours and require re-application in accordance with manufacturer recommendations.

GFL evaluated foam surfactants supplied by Atmos Technologies, Bektra Corp., and ONM. Product information for these suppliers is provided in Attachments 3D, 3E, and 3F, respectively. Quotations were obtained for the concentrate solutions and proprietary spreading equipment from Atmos Technologies.

GFL is in the process of finalizing procurement with Atmos Technologies to supply their Atmos Shield 645 foam and appropriate spreading equipment to Site for application over the exposed leachate on the leachate blanket. Delivery of the product is anticipated the week of September 25, 2023. GFL will begin application of the foam surfactant upon receipt of the product and training from Atmos Technologies.

## 2.5.4 Adaptive Pond Covers

Adaptive pond covers are available in several forms. GFL and GHD evaluated the use of the Hexa-Cover® Floating Cover system. This system comprises specially designed polypropylene cover segments that are poured out of bags onto the surface of a pond. These segments auto-install and float to adjoin to each other to provide a barrier that inhibits evaporation of water, release of emissions/odours, and organic growth.

North American suppliers were difficult to identify, but GFL and GHD located a supplier in Tennessee, Southeastern Tank, and obtained product information (Attachment 3G) and a quotation for supply. The intent was that the Hexa-Cover® Floating Cover system could be used on the leachate blanket and/or the leachate lagoon as required. At this time, GFL has not proceeded to procurement. GFL is pursuing foam surfactant procurement in the immediate term, noting covering of the leachate lagoon could potentially result in odour releases occurring downstream of the discharge to the sanitary sewer, rather than at the lagoon itself.

## 3. Evaluation of Existing Leachate Treatment System

GFL is continually evaluating the leachate treatment process as part of the site operations and is working with GHD to develop a design for a leachate treatment facility as part of the site progression for the long-term final build.

The following sections explain the existing evaluation of the system and procedures, and the proposed leachate treatment facility.

### 3.1 Existing Interim Leachate Treatment System

GFL continually evaluates potential modifications to the leachate treatment system, including considerations for immediate and medium-term modifications, and long-term solutions, as follows:

**Long-Term Solution:** GFL and GHD are in the preliminary stages of design for a new leachate treatment system that will replace the existing leachate treatment system.

**Medium-Term Modifications:** GFL continues to evaluate alternate chemical treatment media for use at Site, as required based on the observed effectiveness of the leachate treatment, leachate composition, and odour control considerations. GFL revised the chemical treatment and installed a weir box and aerator within the ILPS. A biofilter was also installed to collect off-gas from the chemical reaction and treat the off-gas to reduce the potential for odours at the ILPS.

Immediate modifications are implemented as required based on odour generation, elevated leachate levels, public complaints, or other contributing factors. Immediate modifications include the following:

- Adjustments to pumping rates, aeration rate, or chemical rates to optimize leachate treatment and minimize odour production
- Continued pumping of leachate to draw down leachate levels on the leachate blanket

- Chemical/product treatment of exposed leachate on the leachate blanket and pond to mitigate odour production
- Evaluation of products for odour mitigation

## **3.2 Proposed Long-Term Leachate Treatment System**

As part of the Site progression, GFL will be implementing a final long-term leachate treatment system and decommissioning the interim leachate treatment process.

As previously mentioned, the design is currently in the preliminary stages and in the process of beginning the full design. The long-term leachate treatment plant will include a leachate aeration tank, pipe flocculator to add chemicals such as acid, coagulant, and polymer, a dissolved air flotation (DAF) unit to separate solids with the help of micro-bubbles, and a final effluent mixing tank with an active oxidizer such as ozone or peroxide. Effluent will be discharged to City of Hamilton sanitary sewer network. The building will be under negative pressure and all foul air will be collected and treated via an odour control system prior to discharge to atmosphere. A draft process flow diagram (PFD) of the long-term leachate treatment system is provided in Attachment 4.

The long-term leachate treatment system will use a new sanitary sewer connection located on Mud Street. Following commissioning of the new leachate treatment system, flow to the leachate lagoon will cease and the leachate lagoon will be decommissioned. As the lagoon is open to the atmosphere, direct discharge to the sanitary sewer and decommissioning of the lagoon will remove a potential source for emissions.

The pre-design approval of the long-term treatment facility will require pre-consultation with the MECP and the City, which is anticipated to occur in November 2023. The design process is anticipated to be completed by the end of December 2023, followed by application for an ECA Amendment for MECP review. The MECP review process is understood to generally require one year for reviews of this magnitude. This will be a critical step to be accomplished in a timely fashion to expedite the final design, procurement, and construction.

## **4. Communications Plan**

### **4.1 Overview**

The goal of the communications plan is to provide timely and transparent information to the Stoney Creek community regarding measures taken to mitigate the odour issues occurring at the Site and provide the opportunity to answer questions regarding the odour issues at the Site.

The Communications Plan, described further below, entails:

- Weekly Online Community Updates;
- Monthly Virtual Community Update Meetings; and
- CLC Quarterly Online Meetings.

The Weekly Online Community Updates and Monthly Virtual Community Update Meetings will continue until the odour issues have been deemed resolved by GFL in consultation with the Ministry of the Environment, Conservation and Parks.



## 4.2 Description

### 4.2.1 Weekly Online Community Update

As requested by the Ministry, Community Updates will be posted on the SCRF website on a weekly basis (<https://gflstoneycreek.com/>). Updates will be published on Thursdays by end of day. Updates will include a description of the activities GFL has performed in the previous week to address the odour issues. In addition, updates may be posted throughout the week, if appropriate.

### 4.2.2 Monthly Virtual Community Update Meeting

As requested by the Ministry, monthly community update meetings will be held virtually. The meetings will be held at the end of every month via Zoom. The Community Update Meetings will provide an opportunity for GFL to provide an update to the community on activities related to mitigation of the odour issues and respond to questions from residents. Residents will be encouraged to submit questions in advance. The Community Update Meetings will be advertised on the SCRF website, by email to community members who have provided their email address to GFL, and by email to Community Liaison Committee members.

### 4.2.3 CLC Quarterly Virtual meetings

In accordance with the Terms of Reference in Schedule G of the Environmental Compliance Approval No. A181008 (ECA), GFL maintains a CLC. In addition to the weekly and monthly updates requested by the Ministry, GFL will continue to provide updates to the CLC. The mandate of the CLC is to provide a forum for public concerns to be raised and to serve for the dissemination, review, and exchange of information and monitoring results relevant to Site operations. In accordance with the ECA, GFL reports on complaints received in the previous quarter. Meeting minutes from the quarterly CLC meetings are published in PDF format to the CLC website (<https://gflclc.org/meetings>).

## 5. Timelines

The table below summarizes the action items noted above and provides a timeline for their implementation.

Table 1 Anticipated Implementation Timelines

Item	Action	Timeline
Leachate Discharge	<ul style="list-style-type: none"> <li>Continue to discharge leachate to sanitary sewer. Increase flow as much as possible in consideration of pumping operations, leachate treatment system, and odour monitoring and mitigation activities.</li> <li>Continue to discharge leachate using tanker trucks and hauling to alternate disposal location(s).</li> <li>Adjust pumping locations (i.e., Interim Leachate Pumping Station, Permanent Leachate Pumping Station, Active Landfill Cells) as required to maximize leachate discharge.</li> <li>Eliminate exposed leachate in the active landfill cells in the north of the site.</li> </ul>	<ul style="list-style-type: none"> <li>Adjustment of pumping location will commence September 21, 2023.</li> <li>Exposed leachate in active waste cells to be removed by October 6, 2023.</li> </ul>

Item	Action	Timeline
Interim Leachate Treatment System	<ul style="list-style-type: none"> <li>• Addition of chemical(s) and evaluation of alternate chemicals</li> <li>• Retention time adjustments</li> <li>• Mixing rate adjustments</li> <li>• Addition of post-treatment injection port for additional chemical injection</li> </ul> <p>–</p>	<ul style="list-style-type: none"> <li>• Adjustments ongoing</li> <li>• Injection port installation scheduled for September 21, 2023</li> </ul>
Leachate Monitoring	<ul style="list-style-type: none"> <li>• Sampling</li> <li>• Bench trials</li> </ul> <p>–</p>	<ul style="list-style-type: none"> <li>• Monitoring ongoing</li> <li>• Bench trials as required</li> </ul>
Odour Monitoring	<ul style="list-style-type: none"> <li>• Site odour monitoring and sampling (GHD)</li> <li>• On-site and off-site monitoring (GFL – site observations, monitoring through community)</li> <li>• Documentation of complaints and resulting actions</li> <li>• Review of MECP monitoring data</li> </ul>	<ul style="list-style-type: none"> <li>• Monitoring ongoing</li> <li>• Additional air monitoring and sampling commencing September 22, 2023</li> <li>• Documentation, follow-up, and review ongoing as required</li> </ul>
Odour Mitigation	<ul style="list-style-type: none"> <li>• Continue operation of deodorizer units around site. Monitor performance and adjust system accordingly (i.e., number/location of units, dosing rate).</li> <li>• Conduct bench trials with Bioballs and apply to exposed leachate in equalization pond and active landfill cells.</li> <li>• Apply foam to equalization pond and active landfill cells.</li> <li>• Cover exposed leachate in active landfill cells with waste.</li> </ul>	<ul style="list-style-type: none"> <li>• Misting system operation ongoing</li> <li>• Foam application scheduled to commence week of September 25, 2023</li> <li>• Additional bench trials to be completed as required</li> <li>• Waste placement ongoing</li> </ul>
Long-Term Leachate Treatment System	<ul style="list-style-type: none"> <li>• Complete preliminary design.</li> <li>• Arrange pre-consultation meeting with MECP and City of Hamilton.</li> <li>• Initiate permitting and approvals.</li> <li>• Proceed to detailed design and procurement.</li> <li>• System construction, commissioning, and operation.</li> </ul>	<ul style="list-style-type: none"> <li>• Pre-consultation (MECP and City) – November 2023</li> <li>• Preliminary design and ECA application – End of December 2023</li> <li>• MECP and City review – TBD at pre-consultation</li> <li>• Construction and commissioning dependent upon approvals</li> </ul>
Communications	<ul style="list-style-type: none"> <li>• Respond to community inquiries by phone/email as they arise.</li> <li>• Issue weekly community updates.</li> </ul>	<ul style="list-style-type: none"> <li>• First weekly community update to be issued Thursday 28th, and every Thursday thereafter</li> </ul>

Item	Action	Timeline
	<ul style="list-style-type: none"><li>• Issue monthly community updates.</li><li>• Continue to conduct quarterly CLC meetings.</li></ul>	<ul style="list-style-type: none"><li>• First monthly community update to be issued Monday October 30th, and end of each month thereafter</li><li>• Next CLC meeting – December 4th</li></ul>

## 6. Closing

We trust that the above information adequately addresses the current concerns regarding odours from the Site. GFL remains committed to working with all stakeholders to resolve the odour issue as quickly as possible and will continue to keep the community informed of mitigation activities and address questions and concerns as they arise.

Regards



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# Attachments

# **Attachment 1**

## **Daily Leachate Pumping Rates and Volumes**

Date	Pumping Rate GPM	Daily Total Litres Pumping Station	Daily Total Litres Trucked Off-Site	Grand Daily Total Litres
1-Jul	0.00	0	0	0
2-Jul	0.00	0	0	0
3-Jul	0.00	0	0	0
4-Jul	255.00	1,380,768	0	1,380,768
5-Jul	255.00	1,386,445	0	1,386,445
6-Jul	255.00	1,418,618	0	1,418,618
7-Jul	255.00	414,079	0	414,079
8-Jul	0.00	0	0	0
9-Jul	0.00	0	0	0
10-Jul	255.00	1,331,942	0	1,331,942
11-Jul	255.00	1,390,231	0	1,390,231
12-Jul	255.00	458,742	0	458,742
13-Jul	0.00	0	0	0
14-Jul	0.00	0	0	0
15-Jul	0.00	0	0	0
16-Jul	0.00	0	0	0
17-Jul	255.00	1,266,082	0	1,266,082
18-Jul	255.00	527,629	0	527,629
19-Jul	0.00	0	0	0
20-Jul	0.00	0	0	0
21-Jul	0.00	0	0	0
22-Jul	0.00	0	0	0
23-Jul	0.00	0	0	0
24-Jul	0.00	0	0	0
25-Jul	0.00	0	0	0
26-Jul	255.00	1,155,560	0	1,155,560
27-Jul	255.00	848,597	0	848,597
28-Jul	255.00	463,284	0	463,284
29-Jul	0.00	0	0	0
30-Jul	0.00	0	0	0
31-Jul	0.00	0	0	0
1-Aug	0.00	0	0	0
2-Aug	0.00	0	0	0
3-Aug	0.00	0	0	0
4-Aug	0.00	0	87,000	87,000
5-Aug	0.00	0	0	0
6-Aug	0.00	0	0	0
7-Aug	0.00	0	0	0
8-Aug	0.00	0	130,840	130,840
9-Aug	0.00	0	135,190	135,190
10-Aug	0.00	0	351,740	351,740
11-Aug	0.00	0	171,880	171,880
12-Aug	0.00	0	0	0
13-Aug	0.00	0	0	0
14-Aug	0.00	0	358,630	358,630
15-Aug	0.00	0	199,340	199,340
16-Aug	0.00	0	201,850	201,850
17-Aug	0.00	0	167,610	167,610
18-Aug	147.00	216,994	133,060	350,054
19-Aug	155.00	422,406	0	422,406
20-Aug	150.00	408,780	0	408,780
21-Aug	150.00	476,910	38,860	515,770
22-Aug	150.00	374,715	0	374,715
23-Aug	150.00	357,683	0	357,683
24-Aug	165.00	374,715	0	374,715
25-Aug	150.00	476,910	0	476,910
26-Aug	166.00	452,383	0	452,383
27-Aug	143.00	389,704	0	389,704
28-Aug	150.00	613,170	0	613,170
29-Aug	150.00	579,105	0	579,105
30-Aug	110.00	599,544	205,060	804,604
31-Aug	127.00	692,201	208,450	900,651
1-Sep	113.00	615,895	175,060	790,955
2-Sep	121.00	659,498	0	659,498
3-Sep	136.00	741,254	0	741,254
4-Sep	131.00	714,002	0	714,002
5-Sep	129.00	703,102	288,160	991,262
6-Sep	111.00	615,289	221,320	836,609
7-Sep	80.00	436,032	289,110	725,142
8-Sep	71.00	386,978	322,650	709,628
9-Sep	72.00	392,429	0	392,429
10-Sep	75.00	408,780	0	408,780
11-Sep	77.00	419,681	291,940	711,621
12-Sep	76.00	414,230	288,990	703,220
13-Sep	73.00	397,879	146,590	544,469
14-Sep	88 to 107	563,115	218,720	781,835
15-Sep	107.00	583,193	178,380	761,573
16-Sep	102.00	555,941	0	555,941
17-Sep	100.00	545,040	0	545,040
18-Sep	107.00	583,193	294,300	877,493
19-Sep	99.00	539,590	254,520	794,110
Subtotals Litres		28,752,318	5,359,250	
Grand Total Litres		34,111,568		

# **Attachment 2**

## **GFL Monitoring Data**

<b>GFL Environmental MISA ANALYTICAL TEST RESULTS INORGANICS</b>										
PARAMETER	E.Q.Leachate 12-Mar-18 mg/L	E.Q.Leachate 7-Jun-18 mg/L	E.Q.Leachate 11-Sep-18 mg/L	E.Q.Leachate 15-Nov-18 mg/L	E.Q.Leachate 7-Mar-19 mg/L	E.Q.Leachate 6-Jun-19 mg/L	E.Q.Leachate 10-Sep-19 mg/L	E.Q.Leachate 11-Nov-19 mg/L	E.Q.Leachate 2-Mar-20 mg/L	E.Q.Leachate 4-Jun-20 mg/L
Alkalinity	2600	2300	3000	2700	2800	2600	3400	2800	3000	3200
Flouride	3	2.6	3.2	2.1	2.5	3.2	2.5	2.1	2.6	3.6
Bromide	67	<20	75	60	66	55	81	89	64	79
Phosphate	0.93	<1.0	0.34	0.42	0.54	0.6	3.6	0.71	0.6	0.95
pH	8.45	8.68	8.03	8.18	8.11	8.21	8.26	8.01	8.04	8.24
Nitrite (N02-N)	<0.20	<0.10	<0.20	<0.10	<0.10	<0.05	0.029	<0.10	<0.10	<0.005
Nitrate (N03-N)	<0.20	<1.0	<2.0	<1.0	<1.0	<0.5	<0.5	<1.0	<1.0	<0.05
Total Kjeldahl Nitrogen (TKN)	160	160	200	170	170	170	260	200	190	220
Total Organic Carbon (TOC)	390	970	700	400	410	390	660	340	400	420
Total Phosphorus (Total P)	2.2	2.6	3.7	1.6	1.9	2.8	3.6	3.5	3.5	2.8
Specific Conductivity (umhos/cm)	13000	12000	15000	13000	14000	12000	17000	14000	13000	14000
Total Suspended Solids (TSS)	<10	14	39	13	<10	17	12	24	14	16
Cadmium (Cd)	<0.00050	<0.00050	<0.0010	<0.00010	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00045
Cobalt (Co)	0.0039	0.0039	0.0075	0.0055	0.0051	0.0034	0.0057	0.0055	0.0039	<0.025
Chromium (Cr)	0.027	<0.025	<0.050	0.024	<0.025	<0.025	<0.050	<0.025	0.015	<0.025
Copper (Cu)	0.027	0.0052	<0.010	0.0087	0.019	<0.0050	<0.010	0.0079	0.0040	<0.0045
Iron (Fe)	1.1	0.76	1.5	0.99	1.7	0.56	<1.0	1.5	0.66	0.57
Potassium (K)	1100	1000	1400	1200	1300	1100	1700	1500	1200	1400
Magnesium (Mg)	57	70	55	98	89	64	110	80	82	63
Manganese (Mn)	0.11	0.14	0.098	0.093	0.16	0.087	0.097	0.089	0.11	0.12
Molybdenum (Mo)	0.37	0.6	2.2	0.44	0.39	0.35	0.64	0.25	0.59	0.46
Sodium (Na)	1800	2000	2400	1900	2000	1700	2300	1700	1800	2300
Nickel (Ni)	0.15	0.17	0.27	0.16	0.18	0.16	0.26	0.18	0.18	0.19
Lead (Pb)	0.012	0.0028	0.0061	0.0063	0.015	0.0063	<0.005	0.0056	0.0057	0.016
Silicon (Si)	12	13	17	19	15	13	17	17	17	15
Strontium (Sr)	5.2	4.5	3.1	4.6	6.1	3.7	3.2	3.1	4.2	3.6
Titanium (Ti)	0.085	0.058	0.066	0.077	0.047	0.048	<0.05	0.032	0.029	0.035
Vanadium (V)	0.087	0.085	0.099	0.068	0.072	0.068	0.057	0.039	0.054	0.084
Zinc (Zn)	0.025	<0.025	<0.050	0.0096	<0.025	<0.025	<0.050	<0.025	0.0066	<0.025
Chloride (Cl-)	2400	2200	3000	2300	2700	2200	3300	2600	2400	3400
Biochemical Oxygen Demand (BOD (5))	280	470	820	700	340	390	540	200	340	340
<b>OTHER PARAMETERS</b>										
Ammonia (NH3 - N)	150	160	210	160	170	150	250	190	170	190
Phenols-4AAP	2.5	0.71	2.8	1.3	1.1	0.81	2.4	0.66	1.1	0.87
Aluminum (Al)	0.14	0.12	0.10	0.13	0.067	0.073	<0.050	0.054	0.037	0.048
Boron (B)	3.2	3.1	4.8	3.6	3.9	3.5	5.4	3.3	2.9	4.1
Barium (Ba)	0.21	0.17	0.19	0.25	0.21	0.16	0.19	0.20	0.20	0.17
Beryllium (Be)	<0.0025	<0.0025	<0.0050	<0.0005	<0.0025	<0.0025	<0.0025	<0.0025	<0.00050	<0.0020
Calcium (Ca)	44	52	25	84	83	49	66	61	74	50
Sulfate (SO4)	220	180	400	580	460	40	370	510	240	98

**Explanation of Terms:**  
 ug/L - Micrograms per litre (parts per billion)  
 mg/L - Milligrams per litre (parts per million)  
 ND - Not Detected  
 < - Less than  
 > - Greater than



GFL Environmental MISA ANALYTICAL TEST RESULTS INORGANICS													
PARAMETER	E.Q.Leachate 1-Sep-20 mg/L	E.Q.Leachate 2-Dec-20 mg/L	E.Q.Leachate 3-Mar-21 mg/L	E.Q.Leachate 11-Jun-21 mg/L	E.Q.Leachate 20-Sep-21 mg/L	E.Q.Leachate 10-Nov-21 mg/L	E.Q.Leachate 14-Mar-22 mg/L	E.Q.Leachate 3-Jun-22 mg/L	E.Q.Leachate 13-Sep-22 mg/L	E.Q.Leachate 19-Dec-22 mg/L	E.Q.Leachate 8-Mar-23 mg/L	E.Q.Leachate 22-Jun-23 mg/L	E.Q.Leachate 8-Sep-23 mg/L
Alkalinity	3100	3200	3200	2800	3000	2800	2600	2900	3800	2500	2700	2600	2500
Flouride	3.5	3.5	3.0	2.6	3.7	3.0	3.0	2.9	3.0	2.4	2.4	2.7	2.8
Bromide	82	59	72	62	81	48	62	56	84	59	75(2)	59	59
Phosphate	1.2	1.5	0.45	1.2	1.5	1.2	0.96	0.63	0.5	1.2	0.88	1	0.3
pH	8.29	8.26	8.28	8.20	8.26	8.32	8.21	8.43	8.10	8.21	8.06	8.00	8.05
Nitrite (N02-N)	<0.10	0.055	<0.05	<0.05	<0.05	<0.05	0.011	<0.010	<0.50	<0.10	<0.050	<0.10	<0.050
Nitrate (N03-N)	<1.0	<0.05	<0.05	<0.05	<0.05	<0.50	<0.10	<0.10	<5.0	<1.0	<0.50	<1.0	<0.50
Total Kjeldahl Nitrogen (TKN)	220	230	200	230	350	170	180	170	290	190	230	190	99
Total Organic Carbon (TOC)	470	490	390	370	490	290	330	290	480	260	320	340	340
Total Phosphorus (Total P)	3.1	3.7	2.7	4.0	4.8	2.6	2.9	2.8	5.1	5.3	2.7	3	2.4
Specific Conductivity (umhos/cm)	14000	16000	14000	15000	15000	12000	12000	12000	18000	14000	16000	14000	12000
Total Suspended Solids (TSS)	21	12	18	10	14	<10	15	12	13	21	14	17	94
Cadmium (Cd)	<0.00045	<0.00045	<0.00009	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00045	<0.00090	<0.00045	<0.00045
Cobalt (Co)	0.0044	0.0049	0.0042	0.0039	0.0047	0.0040	0.0034	0.0032	0.0048	0.0039	<0.0050	0.0039	0.0059
Chromium (Cr)	<0.025	<0.025	0.018	<0.025	<0.025	<0.025	<0.025	<0.025	0.027	0.027	<0.050	<0.025	0.03
Copper (Cu)	<0.0045	<0.0045	0.0052	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	<0.0045	0.008	0.01	0.0048	0.0075
Iron (Fe)	0.79	0.72	1.2	<0.50	0.58	<0.50	<0.50	<0.50	0.81	1.2	<1.0	4	5.4
Potassium (K)	1200	1500	1300	1500	1400	1100	1000	950	1600	1300	1500	1000	940
Magnesium (Mg)	82	73	74	72	65	69	68	64	64	83	110	97	130
Manganese (Mn)	0.23	0.16	0.13	0.12	0.14	0.11	0.13	0.084	0.098	0.14	0.21	0.3	0.78
Molybdenum (Mo)	0.40	0.43	0.29	0.31	0.31	0.20	0.27	0.33	0.59	0.26	0.21	0.35	0.059
Sodium (Na)	2100	2400	2000	2100	2100	1600	1700	1600	2600	2000	2300	1900	1800
Nickel (Ni)	0.17	0.19	0.15	0.17	0.17	0.13	0.14	0.15	0.21	0.19	0.15	0.19	0.24
Lead (Pb)	0.0034	0.0036	0.005	<0.0025	0.0050	0.0049	0.0056	0.0028	0.0026	0.0076	0.032	0.016	0.009
Silicon (Si)	15	16	16	17	15	14	13	14	17	17	18	16	14
Strontium (Sr)	3.4	3.1	4.3	3.9	6.2	5.2	3.7	3.9	3.1	3.0	4.7	3.4	3.9
Titanium (Ti)	0.045	0.045	0.028	0.033	0.041	0.028	0.031	<0.025	0.032	0.028	<0.050	0.026	0.078
Vanadium (V)	0.082	0.089	0.067	0.072	0.083	0.052	0.063	0.055	0.086	0.049	0.062	0.082	0.15
Zinc (Zn)	<0.025	<0.025	0.0053	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.24	<0.050	<0.025	<0.025
Chloride (Cl-)	2900	3500	2600	2800	3100	2200	2300	2300	3400	2800	2900	2400	2100
Biochemical Oxygen Demand (BOD (5))	470	460	290	180	400	110	410	190	350	86	210	400	250
<b>OTHER PARAMETERS</b>													
Ammonia (NH3 - N)	200	220	190	200	230	160	170	150	240	160	230(1)	170	73
Phenols-4AAP	1.2	1.2	0.93	0.47	1.1	0.53	1.0	0.98	0.99	0.22	0.73	0.72	0.7
Aluminum (Al)	0.048	0.037	0.032	0.029	0.044	0.044	0.042	0.029	0.047	0.2	<0.049	0.04	0.12
Boron (B)	3.8	3.4	3.8	3.5	3.5	3.4	3.3	3.7	4.2	2.7	3.9	3.7	3.5
Barium (Ba)	0.15	0.14	0.18	0.18	0.23	0.20	0.16	0.16	0.2	0.17	0.26	0.19	0.19
Beryllium (Be)	<0.0020	<0.0020	<0.00040	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0040	<0.0020	<0.0020
Calcium (Ca)	79	56	46	29	43	48	46	44	25	78	75	82	77
Sulfate (SO4)	230	240	210	59	120	180	230	190	100	580	890(2)	590	500

**Explanation of Terms:**

ug/L - Micrograms per litre (parts per billion)

mg/L - Milligrams per litre (parts per million)

ND - Not Detected

< - Less than

> - Greater than

GFL Environmental MISA ANALYTICAL TEST RESULTS ORGANICS																							
PARAMETERS	E.Q.Leachate 12-Mar-18 ug/L	E.Q.Leachate 7-Jun-18 ug/L	E.Q.Leachate 11-Sep-18 ug/L	E.Q.Leachate 15-Nov-18 ug/L	E.Q.Leachate 7-Mar-19 ug/L	E.Q.Leachate 6-Jun-19 ug/L	E.Q.Leachate 10-Sep-19 ug/L	E.Q.Leachate 11-Nov-19 ug/L	E.Q.Leachate 2-Mar-20 ug/L	E.Q.Leachate 4-Jun-20 ug/L	E.Q.Leachate 1-Sep-20 ug/L	E.Q.Leachate 2-Dec-20 ug/L	E.Q.Leachate 3-Mar-21 ug/L	E.Q.Leachate 11-Jun-21 ug/L	E.Q.Leachate 20-Sep-21 ug/L	E.Q.Leachate 10-Nov-21 ug/L	E.Q.Leachate 14-Mar-22 ug/L	E.Q.Leachate 3-Jun-22 ug/L	E.Q.Leachate 13-Sep-22 ug/L	E.Q.Leachate 19-Dec-22 ug/L	E.Q.Leachate 8-Mar-23 ug/L	E.Q.Leachate 22-Jun-23 ug/L	E.Q.Leachate 8-Sep-23 ug/L
<b>Group #16 - Volatile Organics</b>																							
1,1,2,2 - Tetrachloroethane	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<4.0	<10	<10	<10	<10
1,1,2 - Trichloroethane	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<4.0	<10	<10	<10	<10
1,1 - Dichloroethane	<20	<50	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<5.0	<5.0	<2.0	<10	<2.0	<5.0	<5.0	<5.0	<5.0
1,1 - Dichloroethylene	<20	<50	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<5.0	<5.0	<2.0	<10	<2.0	<5.0	<5.0	<5.0	<5.0
1,2 - Dichlorobenzene	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<4.0	<10	<10	<10	<10
1,2 - Dichloroethane	<40	<100	<10	<10	<10	<10	<10	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<4.9	<10	<10	<10	<10
1,2 - Dichloropropane	<20	<50	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<10	<10	<10	<5.0	<10	<5.0	<5.0	<5.0	<2.0	<10	<2.0	<5.0	<5.0	<5.0	<5.0
1,3 - Dichlorobenzene	<40	<100	<10	<10	<10	<10	<20	<10	<20	<5.0	<20	<10	<10	<20	<10	<10	<4.0	<20	<4.0	<10	<10	<10	<10
1,4 Dichlorobenzene	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<4.0	<10	<10	<10	<10
Bromodichloromethane	<20	<50	<5.0	<5.0	<5.0	<5.0	<20	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<5.0	<5.0	<2.0	<10	<5.0	<5.0	<5.0	<5.0	<5.0
Bromomethane	<100	<250	<25	<25	<25	<25	<50	<25	<50	<25	<50	<25	<50	<25	<50	<25	<10	<50	<5.0	<25	<25	<25	<25
Bromoform	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<10	<10	<10	<10	<10
Carbon Tetrachloride	<20	<50	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<5.0	<5.0	<2.0	<10	<1.9	<5.0	<5.0	<5.0	<5.0
Chlorobenzene	<20	<50	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<5.0	<5.0	<2.0	<10	<2.0	<5.0	<5.0	<5.0	<5.0
Chloroform	<20	<50	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<5.0	<5.0	<2.0	<10	<2.0	<5.0	<5.0	<5.0	<5.0
Chloromethane	<100	<250	<25	<25	<25	<25	<50	<25	<50	<25	<50	<25	<50	<25	<25	<25	<10	<50	<5.0	<25	<25	<25	<25
CIS - 1,3 - Dichloropropene	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<3.0	<10	<10	<10	<10
Dibromochloromethane	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<5.0	<10	<10	<10	<10
Ethylene Dibromide	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<1.9	<10	<10	<10	<10
Methylene Chloride	<100	<250	<25	<10	<25	<25	<50	<25	<50	<25	<50	<25	<25	<50	<25	<25	<10	<50	<20	<25	<25	<25	<25
Tetrachloroethylene	<20	<50	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<5.0	<5.0	<2.0	<10	<2.0	<5.0	<5.0	<5.0	<5.0
Trans - 1,2 - Dichloroethylene	<20	<50	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<5.0	<5.0	<2.0	<10	<5.0	<5.0	<5.0	<5.0	<5.0
Trans - 1,3 - Dichloropropene	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<4.0	<10	<10	<10	<10
Trichloroethylene	<20	<50	<5.0	<5.0	<5.0	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<10	<5.0	<5.0	<5.0	<2.0	<10	<2.0	<5.0	<5.0	<5.0	<5.0
Trichlorofluoromethane	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<5.0	<10	<10	<10	<10
Vinyl Chloride	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<10	<20	<10	<10	<4.0	<20	<2.0	<10	<10	<10	<10
																							<5.0
<b>Group #17 - Non-halogenated Volatiles</b>																							
Benzene	<20	<50	15	9.7	10	13	11	9.4	10	11	14	13	13	14	12	9.5	8.4	14	9.2	<5.0	8	11	<5.0
Ethylbenzene	27	<50	37	26	24	26	33	26	29	24	29	38	29	34	26	20	18	32	30	5.4	27	27	<5.0
Styrene	<40	<100	<10	<10	<10	<10	<20	<10	<20	<10	<20	<10	<20	<10	<10	<10	<4.0	<20	<4.0	<10	<10	<10	<10
Toluene	230	210	340	200	190	150	300	180	190	190	250	300	210	270	190	120	100	170	210	25	160	140	<10
O-Xylene	21	<50	32	25	22	23	30	24	23	19	24	28	23	28	20	14	14	24	25	<5.0	21	21	<5.0
M-Xylene + P-Xylene	47	<50	63	49	43	43	57	46	44	37	48	65	45	54	40	29	27	45	45	8.1	40	40	<5.0
Xylenes (Total)	68	<50	95	73	65	66	86	70	66	56	72	94	68	81	61	43	42	69	70	8.1	61	61	<5.0
<b>Group #18 - Water Soluble Volatiles</b>																							
Acrolein	<2000	<5000	<500	<500	<500	<500	<1000	<500	<1000	<500	<1000	<500	<500	<1000	<500	<500	<200	<1000	<1000	<500	<500	<500	<500
Acrylonitrile	<1000	<2500	<250	<250	<250	<250	<500	<250	<500	<250	<500	<250	<250	<500	<250	<250	<100	<500	<500	<250	<250	<250	<250
<b>Group #19 - Base Neutral Extractables</b>																							
Acenaphthene	<20	<20	<40	<20	<20	<10	<20	<10	<1.6	<10	<8.0	<8.0	<2.0	<8.0	<2.0	<20	<4.0	<4.0	<4.0	<2.0	<0.80	<2.0	<20
Acenaphthylene	<20	<20	<40	<20	<20	<10	<20	<10	<1.6	<10	<8.0	<8.0	<2.0	<8.0	<2.0	<20	<4.0	<4.0	<4.0	<2.0	<0.80	<2.0	<20
Anthracene	<20	<20	<40	<20	<20	<10	<20	<10	<1.6	<10	<8.0	<8.0	<2.0	<8.0	<2.0	<20	<4.0	<4.0	<4.0	<2.0	<0.80	<2.0	<20
Benzo(a)anthracene	<20	<20	<40	<20	<20	<10	<20	<10	<1.6	<10	<8.0	<8.0	<2.0	<8.0	<2.0	<20	<4.0	<4.0	<4.0	<2.0	<0.80	<2.0	<20
Benzo(a)pyrene	<20	<20	<40	<20	<20	<10	<20	<10	<1.6	<10	<8.0	<8.0	<2.0	<8.0	<2.0	<20	<4.0	<4.0	<4.0	<2.0	<0.80	<2.0	<20
Benzo(b)fluoranthene	<20	<20	<40	<20	<20	<10	<20	<10	<1.6	<10	<8.0	<8.0	<2.0	<8.0	<2.0	<20	<4.0	<4.0	<4.0	<2.0	<0.80	<2.0	<20
Benzo(g,h,i)perylene	<20	<20	<40	<20	<20	<10	<20	<10	<1.6	<10	<8.0	<8.0	<2.0	<8.0	<2.0	<20	<4.0	<4.0	<4.0	<2.0	<0.80	<2.0	<20
Benzo(k)fluoranthene	<20	<20	<40	<20	<20	<10	<20	<10	<1.6	<10	<8.0	<8.0	<2.0	<8.0	<2.0	<20	<4.0	<4.0	<4.0	<2.0	<0.80	<2.0	<20
Biphenyl	<50	<50	<100	<50	<50	<25	<50	<25	<4.0	<25	<20	<20	<5.0	<20	<5.0	<50	<10	<10	<10	<5.0	<2.0	<5.0	<50
Camphene	<100	<100	<200	<100	<100	<50	<100	<50	<8.0	<50	<40	<40	<10	<40	<10	<100	<20	<20	<20	<10	<4.0	<10	<100
1 - Chloronaphthalene	<100	<100	<200	<100	<100	<50	<100	<50	<8.0	<50	<40	<40	<10	<40	<10	<100	<20	<20	<20	<10	<4.0	<10	<100
2 - Chloronaphthalene	<50	<50	<100	<50	<50	<25	<50	<25	<4.0	<25	<20	<20	<5.0	<20	<5.0	<50	<10	<10	<10	<5.0	<2.0	<5.0	<50
Chrysene	<20	<20	<40	<20	<20	<10	<20	<10	<1.6	<10	<8.0	<8.0	<2.0	<8.0	<2.0	<20	<4.0	<4.0	<4.0	<2.0	<0.80	<2.0	<20
Dibenz(a,h)anthracene	<20	<20	<40	<20	<20	<10	<20	<10	<1.6	<10	<8.0	<8.0	<2.0	<8.0	<2.0	<20	<4.0	<4.0	<4.0	<2.0	<0.80	<2.0	<20
Fluoranthene	<20	<20	<40	<20	<20	<10	<20	<10	<1.6	<10	<8.0	<8.0	<2.0	<8.0	<2.0	<20	<4.0	<4.0	<4.0	<2.0	<0.80	<2.0	<20
Fluorene	<20	<20	<40																				









# **Attachment 3**

## **Odour Mitigation Product Information**

<b>Company</b>	<b>Contact</b>	<b>Technology</b>	<b>Product</b>	<b>Attachment</b>
Ecolo Toronto 4545 Eastgate Parkway, Unit 2, Mississauga, ON L4W 3W6	Nick Darwish O: 905-625-4533 ext. 22 <a href="mailto:ndarwish@ecolotoronto.com">ndarwish@ecolotoronto.com</a>	Misting System	XStreme Vapor Solution 8015	3A
Odor-No-More Inc. 14921 Chestnut St, Westminster CA 92683	Dane Espinoza 714-369-5991 <a href="mailto:de@odornomore.com">de@odornomore.com</a>	Misting System	CupriDyne Concentrate Iodine	3B
Bektra Corp. 220 Bayview Drive, Unit 6-7, Barrie, ON L4N 4Y8	Michael Beckley O: 705-734-2422 C: 705-817-7017 <a href="mailto:mike@bektra.com">mike@bektra.com</a>	Solid De-odourizer	Bektra Bin Balls	3C
Atmos Technologies 216 Garfield Ave, West Chester, PA 19380	Gregg Campbell 919-593-8538 <a href="mailto:gcampbell@atmos-technologies.com">gcampbell@atmos-technologies.com</a>	Foam Surfactant	Atmos Shield 645 Atmos Soil Equivalent Foam AC-667 SE	3D
Bektra Corp. 220 Bayview Drive, Unit 6-7, Barrie, ON L4N 4Y8	Michael Beckley O: 705-734-2422 C: 705-817-7017 <a href="mailto:mike@bektra.com">mike@bektra.com</a>	Foam Surfactant	Bektra Bio-Key 880I	3E
Odor-No-More Inc. 14921 Chestnut St, Westminster CA 92683	Dane Espinoza 714-369-5991 <a href="mailto:de@odornomore.com">de@odornomore.com</a>	Liquid Surfactant	CupriDyne Clean Powder Iodine	3F
Southeastern Tank 60 Vesta Road, Lebanon, TN 37090	Marc Nichols 615-653-0529 <a href="mailto:marc@setank.com">marc@setank.com</a>	Adaptive Pond Cover	Hexa-Cover 114	3G





# AirStreme™

## AOC-E150-TV



The AirStreme™ AOC-E150-TV is a self-contained odor control cannon that emits waterfree odor neutralizing solutions in the form of vapor. The feature rich oscillating vapor cannons are built for stand-alone odor control operation and can be used to replace much larger water-based odor control systems. With these vapor cannons, there will be no need to worry about water supply or winterization issues.

The AOC-E150-TV Vapor Cannon uses XStreme™ Solutions, which are powerful odor neutralizers similar to Ecolo's AirSolution™ line but contain 0% water and are highly concentrated. The waterless XStreme™ Vapor Solutions are designed to function in below-freezing temperatures to combat odor complaints all year round. Unlike masking agents, it works through the process of odor counteraction by reacting with malodorous molecules to form new, larger molecules with a lower vapor pressure which become undetectable.

### Ordering Information:

<b>Product Code:</b>	10-AOC-E150-TV
<b>Current Composition:</b>	12 Amps
<b>Electrical Composition:</b>	220 VAC - 1Ph - 60Hz
<b>Power Cable Length:</b>	10 ft / 3 m
<b>Fan Starter:</b>	Direct
<b>Emergency Stop:</b>	Yes
<b>Control Panel Buttons:</b>	<ul style="list-style-type: none"> <li>• Vapor START/STOP</li> <li>• Fan START/STOP</li> <li>• Oscillate</li> <li>• Manual Turn</li> </ul>

### Product Specifications:

	Net	Shipping*
<b>Weight:</b>	570 lbs / 258 kg	904 lbs / 410 kg
<b>Length:</b>	44" / 1.12 m	48" / 1.22 m
<b>Width:</b>	44" / 1.12 m	48" / 1.22 m
<b>Height:</b>	84" / 2.13 m	90" / 2.28 m
<b>Elevation, HAND:</b>	-20° to 60°	
<b>Programming:</b>	Event cycle with 24/7	
<b>Base:</b>	36" x 36" with fork truck pockets	
<b>Construction:</b>	<ul style="list-style-type: none"> <li>• Control panels - stainless steel</li> <li>• Chassis - hot dipped galvanized steel</li> </ul>	

\* Shipping weight (904lbs./410kg.) includes vinyl cover + 1 case (16L) of vapor solution

**WATERLESS ODOR  
TREATMENT**

**OSCILLATING MOTION**

**INDEPENDENT  
MULTI-ZONE OPERATION**

**BELOW-FREEZING  
COMPATIBILITY**

**PLUG-AND-PLAY**

### Applicable Areas:



Landfills



Greenhouse  
Operations



Other  
Open Areas



# AOC-E150-TV



**Note:**

The data contained herein is furnished for informational purposes only. It is the user's responsibility to determine suitability for their purpose of any production methods mentioned herein and to adopt such precautions as may be advisable for the protection of property and of persons against any hazards that may be involved in the handling and use thereof. Ecolo makes no representations, expressed or implied, either in fact or by operation of law, statute or otherwise.

Ecolo specifically disclaims, except for the company standard 1-year warranty on the equipment (including parts) and 90 days warranty on the XStreme vapor heads, all warranties, whether written or oral, expressed or implied, including any warranties as to quality, merchantability or fitness for a particular purpose, arising from the sale or use of Ecolo's products. Ecolo specifically disclaims any liability for consequential or incidental damages of any kind, including lost profits.

We recommend that each prospective user test the proposed application before repetitive use, using this data as a guide. This product may be covered by one or more Canadian, American, or foreign patents or patent applications.

**Ordering Information:**

**XStreme™ Vapor Solutions:**

<b>#8015</b> 50-XST-8015-P4-4000 4 x 4L (Case)	<b>#8023</b> 50-XST-8023-P4-4000 4 x 4L (Case)	<b>#8012</b> 50-XST-8012-P4-4000 4 x 4L (Case)	<b>#8014</b> 50-XST-8014-P4-4000 4 x 4L (Case)
50-XST-8015-C20 20L (Pail)	50-XST-8023-C20 20L (Pail)	50-XST-8012-C20 20L (Pail)	50-XST-8014-C20 20L (Pail)
50-XST-8015-181KG 200L (Drum)	50-XST-8023-181KG 200L (Drum)		



**Conversions:**

cm / 2.54 = inch    kg x 2.2 = lbs

\* AirStreme is a trademark owned by Ecolo Odor Control Technologies Inc.



Ecolo Toronto

EMAIL: [info@ecolotoronto.com](mailto:info@ecolotoronto.com)





## AirSolution and Chemical Reactions

Most sites with problematic odors require solutions that will permanently neutralize the odors and not be confused with perfumes or masking agents. Successful treatment is measured by a lack of odor, less complaints, or occasionally detection of a pleasant note in the air.

### Technology behind AirSolution and XStreme Solution

AirSolution and XStreme odour neutralizers uses Two-Aldehyde technology, which blends two classes of aldehydes to permanently and significantly neutralize the unpleasant odors. The patented two aldehyde technology permanently reacts with these common malodors to produce either a new odorless compound that is heavier and less volatile, or a modified reaction compound that smells much more pleasant but is quickly volatilized. Two Aldehyde technology has proven very effective against sulfur compounds (rotten egg), organic acids such as capric acid, caproic acid and valeric acid (perspiration, cheesy and vomit odors) and various amines generated in the breakdown of proteins (decay and urine odor). Many malodor molecules are sulfur compounds, or primary or secondary amines and are chemically reactive with the aldehydes of AirSolution or XStreme Solution.

Examples of naturally occurring aldehydes and ketones include vanillin (from Vanilla bean), cinnamaldehyde (from cinnamon bark), benzaldehyde (from bitter almond), camphor, (R)-carvone (spearmint oil), (S)-carvone (caraway seed oil), Z-jasmone (scent of jasmine). Ecolo Odour Neutralizing products are composed of a blend of plant extracted materials in a format appropriate for the application. These materials vary from highly complex mixtures (essential oils), to single chemicals. Below is a list of the most important materials incorporated in AirSolution.

#### Essential Oils

Camphor Oil  
Cinnamon Leaf Oil  
Cedarwood Oil  
Cornmint Oil  
Eucalyptus Oil  
Lemon Oil  
Lime Oil  
Orange Oil  
Peppermint Oil  
Pine Oil  
Rosemary Oil  
Spearmint Oil

#### Single Chemicals

Amyl Acetate  
Aldehyde C12  
Cinnamic Aldehyde  
Citral  
Citronellal  
Coumarin  
Ethyl Acetate  
Eugenol  
Geraniol  
Methyl Salicylate

Every AirSolution and XStreme Solution has its specific formula that has been designed to eliminate some particular odor. Therefore, the difference between AirSolution varieties is in specific materials required in the formula and their individual concentration.



### Method of Application

This permanent neutralization of odors is aided by the method of AirSolution application; high pressure misting, fogging, or vaporization allows the product to achieve intimate contact with the odorous air to effectively contact the odorous molecules. This is generally the most efficient and economical method of neutralization. The reaction occurs nearly instantly when the prepared and misted solution contacts the odorous air stream. If the solution were to require 10 seconds of contact time to completely mix with the air from an odorous site in a 20km/h wind (6m/s), the reaction would be complete within 60 meters of the installed distribution method.

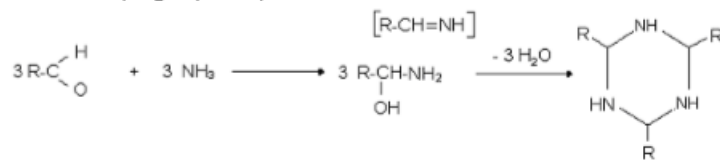
In some cases, direct addition to waste water may be recommended. This method can be useful in scrubber applications and are associated with complete utilization of the product as it is metered in as required. This is useful when a scrubber stack is the point source releasing the odors. The Two-Aldehyde technology has been tested in many field applications against a variety of odors when being finely dispersed by air or when added directly to the waste.

### Chemical Equations:

AirSolution will be presented with a wide array of odors. Rarely will only one offensive odor be present in an air stream, so the complexity of the formulation helps combat real world odors.

#### Reaction of an aldehyde with:

- Ammonia (in gas phase)



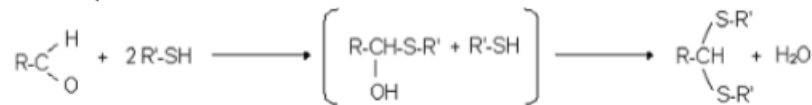
- A primary amine



- A secondary amine

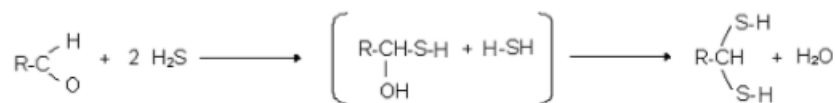


- A mercaptan



(Thioacetal)

- Hydrogen sulfide

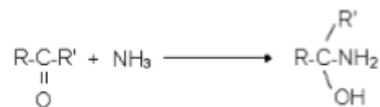


(Thioacetal)

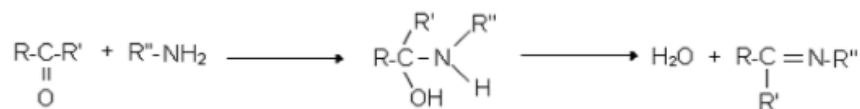


**The reaction of a ketone with:**

- Ammonia



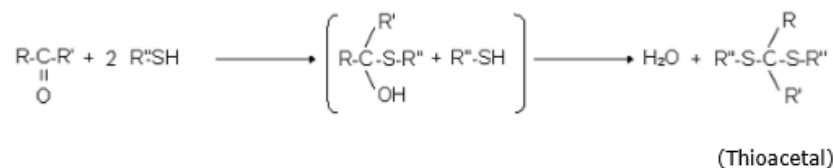
- A primary amine



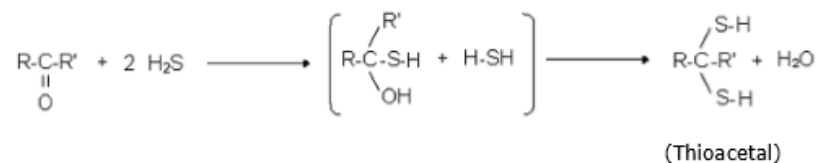
- A secondary amine



- A mercaptan



- Hydrogen sulfide



The end products are generally larger and heavier, with the change resulting in a new molecule without the original odor characteristics. The product is safe, biodegradable and environmentally sound. The permanent removal of the odors from the air stream significantly improves the quality of air

## XStreme Vapor Solution Concentrates

**Material:** XStreme Vapor Solution 8015  
**Revision Date:** August 5, 2022

### 1. IDENTIFICATION

**Product Identification:**

**Product Name:** XStreme Vapor Solution Series Concentrate  
**Synonyms:** None  
**Chemical Family:** Mixture  
**Application / Use:** Deodorizer  
**Supplied By:** Ecolo Odor Control Systems Toronto  
4540 Eastgate Parkway, Unit 2  
Mississauga, ON L4W 3W6  
**Prepared By:** Technical Services  
**Telephone number of preparer:** (905) 625-4533  
**24-Hour Emergency Telephone Number :** CANUTEC 613-996-6666

### 2. HAZARDS IDENTIFICATION

The product is not classified.

**Information pertaining to special dangers for human and environment:**

**Adverse physicochemical effects:**

**Adverse human health effects and symptoms:**

**Eye Contact:** May irritate eyes.

**Skin Contact:** May cause minimal skin irritation in sensitive individuals

**Ingestion:** May cause indigestion

**Adverse environmental effects:** There is no known ecological information for this product

**Other adverse hazards:** There is no additional information for this product.

#### Label Elements

**Hazard Statements:**

H315 + H320 May cause skin and eye irritation if direct contact with liquid

**Precautionary Statements**

P264 Wash contaminated skin thoroughly after handling

P280 Wear protective gloves/eye protection

P302 + P352 If on skin: Wash with plenty of water

P305 + P351 + P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses.

P321 Specific treatment (see medical advice on this label)

P333 + P313 If skin irritation or rash occurs: Seek medical advice/attention

**SAFETY DATA SHEET**
**8015**

P337 + P313 If eye irritation persists: Seek medical advice/attention

P370 + P378 In case of fire: Use foam, carbon dioxide, dry powder or water fog to extinguish

P403 Store in well-ventilated place

P501 Dispose of contents/container in accordance with local regulations

## Contains

(R)-p-mentha-1,8-diene, 2-methoxy-4-prop-2-enylphenol, (E)-3-phenylprop-2-enal, 2-oxabicyclo (2,2,2)octane, 1,3,3-trimethyl, citral, 3,7-dimethyloct-6-enal

This product does not contain any substances classified as PBT or vPvB

**3. COMPOSITION / INFORMATION ON INGREDIENTS**
**Mixtures**

Isopentyl acetate CAS number: 123-92-2	10-30%
benzaldehyde CAS number: 100-52-7	5-10%
bicyclo(2,2,1) heptan-2-ol, 1,7,7-trimethyl-exo CAS number: 125-12-2	5-7%
(R)-p-mentha-1,8-diene CAS number: 5989-27-5	5-10%
2-(2-[4-(1,1,3,3-tetramethylbutyl)phenoxy]ethoxy)ethanol CAS number: 9036-19-5	1-5%
3-cyclohexene-1-methanol,a,a,4-trimethyl CAS number: 98-55-5	1-5%
2-methoxy-4-prop-2-enylphenol CAS number: 123-92-2	10-30%
(E)-3-phenylprop-2-enal CAS number: 104-55-2	1-5%
methyl 2-hydroxybenzoate CAS number: 119-36-8	1-5%
2-oxabicyclo (2,2,2)octane, 1,3,3-trimethyl CAS number: 470-82-6	1-5%

pentyl 2-hydroxybenzoate CAS number: 2050-08-0	1-5%
chromen-2-one CAS number: 91-64-5	<1%
citral CAS number: 5392-40-5	<1%
1,3-benzodioxole-5-carbaldehyde CAS number: 120-57-0	<1%
4,6,6-trimethylbicyclo[3,1,1]hept-3-ene CAS number: 80-56-8	<1%
(2E)-3,7-dimethylocta-2,6-dien-1-ol CAS number: 106-24-1	<1%
3,7-dimethyloct-6-enal CAS number: 106-23-0	<1%
4-isopropylidene-1-methylcyclohexene CAS number: 586-62-9	<1%
3-methylbutan-1-ol CAS number: 123-51-3	<1%
ethyl acetate CAS number: 141-78-6	<1%

#### 4. FIRST AID MEASURES

**General Information:** Immediate medical attention is not required

**Eye Contact:** In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing. Remove contact lenses and rinse eyes with water.

**Skin Contact:** Remove contaminated clothing and launder before reuse. Wash contaminated skin with mild soap and water for 15 minutes. Get medical attention if irritation persists.

**Inhalation:** Remove person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen and get immediate medical attention.

**Ingestion:** Drink 1 or 2 glasses of water. Never give anything by mouth to an unconscious or convulsing person. Seek immediate medical attention. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into lungs

**Notes to Physician:** Treat symptomatically



**SAFETY DATA SHEET****8015****Hazards:** Contact with eyes, skin and through inhalation**Treatment:** No specific antidote. Treatment based on sound judgment of physician and individual Reactions of patient.**5. FIRE FIGHTING MEASURES****Flammable Properties:** Fire or intense heat may cause violent rupture of packages**Suitable Extinguishing Media:** CO<sub>2</sub>, Dry Chemical, Universal - Type foam.**Unsuitable Extinguishing Media:** Not available**Hazardous Decomposition Materials (under fire conditions):** CO<sub>2</sub>, CO**Specific Hazards Arising from the Chemical:** Thermal decomposition can lead to release of irritating gases and vapors**Autoignition Temperature:** Not applicable**Flammable Limits in Air (%):** Not Available.**Special Exposure Hazards:** Combustible Liquid**Special Protective Equipment:** In any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear**NFPA Ratings for This Product Are:**

HEALTH 0, FLAMMABILITY 2, INSTABILITY 0, PERSONAL PROTECTION: "B" .

**HMIS Ratings for This Product Are:**

HEALTH 0, FLAMMABILITY 2, PHYSICAL HAZARD 0, PERSONAL PROTECTION: Safety Glasses and Gloves

Protective actions during firefighting

Cool containers exposed to heat with water spray and remove them from the fire area if it can be done without risk. Cool containers exposed to flames with water until well after the fire is out. If a leak or spill has not ignited, use water spray to disperse vapours and protect men stopping the leak. Avoid discharge to the aquatic environment.

Special protective equipment for firefighters

Wear positive-pressure self-contained breathing apparatus (SCBA) and appropriate protective clothing. Firefighter's clothing that provides a basic level of protection during chemical incidents is defined by the Canada Occupational Health and Safety Regulations, by provincial guidelines on occupational health and safety or by NFPA standards if applicable.

**6. ACCIDENTAL RELEASE MEASURES****WARNING: Combustible.** Eliminate all ignition sources**Personal Precautionary Measures:** Wear appropriate protective equipment. Avoid contact with spilled or leaked material.**Environmental Precautionary Measures (Large Spills):** Evacuate hazard area of unprotected personnel. Wear appropriate respirator and protective clothing. Shut off source of leak if it is safe to do so. Prevent entry into sewers or streams, dike if needed. Larger amounts may be collected with a sorbent material and placed in an appropriate waste disposal container.**Procedure for Clean Up (Small spills):** Wipe up small spills with an absorbent cloth or paper toweling. Mop up with plenty of soapy water, dilute with running water. May be treated with an absorbent material and placed in a tightly sealed container for proper disposal.**7. HANDLING AND STORAGE**

**Handling:**

**Advice on safe handling:** Avoid contact with eyes and skin. Use with adequate ventilation.

Avoid breathing vapour.

**Protective measures:**

**Technical Measures:**

**Measures to prevent aerosol and dust generation:** not applicable

**Measures required to protect the environment:** Keep containers tightly closed when not in use.

**Specific requirements or handling rules:** Wear gloves and goggles or glasses while mixing or pouring.

**Precautions against fire and explosion:** Avoid excessive heat, sparks, open flame or smoking near product. Rinse empty containers before disposal to prevent vapour build up. If container is to be reused, keep tightly closed and do not rinse.

**Further information:** wash/wipe the outside of containers and skin thoroughly after handling.

**Storage:**

**Technical measures and storage conditions:** Store tightly closed container. Keep away from heat, sparks, open flame, direct sunlight and all incompatibles.

**Packaging materials:** Store in original containers

**Requirements for storage rooms and vessels:** Cool, dry area recommended

**Suggestions for storage assembly:** No Further Recommendations

**Storage class:** Not Available

**Further information on storage conditions:** Local Ventilation Sufficient if well ventilated

**Specific uses (for end products):** Deodorization

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

**Exposure limit values:** **Occupational exposure limits:**

**Biological limit values:** Not available

**DNEL and PNEC-value(s) as applicable:** Not available

**Exposure Controls:** **Occupational exposure controls:** Not available

**Technical measures to prevent exposure:** General ventilation.

**Personal protection equipment:**

**Respiratory Protection:** General Ventilation

**Hand protection:** Rubber Gloves

**Eye protection:** Safety goggles or glasses recommended in case of splashing

**Skin protection:** Rubber Gloves. Minimize skin contact. Wash with soap and water before eating, drinking, smoking or using the toilet

**Other Personal Protection Data:** Eye wash kit should be available.

**Hygiene measures**

Wash hands thoroughly after handling. Wash at the end of each work shift and before eating, smoking, and using the toilet. Do not eat, drink or smoke when using this product.

**Respiratory protection**

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Avoid excessive inhalation of concentrated gas. Ensure all respiratory protective equipment is suitable for its intended use and is NIOSH approved. R95 Particulate filtering or equivalent facepieces Respirators should comply with any relevant provincial regulation and/or provincial guidelines applicable to health and safety at work. Half mask and quarter mask respirators with replaceable filter cartridges should comply with the Canadian regulation on health and safety at work, SOR/86-304, Part XII (12.7) and any relevant provincial regulation relating to health and safety at work. Using an R95 approved particulate respirator is recommended.

**Environmental exposure controls:**
**Water (incl. sewage plant):** Not applicable

**Air:** Not applicable

**Soil:** Not applicable

## 9. PHYSICAL AND CHEMICAL PROPERTIES

<b>Physical State:</b>	Liquid
<b>Color:</b>	Clear pale yellow to dark yellow
<b>Odour:</b>	Characteristic
<b>Odour Threshold</b>	No information available
<b>pH:</b>	Not applicable
<b>Melting point/range (°C):</b>	Not Available
<b>Boiling point/range (°C):</b>	>100 °C
<b>Flash point (°C):</b>	>80°C Closed cup
<b>Evaporation Rate</b>	<1 (butyl acetate =1)
<b>Flammability (solid, gas):</b>	Not Applicable
<b>Upper/lower flammability or explosive limits</b>	No information available
<b>Explosive properties:</b>	Not Available
<b>Oxidizing properties:</b>	Not Available.
<b>Auto-Ignition temperature (°C):</b>	Not Available
<b>Vapor pressure (°C):</b>	Not Available

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<b>Decomposition Temperature</b>	Not Available
<b>Relative density (g/cm<sup>3</sup>):</b>	0.925-0.945 @ 20 C
<b>Water solubility (20°C in g/l):</b>	Insoluble.
<b>Partition coefficient n-Octanol/Water (log Po/w):</b>	Not Available
<b>Viscosity, dynamic (mPa s):</b>	Kinematic viscosity <20.5 mm <sup>2</sup> /s
<b>Vapor density:</b>	>1
<b>Evaporation rate:</b>	<1
<b>Dust explosion hazard:</b>	Not Applicable
<b>Explosion limits:</b>	Not Applicable
<b>Substance groups relevant properties:</b>	Not Available
<b>Other information (where applicable like surface tension, miscibility, fat solubility, conductivity, gas group, etc):</b>	Not Available
<b>% Volatile by Volume:</b>	Not Available

**10. STABILITY AND REACTIVITY**

**Reactivity:** There is no known reactivity hazards associated with this product

**Chemical Stability:** Stable at normal ambient temperatures and when used as recommended. Stable under the prescribed storage conditions.

**Hazardous Polymerization:** This product presents no significant reactivity hazard. Hazardous polymerization will not occur.

**Conditions to Avoid:** Keep away from heat, sparks and flame. Avoid hot work and sources of ignition on or near empty containers.

**Materials to Avoid:** No specific material or group of materials is likely to react with the product to produce a hazardous situation.

**Hazardous Decomposition Products:** Does not decompose when used and stored as recommended. Thermal decomposition or combustion productions may include the following substances. Harmful gases or vapours.

**11. TOXICOLOGICAL INFORMATION**

**Information on toxicological effects**

**Ingestion:** If ingested, may cause nausea.

**Skin Corrosion/Irritation:** Irritating. Wash skin if splashed

**Respiratory sensitization :** Based on available data the classification criteria are not met.

**Serious Eye damage/irritation:** Based on available data the classification criteria are not met.

**Skin Sensitisation:** May cause skin sensitisation or allergic reactions in sensitive individuals.

**Germ Cell mutagenicity:** Based on available data the classification criteria are not met.

**Repeated Dose Toxicity (sub-acute to chronic):** Not available

**Acute Test of Product:**

**Acute toxicity Oral:** LD50: >2,000 mg/kg (calculated, oral/rat)

**Acute Dermal LD50:** LD50>5,000 mg/kg

**Acute Inhalation LC50:** >2 mg/l. 8/H (rat) Vapour

**Carcinogenicity Comment:** Based on available data the classification criteria are not met.

**IARC Carcinogenicity:** Based on available data the classification criteria are not met.

**Reproductive Toxicity/Teratogenicity/Embryotoxicity/Mutagenicity:** Based on available data the classification criteria are not met.

Specific target organ toxicity -single exposure

STOT-single exposure: Not classified as a specific target organ toxicant after a single exposure

Specific target organ toxicity – repeated exposure

STOT- repeated exposure: Not classified as a specific target organ toxicant after repeated exposure

Aspiration hazard: Based on available data the classification criteria are not met.

Inhalation: No specific symptoms known

Ingestion: May cause sensitive or allergic reactions in sensitive individuals. Redness. Irritating to skin

Eye contact: May cause temporary eye irritation

Route of exposure: Ingestion, Inhalation, Skin and or eye contact

Target organs: No specific target organs known

General information: The severity of the symptoms described will vary dependent on the concentration and the length of exposure.

## 12. ECOLOGICAL INFORMATION

**Aquatic toxicity Information:** Not Available

**Soil toxicity Information:** Not available

**Air toxicity Information:** Not available

**Mobility**      **Known or predicted distribution to environmental compartments:**

**Surface tension:** Not available

**Adsorption/Desorption**

**Soil-water:** Not available

**Water-air:** Not Available

**Soil-air:** Not Available

**Persistence and degradability**

**Abiotic Degradation(in sea-water, fresh-water, air, soil):** Not Available.

**Physical-and photo-chemical elimination (ozonolysis, oxidation, photo-oxidation, de-chlorination, photo-mineralisation):** Not Available.

**Biodegradation:** All data not available.

**Bioaccumulative potential**

**Partition coefficient n-octanol /water (log KO/W):** Not Available.

**Bioconcentration factor (BCF):** All data not available

**Longterm-Ecotoxicity:** Not Available

**Results of PBT assessment:** Not available

**Other adverse effects (ozone depletion, photochemical ozone creation, endocrine disruption, global warming, etc):** Will not deplete the ozone layer. Other data Not Available

**Further ecological information (as applicable):** No additional remark

## 13. DISPOSAL CONSIDERATIONS

**Waste management measures (as applicable):**

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Can be incinerated, when in compliance with local regulations. Can be landfilled when in compliance with local regulations.

**Appropriate disposal of packaging:** Empty containers should be rinsed with hot water a minimum of three times and recycled or disposed of through an approved waste management facility.

**Additional information (including any national or regional provisions):** Not Available

**14. TRANSPORT INFORMATION**

**ICAO/IATA** Not regulated as a hazardous material or dangerous good for transportation.

**IMO/IMDG** Not regulated as a hazardous material or dangerous good for transportation.

**RID/ADR** Not regulated as a hazardous material or dangerous good for transportation.

**Marine Pollutant:** Not a pollutant

**15. REGULATORY INFORMATION**

**Chemical Safety Assessment :** Not Available

**Canada:** D2B. Possible irritation to eyes

**WHMIS Classification:**

**CPR: Compliance:** This product has been classified in accordance with the hazard criteria of the CPR and the SDS contains all the information required by the CPR.

**Hazard symbols and hazard statements for labelling:** No special labelling required

**R-Phrases:**

R36: Irritating to eyes.

**S-Phrases:**

S2: Keep out of the reach of children

S3/7/9: Keep container tightly closed in a cool, well-ventilated place.

S16: Keep away from sources of ignition - No smoking.

S24/25: Avoid contact with skin and eyes.

S26: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

S37/39: Wear suitable gloves and eye/face protection.

**Special provisions concerning the labelling of certain preparations:** Not available

**Authorization and/or restrictions on use:** Not available

**Other EU regulations:** Not available

**Information according 1999/13/EC about limitation of emissions of volatile organic compounds (VOC-guideline):** Not available

**National regulation Information:** Not available

**16. OTHER INFORMATION**

**NOTICE TO READER:**

**Disclaimer:**

**SAFETY DATA SHEET****8015**

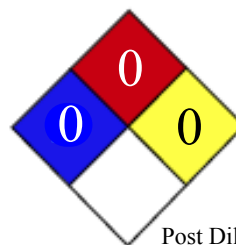
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**Training instructions (as applicable):** Not applicable

**Recommended restrictions on use (as applicable):** Not applicable

**\*\*\*END OF SDS\*\*\***





Health	0
Fire	0
Reactivity	0
Personal Protection	B

## Product Specifications

2014

### CupriDyne® Clean Industrial Odor Eliminator Concentrate

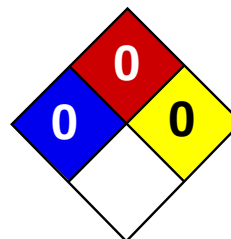
<b>Description:</b>	Concentrated Odor Eliminator utilizing a proprietary blend of micronutrients that is highly effective against all organically derived odors.
<b>Intended Use:</b>	In and around animal housing, dumps, trash receptacles, industrial sludge and waters.
<b>Product Features:</b>	Eliminates odor in minutes vs. hours Eco-friendly and non-toxic, when diluted Utilizes micronutrients for odor control
<b>Limitations:</b>	Requires dilution. Do not use in concentrated form.
<b>Key Components:</b>	Iodine Cuprous Iodide Sulfamic Acid Potassium Bicarbonate Water
<b>Mixing Instructions:</b>	Apply appropriately diluted product following Instructions for Use.
<b>Application Instructions:</b>	For best results clean all debris and organic matter from all surfaces to be treated first. Apply to the air and all hard surfaces in a fine mist above and on all affected areas. Safe for human and animal contact in diluted form.
<b>Instructions for Use:</b>	Dilute per label instructions and apply to affected area through misting, pressurized sprayer or other spraying mechanism and allow to sit. Do not rinse. Test on inconspicuous area of surface to be treated first.
<b>Mechanism of Action:</b>	Oxidation of organic compounds. Most odorous compounds are oxidized to Hydrogen and Oxygen (including sulfurs and ammonia).
<b>Storage:</b>	Store in cool, dry place
<b>Compliances:</b>	None
<b>Precautions:</b>	Refer to appropriate MSDS (material safety data sheet). For technical assistance call (949) 643-9540

**Warranty:**

Odor No More<sup>®</sup> will replace any defective material. Because the storage, handling and application of this material are beyond our control, we can accept no liability for the results obtained.

**Disclaimer:**

All information on this data sheet is based on laboratory testing and practical use by third parties. Odor-No-More<sup>®</sup> makes no representations or warranties of any kind concerning this data.



Health	0
Fire	0
Reactivity	0
Personal Protection	B

## Safety Data Sheet Iodine Solution, 0.025N SDS

### Section 1: Chemical Product and Company Identification

**Product Name:** CupriDyne®  
Concentrate Iodine (Requires Dilution)

**Contact Information:**

**Odor No More, Inc.**  
14921 Chestnut St.  
Westminster, CA 92683  
US Sales: **1-888-400-2863**  
International Sales: **1-888-400-2863**  
Order Online: [info@odornomore.com](mailto:info@odornomore.com)

**CAS#:** Mixture.

**RTECS:** Not applicable.

**TSCA:** TSCA 8(b) inventory: Iodine; Cuprous Iodide  
Sulfamic Acid: Potassium Bicarbonate; Water

**CI#:** Not applicable.

**24HR Emergency Telephone, call:**  
1-949-295-3622

**For non-emergency assistance, call:** 1-888-400-2863

**onym: Free Iodine Solution**

**Chemical Name:** Not applicable.

**Chemical Formula:** Not applicable.

### Section 2: Hazards Identification

**Potential Acute Health Effects: Dilute**

Non-hazardous in case of skin contact, of eye contact, of ingestion, of inhalation.

**Potential Chronic Health Effects: Dilute**

Non-hazardous in case of skin contact, of eye contact, of ingestion, of inhalation. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not Available

### Section 3: Composition and Information on Ingredients

**Composition:**

Name	CAS #	% by Weight
Iodine	7553-56-2	0.025
Cuprous Iodide	7681-65-4	0.01
Sulfamic Acid	5329-14-6	< 1
Potassium Bicarbonate	298-14-6	< 1
Water	7732-18-5	>98

**Toxicological Data on Ingredients:** Iodine: ORAL (LD50): Acute: 14000 mg/kg [Rat]

#### Section 4: First Aid Measures

**Eye Contact:** Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used.

**Skin Contact:**

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention.

**Serious Skin Contact:** Not available.

**Inhalation:** Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

#### Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

#### Section 6: Accidental Release Measures

**Small Spill:**

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Absorb with an inert material and put the spilled material in an appropriate waste disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

### Section 7: Handling and Storage

**Precautions:**

Do not breathe excess gas/fumes/ vapour/spray. Avoid contact with skin. Wear suitable protective clothing. If you feel unwell, seek medical attention and show the label when possible.

**Storage:**

No specific storage is required. Use shelves or cabinets sturdy enough to bear the weight of the chemicals. Be sure that it is not necessary to strain to reach materials, and that shelves are not overloaded.

### Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

**Personal Protection:** Safety glasses. Lab coat. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

Iodine CEIL: 0.1 (ppm) from ACGIH (TLV) CEIL: 1 (mg/m<sup>3</sup>) from OSHA Consult local authorities for acceptable exposure limits.

### Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** Not applicable.

**Color:** Clear/Slight yellow tint

**pH (1% soln/water):** 5.5-6.5

**Boiling Point:** The lowest known value is 100°C (212°F) (Water).

**Melting Point:** Not available.

**Critical Temperature:** Not available.

**Specific Gravity:** Weighted average: 1.01 (Water = 1)

**Vapor Pressure:** The highest known value is 17.535 mm of Hg (@ 20°C) (Water).

**Vapor Density:** The highest known value is 0.62 (Air = 1) (Water).

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, methanol, diethyl ether, acetone.

**Solubility:**

Easily soluble in cold water, hot water. Soluble in diethyl ether. Partially soluble in methanol, acetone.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Slightly reactive to reactive with oxidizing agents, combustible materials, organic materials, metals, acids.

**Corrosivity:**

Slightly corrosive to corrosive in presence of aluminum, of zinc, of copper. Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not Available

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

### Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available. LC50: Not available.

**Chronic Effects on Humans:**

DEVELOPMENTAL TOXICITY: Not Available

**Other Toxic Effects on Humans:** Non-hazardous in case of skin contact, of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not Available

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous degradation products are not likely.

**Toxicity of the Products of Biodegradation:** Not available.

**Special Remarks on the Products of Biodegradation:** Not available.

### Section 13: Disposal Considerations

**Waste Disposal:**

**Section 14: Transport Information**

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**DOT Classification:** Not a DOT controlled material (United States).**Identification:** Not applicable.**Special Provisions for Transport:** Not applicable.**Section 15: Other Regulatory Information****Federal and State Regulations:**

Pennsylvania RTK: Iodine;

Massachusetts RTK: Iodine, TSCA 8(b) inventory: Iodine; Water

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).**Other Classifications:****WHMIS (Canada):****DSCL (EEC):**

This product is not classified according to the EU regulations.

**HMIS (U.S.A.):** No Significant Health Risk.**Health Hazard:** 0**Fire Hazard:** 0**Reactivity:** 0**Personal Protection:** b**National Fire Protection Association (U.S.A.):****Health:** 0**Flammability:** 0**Reactivity:** 0**Specific hazard:** 0**Protective Equipment:**

Gloves. Lab coat. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

**Section 16: Other Information****References:** Not available.**Other Special Considerations:** Not available.**Created:** 05/28/2015 4:00 AM **UPDATED:** 03/21/2019**Disclaimer:**

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## Performance Advantages

- Light weight
- Free-flowing
- Excellent dimensional strength
- True odor neutralization
- Anti-slip features
- Easy clean-up
- Long lasting scent release



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## BEKTRA BIN BALLS Wintermint Granular Odor Neutralizer

Bektra Bin Balls are industry unique spheres of post consumer mineral offering **Triple Action Performance:**

- 1. Spheres infused with true odor neutralizing technology**
- 2. Scent release formula activates on contact with liquids**
- 3. Absorption of liquids without clumping**

Unlike conventional clay granular product that is not only heavy and becomes greasy, or hard as brick to clean up, the free-flowing balls maintain dimensional strength making clean up a breeze. The sphere porosity and strength provide absorption with anti-slip features and a consistent release of odor neutralizing compounds for long lasting results against the toughest odors.

### SPECIFICATIONS:

**Appearance:** White spheres of porous mineral

**Odor:** Pleasant key notes

**Stability:** 1 year at ambient temperature

### DIRECTION FOR USE:

Bektra Bin Balls are free flowing and non-clumping granules designed for easy application on any surface. Sprinkle freely over areas to combat nuisance malodors and dispose into waste containers as required. For routine use in trash and recycling bins, pour Bin Balls into the bottom before filling with trash and repeat as necessary. Used as directed, Bin Balls are non-polluting, non-hazardous and safe for use around people, pets and plants.

### PACKAGING:

BBS101-0016	4x4L	(4x1.3 gal bottle)	5kg.	(11 lbs.)
BBS101-0020	20L	(5.3 gal carton)	5.3kg.	(12 lbs.)
BBS101-0110	110L	(30 gal drum)	22kg.	(48 lbs.)
BBS101-0200	200L	(53 gal drum)	53kg.	(117 lbs.)

### STORAGE & HANDLING:

Keep out of reach of children. Use scoop to sprinkle over areas of use - do not use bare hands. Keep container closed when not in use. Do not store in areas of high temperature or direct sunlight.

### COMMON AREA OF USE:

- Trash room floors
- Bins & compactors
- Transfer stations
- Agra-food processing yards
- Material recovery facilities







## Alternative Daily Cover for Odor & VOC Control

# ATMOS

Pioneering Environmental Solutions

## FEATURES

- Biodegradable
- Non-hazardous
- Non-combustible
- No ambient temperature limits
- Consumes no valuable airspace
- Withstands moderate rainfall
- Maintains integrity up to 72 hours
- No leachate interference
- No clean-up necessary
- Easy to use
- Scavengers cannot see or smell the trash



FROM INDUSTRY LEADING TECHNOLOGY TO ON-SITE SERVICE, ATMOS' FOAM TECHNOLOGY IS THE MOST ADVANCED AND COST EFFECTIVE ALTERNATIVE DAILY COVER AND ODOR CONTROL SOLUTION

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## Atmos Cover ADC

Atmos Technologies' Alternative Daily Cover is a highly engineered system of aqueous foam and application equipment that effectively meets the performance criteria of Subtitle D. The cover material, Atmos Cover ADC, is a non-hardening protein based foam that can be adjusted to last from overnight to over a weekend.

Atmos Cover ADC forms a barrier between the waste and the atmosphere to provide both an immediate and effective barrier to minimize odors, VOC's, disease vectors and blowing litter. It can also be applied directly to liquid surfaces such as lagoons and retention ponds.

# Pneumatic Foam Unit (PFU) 2500



## Big, Quick & Powerful

The self-propelled unit is ideal for sites where quick coverage of large areas is important. The PFU 2500 is self-contained and designed to meet the rugged demands of solid waste landfills and environmental remediation sites. The Atmos Cover ADC is applied by our 12 foot wide, rear-mounted, bi-directional spray bars, hose reels, or front monitor system. A climate controlled safety cab provides the operator with superior safety and comfort while applying the cover. The Atmos ADC system is built for a quick, one-person operation.

The unit includes diesel driven hydraulics, air compressor, rubber tracks and drive assemblies, pump, hoses, solution storage tank, freeze protection and our proprietary foam-generating technology. This unit is designed to operate with Atmos' Bulk Storage & Dilution System (BSD).



17 Campus Boulevard, Suite 100, Newtown Square, PA 19073

Phone: 610-436-4314

[atmos-technologies.com](http://atmos-technologies.com)

## FEATURES

Durable, rubber tracks

CAT® C-7 Engine  
Maintenance free

## SPECIFICATIONS

**Solution Tank**  
2500 Gallons

**Coverage Rate**  
400-800 Sq. Ft./Min.

### Size

Length: 29'6"

Width: 8'6"W

Height: 10'9"H

### Weight

40,000 Lbs

### Application

Spray bars, hose reel, monitor nozzle

### Freeze Protection

120 VAC or 230 VAC,  
30A, single phase

# Atmos Cover ADC

## The Best Solution for Odor and VOC Control

### The Turn Key Solution

The Atmos setup includes foam concentrate, application equipment, bulk storage, mixing center training and a full maintenance program.

### Cost Effective

No capital investment and no rental fees for equipment. Overall cost lower than other ADCs.

### Zero Lost Airspace

Improves the value of the landfill by extended the useful life and maximizes the return on investment

### Superior Coverage

The foam layer provides superior performance versus other products. The multi-directional spray bars ensure no gaps or shadowing for odors to escape.

### Quick & Easy to Use

Atmos Cover ADC can be applied effectively by a single trained employee; simple daily setup and no clean-up is required

### Apply in All Temperatures

Improves site operations even under the harshest, cold weather conditions. Withstands snow, moderate rainfall, extreme temperatures, and wind.

## Atmos Cover performs as a soil equivalent cover



**CONTROL FOUL ODORS**  
Atmos Cover ADC forms a complete barrier to odors. The foam forms an impenetrable barrier around the working face .



**CONTROL BLOWING LITTER**  
Atmos Cover ADC is holds down the waste to prevent blowing trash.



**CONTROL FIRE HAZARDS**  
Atmos Cover ADC is non-combustible. Sites often write it into their fire prevention plan. Our combustibility testing is available upon request.



**CONTROL DISEASE VECTORS**  
Atmos Cover ADC forms a barrier that prevents odors or visual attraction. Vectors will not land on, peck at or move into the foam covered area.

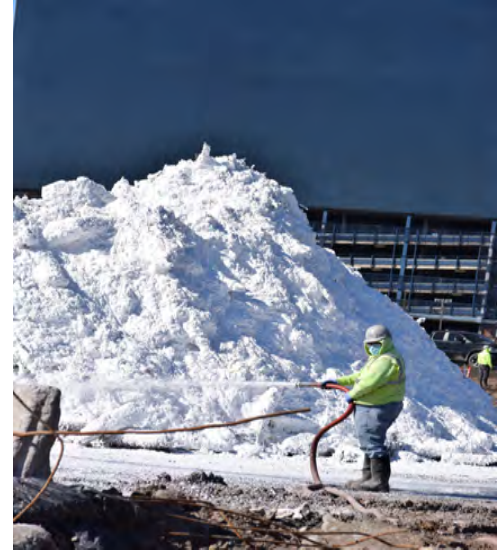


**CONTROL SCAVENGERS**  
Atmos Cover ADC prevents scavengers' sight or smell of the trash

## Atmos Shield 645

### The Odor Control Foam

Atmos Shield 645 foam concentrate produces a thick, long lasting foam barrier for immediate suppression of dust, odors, and volatile organic compounds (VOCs). Atmos Shield 645 provides superior emissions control for a period of up to 24 hours. It has been specified for use at Superfund and other hazardous waste sites across the United States and Canada. The product is designed for use exclusively in Atmos Technologies' Pneumatic Foam Units.



### Features

- Zero PFOS / PFAS
- Biodegradable
- Non-Hazardous
- Non-Reactive
- Use at any ambient temperature

### Benefits

- Immediate setup & control of VOCs
- Requires only water dilution
- Vary duration with dilution level
- No clean-up
- Will not add to soil volume

### Applications

Primary applications for Atmos Shield 645 is for control of odors, VOCs, and dust during active excavation and for overnight coverage of contaminated soils at hazardous waste sites. Wintergreen or vanilla can be added to customize the scent.

The product can also be applied on liquid surfaces, such as lagoons and retention ponds.



# SAFETY DATA SHEET

## SOIL EQUIVALENT FOAM AC-667 SE

### Section 1. Identification

**GHS product identifier** : SOIL EQUIVALENT FOAM AC667SE  
**Chemical name** : Proprietary Surfactant.  
**Other means of identification** : Aqueous anionic surfactant mixture.  
**Product type** : Liquid.

Relevant identified uses of the substance or mixture and uses advised against

**Product use** : Aqueous Surfactant. Spray application for VOC and Odor control.  
**Area of application** : Industrial applications.

**Supplier/Manufacturer** : Atmos Technologies, Inc.  
 17 Campus Blvd., Suite 100  
 Newtown Square, PA 19073  
 Phone: 1-800-733-3626 or  
 610-436-4314

**E-mail** : info@atmos-technologies.com  
 Website: www.atmos-technologies.com

**Emergency telephone number (with hours of operation)** : CHEMTREC 800 424 9300

### Section 2. Hazards identification

**OSHA/HCS status** : While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this SDS contains valuable information critical to the safe handling and proper use of the product. This SDS should be retained and available for employees and other users of this product.

**Classification of the substance or mixture** : Not classified.

GHS label elements

**Signal word** : No signal word.  
**Hazard statements** : No known significant effects or critical hazards.

Precautionary statements

**Prevention** : Not applicable.  
**Response** : Not applicable.  
**Storage** : Not applicable.  
**Disposal** : Not applicable.

**Hazards not otherwise classified** : None known.

## Section 3. Composition/information on ingredients

**Substance/mixture** : Substance  
**Chemical name** : Proprietary Surfactant.  
**Other means of identification** : Aqueous anionic surfactant mixture.

### CAS number/other identifiers

**CAS number** : Not available.  
**Product code** : Not available.

Ingredient name	Other names	%	CAS number
Proprietary Surfactant.	-	100	-

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

**There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health and hence require reporting in this section.**

## Section 4. First aid measures

### Description of necessary first aid measures

**Eye contact** : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Get medical attention if irritation occurs.

**Inhalation** : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if symptoms occur.

**Skin contact** : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur.

**Ingestion** : Wash out mouth with water. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. Get medical attention if symptoms occur.

### Most important symptoms/effects, acute and delayed

#### Potential acute health effects

**Eye contact** : No known significant effects or critical hazards.  
**Inhalation** : No known significant effects or critical hazards.  
**Skin contact** : No known significant effects or critical hazards.  
**Ingestion** : No known significant effects or critical hazards.

#### Over-exposure signs/symptoms

**Eye contact** : No specific data.  
**Inhalation** : No specific data.  
**Skin contact** : No specific data.  
**Ingestion** : No specific data.

### Indication of immediate medical attention and special treatment needed, if necessary

**Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.  
**Specific treatments** : No specific treatment.

## Section 4. First aid measures

**Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training.

See toxicological information (Section 11)

## Section 5. Fire-fighting measures

### Extinguishing media

**Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.

**Unsuitable extinguishing media** : None known.

**Specific hazards arising from the chemical** : In a fire or if heated, a pressure increase will occur and the container may burst.

**Hazardous thermal decomposition products** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide  
sulfur oxides

**Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

**Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

### Personal precautions, protective equipment and emergency procedures

**For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Put on appropriate personal protective equipment.

**For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

**Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

### Methods and materials for containment and cleaning up

**Small spill** : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.



## Section 6. Accidental release measures

- Large spill** : Stop leak if without risk. Move containers from spill area. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

### Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8).
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

## Section 8. Exposure controls/personal protection

### Control parameters

#### Occupational exposure limits

None.

- Appropriate engineering controls** : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

### Individual protection measures

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

#### Skin protection

## Section 8. Exposure controls/personal protection

- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

## Section 9. Physical and chemical properties

### Appearance

- Physical state** : Liquid. [Clear viscous liquid.]
- Color** : Translucent. White.
- Odor** : Odorless.
- Odor threshold** : Not available.
- pH** : Not available.
- Melting point** : Not available.
- Boiling point** : 99°C (210.2°F)
- Flash point** : Not applicable.
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : Not applicable.
- Lower and upper explosive (flammable) limits** : Not available.
- Vapor pressure** : 3.3 kPa (25 mm Hg) [room temperature]
- Vapor density** : Not available.
- Relative density** : 1.01 to 1.06
- Solubility** : Easily soluble in the following materials: cold water and hot water.
- Solubility in water** : Easily soluble.
- Partition coefficient: n-octanol/water** : Not available.
- Auto-ignition temperature** : Not available.
- Decomposition temperature** : Not available.
- SADT** : Not available.
- Viscosity** : Not available.

## Section 10. Stability and reactivity

<b>Reactivity</b>	: No specific test data related to reactivity available for this product or its ingredients.
<b>Chemical stability</b>	: The product is stable.
<b>Possibility of hazardous reactions</b>	: Under normal conditions of storage and use, hazardous reactions will not occur. Under normal conditions of storage and use, hazardous polymerization will not occur.
<b>Conditions to avoid</b>	: Keep away from heat.
<b>Incompatible materials</b>	: No specific data.
<b>Hazardous decomposition products</b>	: Low levels of sulfur oxides on exposure to high temperatures (concentrate).

## Section 11. Toxicological information

### Information on toxicological effects

#### Acute toxicity

Not available.

**Conclusion/Summary** : Not expected.

#### Irritation/Corrosion

Not available.

#### Sensitization

Not available.

#### Mutagenicity

**Conclusion/Summary** : Not available.

#### Carcinogenicity

**Conclusion/Summary** : Not available.

#### Reproductive toxicity

**Conclusion/Summary** : Not available.

#### Teratogenicity

**Conclusion/Summary** : Not available.

#### Specific target organ toxicity (single exposure)

Not available.

#### Specific target organ toxicity (repeated exposure)

Not available.

#### Aspiration hazard

Not available.

**Information on the likely routes of exposure** : Not available.

## Section 11. Toxicological information

### Potential acute health effects

<b>Eye contact</b>	: No known significant effects or critical hazards.
<b>Inhalation</b>	: No known significant effects or critical hazards.
<b>Skin contact</b>	: No known significant effects or critical hazards.
<b>Ingestion</b>	: No known significant effects or critical hazards.

### Symptoms related to the physical, chemical and toxicological characteristics

<b>Eye contact</b>	: No specific data.
<b>Inhalation</b>	: No specific data.
<b>Skin contact</b>	: No specific data.
<b>Ingestion</b>	: No specific data.

### Delayed and immediate effects and also chronic effects from short and long term exposure

#### Short term exposure

<b>Potential immediate effects</b>	: Not available.
<b>Potential delayed effects</b>	: Not available.

#### Long term exposure

<b>Potential immediate effects</b>	: Not available.
<b>Potential delayed effects</b>	: Not available.

### Potential chronic health effects

Not available.

<b>General</b>	: No known significant effects or critical hazards.
<b>Carcinogenicity</b>	: No known significant effects or critical hazards.
<b>Mutagenicity</b>	: No known significant effects or critical hazards.
<b>Teratogenicity</b>	: No known significant effects or critical hazards.
<b>Developmental effects</b>	: No known significant effects or critical hazards.
<b>Fertility effects</b>	: No known significant effects or critical hazards.

### Numerical measures of toxicity

#### Acute toxicity estimates

Not available.

## Section 12. Ecological information

### Toxicity

Not available.

### Persistence and degradability

Not available.

## Section 12. Ecological information

### Bioaccumulative potential

Not available.

### Mobility in soil

**Soil/water partition coefficient (K<sub>oc</sub>)** : Not available.

**Other adverse effects** : No known significant effects or critical hazards.

## Section 13. Disposal considerations

**Disposal methods** : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be rinsed and recycled. If recycling is not an option, dispose of waste containers according to local regulations. Empty containers or liners may retain some product residues, which should be rinsed before disposal. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Section 14. Transport information

	<b>DOT Classification</b>	<b>IMDG</b>	<b>IATA</b>
<b>UN number</b>	Not regulated.	Not regulated.	Not regulated.
<b>UN proper shipping name</b>	-	-	-
<b>Transport hazard class(es)</b>	-	-	-
<b>Packing group</b>	-	-	-
<b>Environmental hazards</b>	No.	No.	No.
<b>Additional information</b>	-	-	-

**Special precautions for user** : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

**Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code** : Not available.

## Section 15. Regulatory information

**U.S. Federal regulations** : **United States inventory (TSCA 8b)**: Not determined.

**Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)** : Not listed

**Clean Air Act Section 602 Class I Substances** : Not listed

**Clean Air Act Section 602 Class II Substances** : Not listed

**DEA List I Chemicals (Precursor Chemicals)** : Not listed

**DEA List II Chemicals (Essential Chemicals)** : Not listed

### SARA 302/304

#### Composition/information on ingredients

No products were found.

**SARA 304 RQ** : Not applicable.

### SARA 311/312

**Classification** : Not applicable.

#### Composition/information on ingredients

No products were found.

### SARA 313

Not applicable.

### State regulations

**Massachusetts** : This material is not listed.

**New York** : This material is not listed.

**New Jersey** : This material is not listed.

**Pennsylvania** : This material is not listed.

### California Prop. 65

None of the components are listed.

### Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

### Montreal Protocol (Annexes A, B, C, E)

Not listed.

### Stockholm Convention on Persistent Organic Pollutants

Not listed.

### Rotterdam Convention on Prior Inform Consent (PIC)

Not listed.

### UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

## Section 16. Other information

### Hazardous Material Information System (U.S.A.)

Health	0
Flammability	0
Physical hazards	0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on SDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

### National Fire Protection Association (U.S.A.)



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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

### Procedure used to derive the classification

Classification	Justification
Not classified.	

### History

- Date of issue/Date of revision** : 11/23/2020
- Date of previous issue** : No previous validation
- Version** : 1
- Prepared by** : IHS
- Key to abbreviations** :
  - ATE = Acute Toxicity Estimate
  - BCF = Bioconcentration Factor
  - GHS = Globally Harmonized System of Classification and Labelling of Chemicals
  - IATA = International Air Transport Association
  - IBC = Intermediate Bulk Container
  - IMDG = International Maritime Dangerous Goods
  - LogPow = logarithm of the octanol/water partition coefficient
  - MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
  - UN = United Nations

## Section 16. Other information

**References** : HCS (U.S.A.)- Hazard Communication Standard  
International transport regulations

✔ Indicates information that has changed from previously issued version.

### Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



## PNEUMATIC FOAM UNIT 400/25

Atmos Technologies completely self-contained and portable foam generating system designed to withstand the rugged demands and harsh elements found at remediation sites. Quick start-up time means that emission control is available when you need it. Recommended for small to medium size remediation projects, dredging operations and hazardous waste sites.



Can be towed around site with a pick-up truck. Foam is applied using a hand-line.

System includes air compressor, pump, hoses, nozzles, solution storage tank and proprietary foam generating technology. Unit has freeze protection for outdoor storage year-round.

### Features

- Simple to operate
- No clean-up necessary
- Durable, rugged construction
- Can be filled and placed aside until needed

### Specifications

- Solution Storage Tank.....400 Gallons
- Coverage Rate.....270 Sq. Ft./Min. @3" depth
- Coverage Area per fill.....2,000 - 6,000 Sq. Ft.
- Size.....16'8" L x 8'6" W x 7'8" H
- Dry Weight.....6,880 Pounds
- Hose.....200 Feet of 1-1/2" Diameter
- Products.....All Long Duration and Soil Equivalent Foam Products
- Freeze Protection System.....120V or 230V, 30 amp, single phase



## Performance Advantages

Bio-Key 880I combines Bektra's newest odor inhibiting technologies in a formula maximizing at source neutralization and long term effectiveness.

### COMMON AREA OF USE:

- Grit and screenings
- Settling ponds
- Dewatered sludge
- Leachate



The information presented in this technical data sheet is believed to be reliable. This information is provided as representative only and there are no warranties, expressed or implied, regarding its performance. Since neither distributor nor manufacturer has any control over handling, storage, use and application conditions, they are not responsible for any claims, liabilities, damages, costs or expenses of any kind arising out of or in any way connected with the handling, storage or use of the product described.

## BIO-KEY 880I Water Mint Injectable Odor Neutralizer

Bio-Key 880I is an injectable odor neutralizing concentrate that actively neutralizes existing offensive odors and contains natural bio-stimulants and probiotics to deactivate odor producing mechanisms. The patented, non-aldehyde, odor elimination technology has been optimized for reducing amines, terpenes and thiols for a broad range of wastewater applications from grit and screening and wastewater settling ponds to biosolids.

### SPECIFICATIONS:

**Appearance:** Thin brown liquid, some settling may occur

**Odor:** Slight with product specific key notes

**Flash Point (CC):** Not applicable

**Freezing Point (°C):** 0°C / 32°F

### DIRECTION FOR USE:

Bio-Key 880I is injected directly into the wastewater or sludge. Recommended at 10 - 60 ppm for wastewater, 20 - 100 ppm for dewatered sludge.

### PACKAGING:

BKT880I-0020	20L	(5.3 gal pail)	22kg.	(48 lbs.)
BKT880I-0200	200L	(53 gal drums)	216kg.	(476 lbs.)
BKT880I-1000	1000L	(264 gal tote)	1076kg.	(2370 lbs.)

### STORAGE & HANDLING:

Keep out of reach of children. Product is intended for industrial use only. Keep container closed when not in use. Wear protective goggles and gloves when transferring or handling product. Protect from freezing. Do not store in areas of high temperature or direct sunlight.



# SAFETY DATA SHEET

Bio-Key Injection Blend Odor Control

## 1. Identification

### 1.1 Product identifier

Product Name Bio-Key Injection Blend Odor Control, all varieties

Product Code BKI 880 Water Mint

### 1.2 Recommended use of the chemical and restrictions on use

Recommended for: Wastewater Odor Control

Not recommended: In food areas of food processing facilities

### 1.3 Details of the supplier of the safety data sheet

Manufacturer Bektra Corp  
220 Bayview Drive, Unit 7  
Barrie, ON L4N 4Y8

Information 705-734-2422

24 Hour Emergency Telephone Number CANUTEC 613-996-6666

## 2. Hazard Identification

Classification of the substance or mixture

Health hazards Skin Irrit. 4 - H315 Eye Irrit. 4 - H320

Label elements

Signal word Warning

Hazard statements H316+H320 Causes mild skin and eye irritation.

Precautionary statements P233 Keep container tightly closed.  
P264 Wash hands thoroughly after handling.  
P265 Do not touch eyes.  
P280 Wear protective gloves/eye protection.  
P302+P352 IF ON SKIN: Wash with plenty of water.  
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes.  
Remove contact lenses if present and easy to do - continue rinsing.  
P403+P235 Store in a well-ventilated place. Keep cool.  
P501 Dispose of contents/ container in accordance with local regulations.

Other hazards: This product does not contain any substances classified as PBT or vPvB.

# SAFETY DATA SHEET

Bio-Key Injection Blend Odor Control

### 3. Composition/information on ingredients

Mixtures

Chemical Name	CAS number	Concentration (% w/w)
Plant extracts	N/A	10-30 %
Alcohols, C11-14-Iso-, C13-Rich, Ethoxylated	78330-21-9	<1 %
2,4-Hexadienoic Acid, Potassium Salt	590-00-1	<1%

The specific chemical identities of some ingredients in this mixture are considered to be trade secrets and are withheld in accordance with the provisions of 1910.1200 of the Code of Federal Regulations.

### 4. First-aid measures

Description of first aid measures

General information	Get medical attention if any discomfort continues. Show this Safety Data Sheet to medical personnel.
Inhalation	Provide fresh air. Call a physician if symptoms develop or persist.
Ingestion	Rinse mouth thoroughly with water. Give a few small glasses of water or milk to drink. Do not induce vomiting unless under the direction of medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs.
Skin contact	Wash skin thoroughly with soap and water. If skin irritation occurs: get medical advice/attention. Take off contaminated clothing and wash before reuse.
Eye contact	Rinse with water. Remove contact lenses if present and easy to do so. Continue rinsing for at least 15 minutes. Consult an ophthalmologist if necessary.
Protection of first aiders	No special measures required.
Most important symptoms and effects, both acute and delayed	There are no known typical symptoms or effects.

### 5. Fire-fighting measures

5.1 Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2). No special requirements
5.2 Special risks of the material/mixture	No special risks
5.3 Information about fire fighting	The extinguishing agent should be chosen according to the primary cause of fire. No unusual fire or explosion hazards noted.

### 6. Accidental release measures

6.1 Personal precautions, protective equipment	Keep unnecessary personnel away. Wear appropriate protective equipment and clothing during clean-up. For personal protection, see section 8 of the SDS
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# SAFETY DATA SHEET

## Bio-Key Injection Blend Odor Control

and emergency procedures	
6.2 Measures for environmental protection	Avoid release to the environment. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains or water courses. Rinsing spills into municipal wastewater treatment systems is appropriate.
6.3 Procedure to stop spillage and measures for cleaning	Never return spills to original containers for re-use. Large spills: stop the flow of material, if this is without risk. Dike the spilled material where possible. Absorb in vermiculite, dry sand or earth and place into containers if rinsing into municipal wastewater treatment systems is not possible.

### 7. Handling and storage

7.1 Notes for safe handling	Do not taste or swallow. Avoid contact with the skin, eyes, and clothing. Wear adequate personal protection and observe good industrial hygiene practices. When using, do not eat, drink, or smoke. Wash hands thoroughly after handling. Avoid release to the environment.
7.2 Notes for safe storage	Keep container closed between uses and protected from extremes in heat and cold.
7.3 Specific end use	No specific instructions

### 8. Exposure Controls/personal protection

- 8.1 Parameters to be controlled: no exposure limits noted for ingredients.
- 8.2 Limitation and controlling of the exposition

Personal Protective equipment



Respiratory protection	No specific recommendations.
Eye/face protection	Wear safety glasses with side shields to protect against eye contact.
Hand protection	Wear suitable protective gloves in order to minimize skin contact.
Other skin and body protection	Wear appropriate clothing to prevent repeated or prolonged skin contact.
Hygiene measures	Wash hands thoroughly after handling. Wash at the end of each work shift and before eating, smoking and using the toilet. Do not eat, drink or smoke when using this product.

### 9. Physical and Chemical Properties

Information on basic physical and chemical properties

# SAFETY DATA SHEET

## Bio-Key Injection Blend Odor Control

Appearance	Water-thin liquid
Color	brown
Odor	Characteristic
Odor threshold	No information available
pH	4-5
Melting point	Not applicable
Initial boiling point and range	212F (100C)
Flash point	>201F (>93 C) closed cup
Evaporation rate	Not applicable
Flammability (solid, gas)	Not applicable
Upper/lower flammability or explosive limits	No information available.
Vapor pressure	No information available.
Vapor density	Not applicable
Specific Gravity @25C	~1.01
Solubility(ies)	Complete in water
Partition coefficient	No information available
Auto-ignition temperature	No information available
Decomposition Temperature	No information available

### 10. Stability and Reactivity

Reactivity	This product is non-reactive under normal conditions of use, storage, and transport.
Stability	This product is stable under normal conditions of use, storage, and transport.
Possibility of hazardous reactions	When handled and stored as directed, no dangerous reactions occur
Conditions to avoid	Protect from freezing and excessive heat. Do not dilute prior to use.
Materials to avoid	Strong oxidizing agents.
Hazardous decomposition products	Does not decompose when used and stored as recommended. Thermal decomposition or combustion products may include the following substances: sulfur dioxide and oxides of sulfur

# SAFETY DATA SHEET

Bio-Key Injection Blend Odor Control

## 11. Toxicological Information

Information on likely routes of exposure:

Inhalation	No adverse effects due to inhalation are expected
Skin contact	May cause skin irritation
Eye contact	May cause eye irritation
Ingestion	May be irritating, cause indigestion and diarrhea if swallowed. Expected to be a low ingestion hazard.

Information on toxicological effects:

Skin corrosion/irritation	May cause skin irritation
Serious eye damage/eye irritation	May cause eye irritation

Respiratory or skin sensitization:

Respiratory sensitization	Not available
Skin sensitization	Not expected to cause skin sensitization
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic
Carcinogenicity	This product is not considered to be a carcinogen by IARC,ACGIH, NTP, or OSHA.
Reproductive Toxicity	Not applicable
Specific target organ toxicity – single exposure	Not applicable
Specific target organ toxicity – repeated exposure	Not applicable
Aspiration hazard	Not applicable

## 12. Ecological Information

Ecotoxicity	Not applicable
Persistence and degradability	Readily biodegradable
Bioaccumulative potential	Not applicable
Partition coefficient	No information available.
Mobility in soil	No data available
Other adverse effects	None known.

## 13. Disposal considerations

General information

Disposal methods	Dispose of contents/container in accordance with local/regional/national/international regulations. Triple rinse empty containers and take them to an approved waste handling site for recycling or disposal.
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# SAFETY DATA SHEET

Bio-Key Injection Blend Odor Control

14. Transport information	
UN Number	Not regulated
Proper UN shipping name	Not regulated
Transport hazard classes	Not regulated
Packing group	Not regulated
Environmental Hazards	Not relevant

## 15. Regulatory information

This product is not hazardous as defined by the OSHA Hazard Communication Standard 29 CFR 1910.1200

Canada – DSL/NDSL: All the ingredients are listed or exempt.

US – All ingredients are listed on the Toxic Substances Control Act (TSCA) Inventory

## 16. Other information

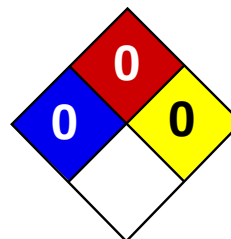
Revision comments            SDS Review

Revision date                2023-04-07

Revision                        1

This information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is, to the best of the company's knowledge and belief, accurate and reliable as of the date indicated. However, no warranty, guarantee or representation is made to its accuracy, reliability or completeness. It is the user's responsibility to satisfy themselves as to the suitability of such information for their own particular use.





Health	0
Fire	0
Reactivity	0
Personal Protection	B

## Safety Data Sheet

### Iodine Powder, 0.00005 - 0.00025N SDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** CupriDyne® Clean  
Powder Iodine Chemistry

**Contact Information:**

**Odor No More, Inc.**  
14921 Chestnut St.  
Westminster, CA 92683  
US Sales: **1-949-643-9540**  
International Sales: **1-949-643-9540**  
Order Online: [info@odornomore.com](mailto:info@odornomore.com)

**CAS#:** See Section 3

**RTECS:** Not applicable.

**TSCA:** TSCA 8(b) inventory: Potassium Iodide  
Copper Sulfate, Sulfamic Acid

**CI#:** Not applicable.

**Synonym:** Free Iodine Powsr

**Chemical Name:** Not applicable.

**Chemical Formula:** Not applicable.

**24HR Emergency Telephone, call:**

1-949-295-3622

**For non-emergency assistance, call:** 1-949-643-9540

#### Section 2: Hazards Identification

**Potential Acute Health Effects: Dilute**

Non-hazardous in case of skin contact, of eye contact, of ingestion, of inhalation.

**Potential Chronic Health Effects: Dilute**

Non-hazardous in case of skin contact, of eye contact, of ingestion, of inhalation. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not Available

#### Section 3: Composition and Information on Ingredients

**Composition:**

<u>Ingredient</u>	<u>CAS#</u>	<u>Percent</u>	<u>Hazardous</u>
Copper Sulfate	7758-99-8	<31%	No
Potassium Iodide	7681-11-0	<47%	No
Inert Proprietary Ingredients		<23%	No

**Toxicological Data on Ingredients:** Iodine: ORAL (LD50): Acute: 14000 mg/kg [Rat]

#### Section 4: First Aid Measures

**Eye Contact:** Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used.

**Skin Contact:**

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention.

**Serious Skin Contact:** Not available.

**Inhalation:** Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

#### Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

#### Section 6: Accidental Release Measures

**Small Spill:**

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Absorb with an inert material and put the spilled material in an appropriate waste disposal. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

### Section 7: Handling and Storage

**Precautions:**

Do not breathe excess gas/fumes/ vapour/spray. Avoid contact with skin. Wear suitable protective clothing. If you feel unwell, seek medical attention and show the label when possible.

**Storage:**

No specific storage is required. Use shelves or cabinets sturdy enough to bear the weight of the chemicals. Be sure that it is not necessary to strain to reach materials, and that shelves are not overloaded.

### Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

**Personal Protection:** Safety glasses. Lab coat. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

Iodine CEIL: 0.1 (ppm) from ACGIH (TLV) CEIL: 1 (mg/m<sup>3</sup>) from OSHA Consult local authorities for acceptable exposure limits.

### Section 9: Physical and Chemical Properties

**Physical state and appearance:** White and blue powders.

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** Not applicable.

**Color:** White and Blue

**pH (1% soln/water):** Not Applicable

**Boiling Point:** The lowest known value is 100°C (212°F) (Water).

**Melting Point:** Not available.

**Critical Temperature:** Not available.

**Specific Gravity:** Weighted average: Not Applicable

**Vapor Pressure:** The highest known value is 17.535 mm of Hg (@ 20°C) (Water).

**Vapor Density:** The highest known value is 0.62 (Air = 1) (Water).

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, methanol, diethyl ether, acetone.

**Solubility:**

Easily soluble in cold water, hot water. Soluble in diethyl ether. Partially soluble in methanol, acetone.

### Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Slightly reactive to reactive with oxidizing agents, combustible materials, organic materials, metals, acids.

**Corrosivity:**

Slightly corrosive to corrosive in presence of aluminum, of zinc, of copper. Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not Available

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

### Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available. LC50: Not available.

**Chronic Effects on Humans:**

DEVELOPMENTAL TOXICITY: Not Available

**Other Toxic Effects on Humans:** Non-hazardous in case of skin contact, of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not Available

### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

Possibly hazardous degradation products are not likely.

**Toxicity of the Products of Biodegradation:** Not available.

**Special Remarks on the Products of Biodegradation:** Not available.

### Section 13: Disposal Considerations

**Waste Disposal:**

**Section 14: Transport Information**

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**DOT Classification:** Not a DOT controlled material (United States).**Identification:** Not applicable.**Special Provisions for Transport:** Not applicable.**Section 15: Other Regulatory Information****Federal and State Regulations:**

Pennsylvania RTK: Iodine;

Massachusetts RTK: Iodine, TSCA 8(b) inventory: Iodine; Water

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).**Other Classifications:****WHMIS (Canada):****DSCL (EEC):**

This product is not classified according to the EU regulations.

**HMIS (U.S.A.):** No Significant Health Risk.**Health Hazard:** 0**Fire Hazard:** 0**Reactivity:** 0**Personal Protection:** b**National Fire Protection Association (U.S.A.):****Health:** 0**Flammability:** 0**Reactivity:** 0**Specific hazard:** 0**Protective Equipment:**

Gloves. Lab coat. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

**Section 16: Other Information****References:** Not available.**Other Special Considerations:** Not available.**Created:** 05/28/2015 4:00 AM**Disclaimer:**

**Odor No More, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose.**

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EFFECTIVE COVERAGE  
FOR ALL FLUIDS

PROVEN TECHNOLOGY SINCE 2004

Certified for use with  
potable water according  
(AS/NZS 4020:2018)



The unique and patented Hexa-Cover® Floating Cover is perfect on almost any form of fluid surface and is the ideal solution for controlling such things as:

- *Odor*
- *Emission*
- *Heat loss*
- *UV effect*
- *Evaporation*
- *Organic growth*

Further, the Hexa-Cover® Floating Cover deters unwanted waterfowls from landing on covered waters (what significantly reduces sedimentation, risk of E. coli).

Since its launch in 2004, Hexa-Cover® Floating Cover has been chosen for a vast number of installations globally, making the Hexa-Cover® Floating Cover the market leading solution.

Today Hexa-Cover® Floating Cover is used on almost all forms of basins, lagoons, reservoirs, containers, ponds and tanks.

Hexa-Cover®:

- Is the solid, robust and long lasting solution
- Has no weak spots, no blow- / injection holes
- Has no hollow areas (that eventually will break)
- Withstand rain, snow and frost
- Has no openings (that eventually will clog due to sand, debris, algae etc.)

Tested by DLG, Testzentrum, Germany



The applications are many and include among others:

Water:

- Wastewater
- Raw - / drinking water
- Cooling- and processwater
- Recovery water
- Irrigation water
- Tailings Ponds
- ILS, PLS, Refino

Industry:

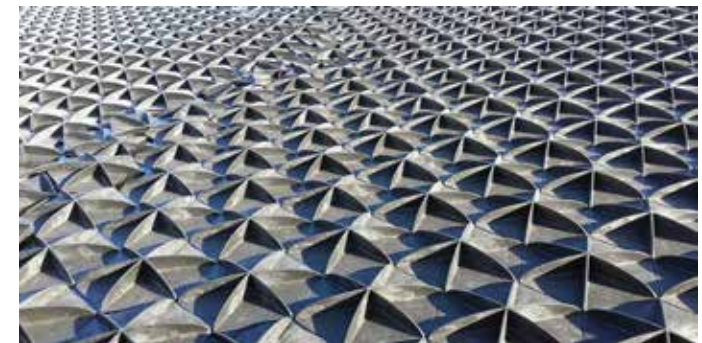
- Leachate
- Decoction
- Chemicals

Oil & Gas:

- Spill-over tanks
- Emergency tanks
- Frac Water tanks
- Boil Feed Water

Agriculture:

- Storage tanks at i.e. Biogas Plants
- Manure and slurry tanks, lagoons etc.



Effective coverage for all fluids





Hexa-Cover® Floating Cover ensures;

- Up to 99% coverage of the surface area
- Up to 95% reduction of evaporation
- Up to 96% reduction of emission
- Up to 96% reduction of odor
- Noticeable reduction in organic growth
- Heat loss / heatflux reduced by 74%)



Hexa-Cover® Floating Cover is manufactured of recycled Polypropylene and is the solid and robust solution offering a long lifespan free of maintenance, service and repair.

Hexa-Cover® has no inside water as this *creates risks for cracks meaning the inside water will escape the elements and enter into the covered fluid, this can potentially pollute / change the balance of the covered fluid.*

Hexa-Cover® Floating Cover - Features & Benefits:

- Ease of installation
- Installation in both full and empty tank
- Automatic distribution on the fluid surface
- Automatic adaption to changes in the level
- Fits to all shapes and geometries
- Easy adaption to changes in surface area
- Unlimited access to the liquid
- Favorable cost
- No running cost
- No repair cost
- No maintenance cost
- Needs no supervision
- Unaffected by rain, snow and frost
- Allows use of aeration
- Favourable price
- 10 years warranty
- 25 years expected lifetime



Hexa-Cover® Floating Cover - in two sizes:

Hexa-Cover® Floating Cover R90

Diagonal measure	18,0 cm
Height	5,0 cm
Weight	0,120 kg
Weight per m2	5,2 kg
Pcs per m2	43
Big Bag	1,0 x 1,3 x 2,5 m
Surface area	50 m2
Weight	265 kg



Hexa-Cover® Floating Cover R114

Diagonal measure	22,8 cm
Height	7,0 cm
Weight	0,243 kg
Weight per m2	6,8 kg
Pcs per per m2	28
Big Bag	1,0 x 1,3 x 2,5 m
Surface area	40 m2
Weight	275 kg

Effective coverage for all fluids







Hexa-Cover<sup>®</sup>  
Big Bag delivery and installation:



Hexa-Cover<sup>®</sup>  
Big Bag delivery and installation:



Hexa-Cover<sup>®</sup>  
Also installation in empty tank (max 5m drop)



Hexa-Cover<sup>®</sup>  
BULK delivery and installation:



Hexa-Cover<sup>®</sup>  
BULK delivery and installation:

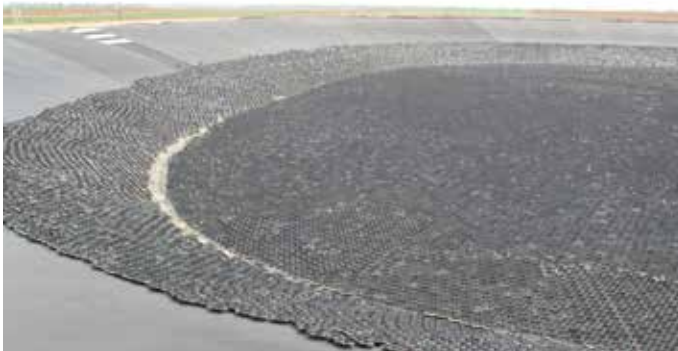


Hexa-Cover<sup>®</sup>  
Automatic adaption to changes in the level



Effective coverage for all fluids





### For more information

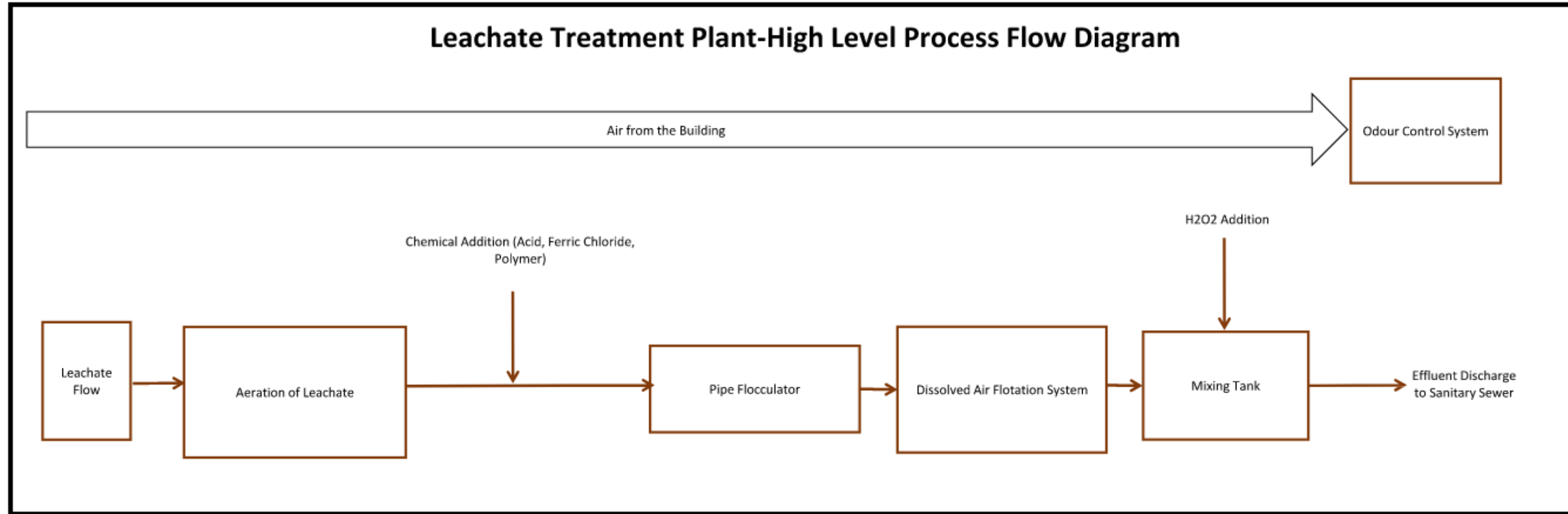
Hexa-Cover A/S • Vilhelmsborgvej 5 • DK-7700 Thisted • TEL +45 96 17 78 00  
[www.hexa-cover.com](http://www.hexa-cover.com) • [info@hexa-cover.dk](mailto:info@hexa-cover.dk)

Effective coverage for all fluids



# **Attachment 4**

**Draft Process Flow Diagram for Long-Term Leachate Treatment System**



*Process Flow Diagram for Long Term Leachate Treatment Process*

455 Phillip Street, Unit 100A Waterloo, Ontario N2L 3X2  
Canada  
ghd.com

Our ref: 11103232

October 13, 2023

Tamara Posadowski  
Ministry of the Environment, Conservation and Parks  
Hamilton District Office  
119 King St W  
Hamilton, ON L8P 4Y7

**Response to MECP Information Request Following Review of Odour Mitigation Letter (GHD, September 21, 2023)**

Dear, Tamara Posadowski,

This letter has been prepared in response to an additional information request received from the MECP regarding odour mitigation measures being implemented at the GFL Stoney Creek Regional Facility. This letter provides responses to the follow-up questions that were submitted via email on October 5, 2023. To facilitate your review, the MECP's questions/comments have also been included below in *italics*.

***Mitigation Measures***

1. *Provide an update on the use of the foam surfactant.*
  - a. *What procedures are in place for application?*

The foam concentrate is stored on-Site in totes. Prior to application, the foam concentrate is mixed with water in a storage tank on a tow-behind pneumatic foam unit (PFU). The PFU is towed to areas of the Site where the foam will be applied. The foam is applied manually using a hose and nozzle.
  - b. *How are specific areas being prioritized?*

Foam is applied directly to the areas with exposed leachate: the leachate collection blanket in the north of the active cell and the leachate lagoon in the west landfill. Foam is applied until all exposed leachate has been covered.
  - c. *Does GFL anticipate it will be able to maintain foam coverage on the exposed leachate and treated leachate pond? If not, why?*

GFL has been able to maintain foam coverage of the exposed leachate. However, the foam dissipates quickly necessitating daily re-application.
  - d. *How will GFL assess the efficacy of this mitigation measure? Assessing the volume of complaints over a short period of time may not provide useful information.*

The efficacy of the foam is routinely monitored by on-site staff as part of daily operations and maintenance activities. Odours are assessed both before and after application of the foam to determine whether adequate mitigation has been achieved.
2. *Feedback provided by GFL to-date indicates limited success with the use of the foam surfactant to mitigate odours. What is the contingency plan or next steps to mitigate odour emissions?*

Leachate is currently being treated at the Interim Leachate Pumping Station (ILPS) through the addition of ferric chloride and aeration prior to being discharged to the leachate lagoon. A dosing port



has also been added to the outlet of the ILPS to add hydrogen peroxide to further treat the leachate. GFL is also preparing to add hydrogen peroxide to the Permanent Leachate Pumping Station to treat the leachate in-situ prior to being pumped to the ILPS.

3. *There are very strong odour emissions coming from the biofilter and these odours are being detected off-site.*
  - a. *How is GFL / GHD monitoring and assessing the effectiveness of this unit?*

The effectiveness of the biofilter is being monitored daily by on-site staff. Hydrogen sulphide readings are being measured using a handheld unit.
  - b. *Is it a feasible solution based on GFL / GHDs assessment of its performance to-date?*

The biofilter has shown some success in mitigating odours, however it is not an effective long-term solution as it is not airtight and cannot adequately treat all of the air being recovered from the ILPS. When the odour load exceeds the capacity of the biofilter there is a possibility of odours escaping. Current chemical dosing levels are being adjusted and additional chemical dosing is being added at other locations to reduce the odour load and optimize system operation.
  - c. *Are other options being explored to address odours from this source?*

The use of a carbon air filtration unit is currently being explored to address odours from this source.
4. *By **November 15, 2023**, GFL shall conduct an odour assessment of the Stoney Creek site. At a minimum, this assessment should provide an odour emissions inventory that details each potential odour source at the site (i.e. exposed leachate, exhausts serving the leachate treatment system, leachate pond, etc.), the odour emission potential, and measures in place to control or minimize odours from each source. This exercise should include an assessment of the efficiency of any pollution control measures (i.e. determine the efficacy of the biofilter).*

An odour assessment will be conducted at the SCRF by November 15, 2023.

5. *GFL ceased the removal of raw leachate from the site via tanker truck as of September 22, 2023. Ministry staff had requested that GFL seek to increase the volume of trucks removing raw leachate from the site to speed up the draw down of leachate. Removal of leachate by tanker truck for treatment by a licenced receiver needs to commence again as soon as practicable.*
  - a. *What progress has been made to get the removal of raw leachate by tanker truck operational again?*

Additional samples of the raw leachate have been collected and provided to the receiver for further review and testing of hydrogen sulphide levels. Discussions are on-going with the receiving facility to recommend the removal of leachate by tanker truck.
  - b. *When does GFL anticipate that this process will recommence?*

Until loads can be shipped and received in a safe manner, GFL cannot commit to a commencement date.
  - c. *GHD indicates in their report that October 6 is the estimated date in which there will no longer be exposed (raw) leachate on-site. How is this estimate impacted given that the ~200,000 litres / day of raw leachate is no longer being removed by tanker truck?*

With no leachate being removed by tanker truck, the timeline for removing exposed leachate from the liner has been prolonged. With the continued disposal of leachate through the sanitary sewer and the placement of cover materials on the blanket, it is estimated that there will no longer be exposed leachate after October 20, 2023.

#### **Leachate Levels, Current Condition and Progress To-Date**

6. *Only quarterly data has been provided in regard to analytical results for raw leachate analysis. Has GFL / GHD conducted any additional analysis of the leachate?*
  - a. *If so, please provide this data to the MECF. City of Hamilton sewer by-law (No. 14-090) includes limits for contaminant discharges to the sanitary system. These limits include sulphide (expressed as H<sub>2</sub>S) and CBOD. Final effluent data provided does not include these parameters.*

Data collected in accordance with the sewer use agreement with the City of Hamilton for the period of February 2015 through November 2022 is provided as Attachment 1 for your reference. The sewer use by-law did not include sulphide until 2022 and so the data prior to 2022 does not include sulphide analysis. As this sampling is only required annually, there is currently only one result available for sulphide in the sewer discharge data. The sulphide concentration in this sample was 0.046 mg/L (November 2022). BOD results are also included in this dataset.

- b. *There does not appear to be any analytical data for H<sub>2</sub>S, sulphide expressed as H<sub>2</sub>S or ammonia. Only total sulphate (SO<sub>4</sub>) data is provided. Has there been no sulphur compound speciation or ammonia analysis?*

Raw leachate or sewer discharge samples were not historically submitted for analysis of sulphide. Sewer discharge samples have not historically been sampled for ammonia. In light of the current concerns regarding leachate-related odours, GFL has commenced sampling for sulphide and ammonia daily in both raw leachate and sewer discharge samples. It is GHD's opinion that this additional analytical data will help inform decisions concerning the source of odours and options for a suitable remedy.

- c. *If so, please provide this data.*

Refer to Attachment 1.

- d. *Sulphate concentrations measured in the raw leachate in June and Sept 2023 do not appear to be significantly different from Nov 2018 and Nov 2019. Please have your qualified consultant provide their professional opinion on why the 2018 and 2019 sulphate values are similar but there were no odour concerns at that time.*

The reason for the difference in odour concerns between 2018/2019 and 2023 is not known. The additional data collection referenced above is being undertaken for the purpose of diagnosing the source and determining options for a suitable remedy.

7. *What is the current volume of **total** leachate at the site?*

The total volume of leachate at the site is currently estimated to be 93,000,000 L.

- a. *How are leachate levels measured, and how often are measurements collected?*

Leachate levels are measured at the Permanent Leachate Pumping Station (PLPS) at the low point of the landfill as well as two leachate monitors located further upgradient in the landfill. Measurements are collected daily at the PLPS and the leachate monitors.

- b. *Is there continuous monitoring of leachate levels at this site?*

Leachate levels are not continuously monitored but are measured manually on a daily basis as noted above.

8. *Have a qualified third provide an acceptable leachate head for the landfill and discuss what measures will be implemented to maintain this level (redundant pumps within the pumping station, etc.).*

It is recommended to limit the level of standing leachate on the liner to 0.5 m at any one time to be consistent with the design and operating concept. Pumps are currently installed in both the PLPS and the ILPS, providing redundancy in the system. In addition to the daily monitoring of leachate levels, the application of final cover over a large portion of the exposed waste will significantly reduce leachate generation.

9. *Provide an estimate of how long it will take to reduce leachate levels to the target level identified in #8 above. This assessment should include several scenarios including:*

- a. *Calculation based on current pumping rates*

Based on the current pumping rate of 100 gpm it will take approximately 171-days of continuous discharge to the sanitary sewer to remove all leachate from the site.

- b. *Current pumping rates plus projected tanker truck removal volumes*

If the removal of leachate by tanker truck can be resumed at a rate of 200,000 L/day, then the timeline presented in a. above will be reduced to 126-days.

- c. *Projected pumping rates if the leachate system can achieve its previous pumping rate volumes (~255 GPM)*

If the pumping rate can be increased to 250 gpm it will take approximately 68-days of continuous discharge to the sanitary sewer to remove all leachate from the site.

10. *Provide MECP with weekly updates detailing the volume of leachate at the site, volume removed from the site over the week, and method and location of disposal.*

Weekly updates will be provided with the requested information every Thursday starting October 19, 2023.

11. *By **December 1, 2023**, have a qualified third party generate a leachate assessment report which includes, but is not limited to, the following:*

- a. *A table summarizing the annual leachate generation and actual volumes removed for the past 5 years. Also provide annual leachate head in the active face over past 5 years.*
- b. *A graphic / chart showing the annual leachate surplus / deficit and assess the cause for the leachate surplus for this period.*
- c. *A review of the predicted leachate generation for the site.*
- d. *A technical assessment to evaluate the leachate levels and their potential to:*
  - i. *Cause odours (i.e. at what level is it expected that there will be minimal odour generation due to leachate and more normal levels of TRS compounds)*
  - ii. *Cause leachate seeps*
  - iii. *Reduce the liner service life*
  - iv. *Cause impacts to groundwater due to increased leakage*
- e. *A plan that discusses how GFL will reduce the generation of leachate at the site moving forward (for example, increased final cover installation frequency, a revised fill sequencing plan, additional berms to separate clean stormwater from the active face, a revised landfill cover design, etc.). This plan will need to evaluate several options and their benefits, along with a discussion on the current vs proposed operations for each of the options.*

A Leachate Assessment Report is currently being prepared and will be submitted by December 1, 2023.

### **Leachate Treatment**

12. *Provide a chart / timeline detailing the dates and additional details pertaining to the changes that were made to the leachate treatment process.*

- a. *When did GFL switch to using ferric chloride for treating leachate?*

GFL switched to using ferric chloride on July 26, 2023.

- b. *What dosage rates have been used?*

Dosage rates have ranged from 11.39 mL/min to 68.33 mL/min. Rates were adjusted based on conditions such as pumping rate, pumping location, and odours.

- c. *What additional chemicals were used to treat raw leachate (i.e., ferric sulphate) and in what quantities? Was this effective?*

GFL used ferrous sulphate to "shock" the exposed leachate on the blanket in three to four areas using one full 1000 L tote in each area. Ferrous sulphate was added to the leachate collection blanket periodically between August 9, 2023 and September 15, 2023. The use of ferrous sulphate ceased after this date as it proved to not be effective at mitigating odours.



- d. *The report states that GFL continues to evaluate the effectiveness of the treatment and adjusts the chemical dosage rates to optimize treatment. What are the variables used to assess efficacy and evaluate effectiveness?*

Hydrogen sulphide concentrations and the presence of odours are the main variables used to optimize the leachate treatment system. These are measured at various locations including the leachate pumping source (before treatment), the ILPS (during treatment), and the leachate lagoon (post-treatment). Bench testing of the leachate also assesses the reaction time and hydrogen sulphide levels based on the chemical and dosage being added.

A timeline detailing changes that were made to the leachate treatment process has been provided as Attachment 2.

13. *The report states that the hydrogen peroxide that had been used for years suddenly stopped working. Have your qualified consultant provide their conclusions as to why this likely occurred and include details regarding any changes in leachate chemistry / characteristics at the GFL site.*

Based on analysis of the current and historical leachate chemistry there hasn't been a significant change in the characteristics. There also have not been any significant changes to the types of waste being received at the SCRF. Discussions with the chemical supplier determined that the hydrogen peroxide that was being added may dissociate at elevated ambient temperatures. As such, the treatment of leachate at the ILPS was switched over to using ferric chloride. In addition, hydrogen peroxide has been re-introduced as part of the leachate treatment both pre- and post-treatment with ferric chloride.

14. *Provide clarification on the dilution of leachate with groundwater.*

- a. *Is groundwater only added at the leachate pond or during the treatment process?*

Groundwater is only added at the leachate pond.

- b. *What happens when there is no groundwater available, how is the process affected?*

Impacted groundwater is pumped into the leachate lagoon from recovery well M4 in the east landfill. The addition of groundwater only serves to dilute the treated leachate in the lagoon. The treatment of leachate will not be impacted when there is no groundwater available since it is not part of the treatment process. However, the concentration of the leachate being sent to the sanitary sewer will increase without the dilution provided by the addition of groundwater.

- c. *Do the leachate pumping volumes being provided include the groundwater that is added to the process? If so, is there a way to distinguish them?*

The leachate pumping volumes provided only reflect the leachate recovered from the east landfill, and do not include added groundwater or leachate from the west landfill. The total leachate/groundwater discharged to the sanitary sewer is tracked separately and measured at the outlet from the leachate lagoon.

15. *We understand that GFL intends to make additional changes to the leachate treatment process. We have scheduled a technical meeting to hear about the changes that are planned. We are requesting that GHD present the recommendations they have provided to GFL, next steps regarding the leachate treatment adjustments and outline the technical assessments that guided this advice. This is intended to be a technical discussion; MECP will have its technical experts participate in the meeting.*

Technical discussion was held between GFL, MECP, and GHD on Friday, October 6.

### **Communication Strategy**

16. *GFL should provide written notification of pending meetings to residents within 3 kilometers from the site. GFL should not solely rely on a website posting and emailing complainants that have provided contact info. Please confirm the method of written notification that GFL intends to use.*

As requested, written notification of pending meetings is being provided to all residents within 3 kilometres of the site via Canada Post unaddressed Admail.

17. *The first virtual meeting is scheduled for Oct 30. Community members should not have to wait another month to share their concerns and receive updates from GFL on the measures in place, progress made, and next steps. The MECP is requesting that the first meeting be held no later than **October 18**.*

As requested, the October meeting has been rescheduled to Wednesday, October 18. Community update meetings have also been scheduled for Thursday, November 16 and Thursday, December 14.

### **Air Monitoring**

18. *The ministry requires additional details regarding the odour and air monitoring proposed in the Sept 21, 2023, report and currently being carried out at the site.*

- a. *What parameters are being monitored?*

Air sampling and monitoring was conducted during the week of September 25, 2023. Monitoring of speciated TRS and VOCs was conducted at both on-site and off-site locations.

- b. *How frequent will monitoring occur?*

The proposed monitoring frequency will be detailed in the Air Monitoring Plan currently being prepared in response to Item 20 below.

- c. *Who is carrying out this sampling?*

GHD completed this sampling.

- d. *How will the monitoring data be communicated to the MECP and the public?*

A draft report from the September air monitoring and sampling event will be compiled by the week of October 16, 2023. Once finalized, results will be shared directly with the MECP via email, and the public via updates to the GFL SCRF website.

19. *Provide a copy of GFLs procedure document for responding to odour complaints. This should include details of the procedures for odour surveys, data collection, and response procedures to share information with the complainants.*

GFL's procedure for responding to odour complaints has been provided in Attachment 3.

20. *By **October 20, 2023**, have a qualified third party develop and submit an air monitoring plan to the ministry detailing a proposal for an ambient air monitoring program at GFL. The air monitoring program shall include, but not be limited to:*

- a. *Continuous monitoring for TRS and ammonia.*

- b. *Odour monitoring on-site and in the surrounding community.*

An Air Monitoring Plan is currently being developed and will be submitted by October 20, 2023.

We trust that the above information adequately addresses the current concerns regarding odours from the Site. GFL remains committed to working with all stakeholders to resolve the odour issue as quickly as possible and will continue to keep the community informed of mitigation activities and address questions and concerns as they arise.

Regards,

A handwritten signature in black ink, appearing to read "Brian Dermody". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

**Brian Dermody, P.Eng.**  
Senior Engineer

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Brad Mullin, GFL  
Peter Lesieczko, GHD  
Tina Morano, GHD  
Stephen Burt, MECP  
Neil Hannington, MECP

# Attachments

# **Attachment 1**

**WQ Annual City Discharge Permit**

GFL - STONEY CREEK REGIONAL FACILITY MONTHLY ANALYTICAL TEST RESULTS HAMILTON SEWER USE BY-LAW (22-103)	Hamilton Sewer Use By-Law	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
		24-Feb-15	24-Mar-15	23-Apr-15	20-May-15	23-Jun-15	28-Jul-15	24-Aug-15	22-Sep-15	30-Oct-15
<b>Calculated Parameters</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Animal/Vegetable Oil and Grease	150	6.3	2.3	4.9	2.6	3	2.3	5.1	1.4	10
<b>Inorganics</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Biochemical Oxygen Demand BOD (5)	300	110	41	37	45	77	65	140	62	52
Fluoride (F-)	10	3.3	1.6	1.9	2.2	2.2	2.9	3.2	2.3	2.1
Total Kjeldahl Nitrogen (TKN)	100.0	190	66	72	83	77	120	120	80	69
pH	6.0-11.0	7.8	7.81	7.4	7.93	7.81	7.67	7.95	7.8	7.81
Phenols-4AAP	1.0	0.85	0.19	0.36	0.028	0.016	0.03	0.04	0.022	0.015
Total Suspended Solids (TSS)	350	35	12	14	39	140	100	100	97	70
Sulfate (SO4)	1500	570	480	700	790	700	710	710	790	780
Sulphide (as H2S)	1									
Cyanide (Total CN-)	2	0.28	0.085	0.13	0.083	0.073	0.15	0.14	0.091	0.11
Chloride (Cl-)	1500	3100	1200	1400	1700	1500	2000	2100	1600	1500
<b>Petroleum Hydrocarbons</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Oil & Grease	150	6.3	2.3	4.9	2.6	3	2.3	5.1	1.4	10
Total Oil & Grease Mineral/Synthetic	15	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.9
<b>Metals</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Aluminum (Al)	50.0	0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1
Total Antimony (Sb)	5	0.2	<0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Arsenic (As)	1	0.2	<0.2	0.05	0.06	0.06	0.1	0.1	0.08	0.05
Total Bismuth (Bi)	5.0	0.2	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Cadmium (Cd)	0.7	<0.005	<0.005	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Chromium (Cr)	5.0	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Cobalt (Co)	5.0	<0.02	<0.02	0.00	0.003	0.003	0.004	0.004	0.003	0.003
Total Copper (Cu)	2.0	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Iron (Fe)	50.0	0.94	0.70	0.1	0.33	0.35	0.58	0.47	0.4	0.62
Total Lead (Pb)	2.0	<0.05	<0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Manganese (Mn)	5.0	0.27	0.15	0.17	0.24	0.15	0.16	0.15	0.15	0.29
Mercury (Hg)	0.01	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Total Molybdenum (Mo)	1.0	0.22	0.08	0.071	0.11	0.12	0.2	0.26	0.16	0.13
Total Nickel (Ni)	2.0	0.15	<0.05	0.045	0.059	0.058	0.097	0.12	0.075	0.0059
Total Phosphorus (P)	10.0	3.6	1.1	1.1	1.4	1.8	2.5	3.2	2.3	1.8
Total Selenium (Se)	1.0	<0.2	<0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Silver (Ag)	5.0	<0.01	<0.00010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Tin (Sn)	5.0	<0.2	<0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Titanium (Ti)	5.0	0.03	0.01	0.008	0.007	0.010	0.015	0.017	0.009	0.011
Total Vanadium (V)	5.0	0.1	0.03	0.034	0.044	0.041	0.067	0.074	0.041	0.039
Total Zinc (Zn)	2.0	<0.01	0.02	0.021	0.011	0.020	0.005	0.005	0.009	0.02
<b>Semivolatile Organics</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Di-N-butyl phthalate	80	<8	<2	<2	<20	<10	<20	<20	<20	<8
Bis(2-ethylhexyl)phthalate+	280	<8	<2	<2	<20*	<10	<20	<20	<20	<8
3,3'-Dichlorobenzidine	2	<3	<0.8	<0.8	<8**	<4*	<8	<8	<8	<3
Pentachlorophenol	5	<4	<1	<1	<10***	<5	<10	<10	<10	<4
Phenanthrene	none	<0.8	<0.2	<0.2	<2		<2	<2	<2	<0.8
Anthracene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Fluoranthene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Pyrene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Benzo(a)anthracene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8

GFL - STONEY CREEK REGIONAL FACILITY MONTHLY ANALYTICAL TEST RESULTS HAMILTON SEWER USE BY-LAW (22-103)	Hamilton Sewer Use By-Law	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
		24-Feb-15	24-Mar-15	23-Apr-15	20-May-15	23-Jun-15	28-Jul-15	24-Aug-15	22-Sep-15	30-Oct-15
Chrysene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Benzo(b,j)fluoranthene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Benzo(k)fluoranthene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Benzo(a)pyrene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Indeno(1,2,3-cd)pyrene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Dibenz(a,h)anthracene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Benzo(g,h,i)perylene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Dibenzo(a,i)pyrene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Benzo(e)pyrene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Perylene	none	<0.8	<0.2	<0.2	<2	<1	<2	<2	<2	<0.8
Dibenzo(a,j) acridine	none	<2	<0.4	<0.4	<4	<2	<4	<4	<4	<2
7H-Dibenzo(c,g) Carbazole	none	<2	<0.4	<0.4	<4	<2	<4	<4	<4	<2
Calculated Parameters	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Total PAHs (18 PAHs)	5	<6	<1	<1	<9.6	<4.8	<9.6	<9.6	<9.6	
Volatile Organics	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Benzene	10	3.2	<2.5	<2	0.36	<2.0	<2.5	<5	0.51	<2.5
Chloroform	40	<1.0	<2.5	<2	<0.20	<2.0	<2.5	<5	<0.50	<2.5
1,2-Dichlorobenzene	50	<2.0	<5.0	<4	<0.50	<4.0	<5.0	<10	<1.0	<5.0
1,4-Dichlorobenzene	80	<2.0	<5.0	<4	<0.50	<4.0	<5.0	<10	<1.0	<5.0
cis-1,2-Dichloroethylene	4000	<1.0	<2.5	<2	<0.50	<2.0	<2.5	<5	<0.50	<2.5
trans-1,3-Dichloropropene	140	<2.0	<5.0	<4	<0.40	<4.0	<5.0	<10	<1.0	<5.0
Ethylbenzene	160	4.3	<2.5	3	1.1	<2.0	<2.5	<5	1.1	<2.5
Methylene Chloride(Dichloromethane)	2000	<5.0	<13	<10	<2.0	<10	<13	<25	<2.5	<13
1,1,2,2-Tetrachloroethane	1400	<2.0	<5.0	<4	<0.50	<4.0	<5.0	<10	<1.0	<5.0
Tetrachloroethylene	1000	<1.0	<2.5	<2	<0.20	<2.0	<2.5	<5	<0.50	<2.5
Toluene	16	94	40	46	3.1	<4.0	<5.0	<10	6.9	<5.0
Trichloroethylene	400	<1.0	<2.5	<2	<0.20	<2.0	<2.5	<5	<0.50	<2.5
p+m-Xylene	1400	10	3.9	4.7	1.9	<2.0	3.1	<5	2.6	<2.5
o-Xylene	1400	5.9	<2.5	2.6	1.4	<2.0	<2.5	<5	1.4	<2.5
Total Xylenes	1400	16	3.9	7.3	3.3	<2.0	3.1	<5	4.1	<2.5
Pesticides & Herbicides	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aldrin	0.2	<0.005	<0.005	<0.005	<0.05	<0.03	<0.005	<0.05		<0.005
Dieldrin	0.2	<0.005	<0.005	<0.005	<0.05	<0.03	<0.007	<0.05		<0.005
a-Chlordane	100	<0.005	<0.005	<0.005	<0.05	<0.03	<0.005	<0.05		<0.005
g-Chlordane	100	<0.005	<0.005	<0.005	<0.05	<0.03	<0.005	<0.05		<0.005
o,p-DDT	0.1	<0.005	<0.005	<0.005	<0.05	<0.03	<0.02	<0.05		<0.005
p,p-DDT	0.1	<0.005	<0.005	<0.005	<0.05	<0.03	<0.02	<0.05		<0.005
Lindane	none	<0.003	<0.003	<0.003	<0.03	<0.02	<0.003	<0.03		
Hexachlorobenzene	0.1	<0.005	<0.005	<0.005	<0.05	<0.03	<0.005	<0.05		<0.005
Mirex	100	<0.005	<0.005	<0.005	<0.05	<0.03	<0.02	<0.05		<0.005
Total Endosulfan	None	<0.005	<0.005	<0.005	<0.05	<0.03		<0.05		<0.005
Heptachlor + Heptachlor epoxide	None	<0.005	<0.005	<0.005	<0.05	<0.03		<0.05		
Total PCB	1	<0.05	<0.05	<0.05	<0.5	<0.3	<0.05	<2	<0.05	<0.05

GFL - STONEY CREEK REGIONAL FACILITY MONTHLY ANALYTICAL TEST RESULTS HAMILTON SEWER USE BY-LAW (22-103)	Hamilton Sewer Use By-Law	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
		25-Nov-15	29-Dec-15	25-Jan-16	24-Feb-16	29-Mar-16	26-Apr-16	8-Jun-16	21-Jul-16	15-Aug-16
<b>Calculated Parameters</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Animal/Vegetable Oil and Grease	150	2.8	5.3	6.4	14	2	5.8	8.4	1.9	14.0
<b>Inorganics</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Biochemical Oxygen Demand BOD (5)	300	39	79	54	130	140	130	160	44	140
Fluoride (F-)	10	2.2	2.3	2.1	2.7	1.8	2.4	2.4	3.0	3.9
Total Kjeldahl Nitrogen (TKN)	100.0	74	98	97	140	77	110	86	120	150
pH	6.0-11.0	7.86	7.77	7.86	7.74	7.59	7.77	7.79	8.42	8.38
Phenols-4AAP	1.0	0.023	0.11	0.079	0.61	0.52	0.56	0.85	0.012	0.2
Total Suspended Solids (TSS)	350	50	40	46	25	16	27	22	170	84
Sulfate (SO4)	1500	840	840	930	740	510	530	870	510	630
Sulphide (as H2S)	1									
Cyanide (Total CN-)	2	0.095	0.12	0.11	0.17	0.12	0.18	0.19	0.092	0.23
Chloride (Cl-)	1500	1400	1700	1700	2100	1100	1300	1800	1700	2500
<b>Petroleum Hydrocarbons</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Oil & Grease	150	2.8	5.3	6.4	14	2	5.8	9.2	1.9	14
Total Oil & Grease Mineral/Synthetic	15	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.8	<0.50	<0.50
<b>Metals</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Aluminum (Al)	50.0	0.1	0.2	<0.1	0.1	0.2	0.2	0.1	<0.1	<0.1
Total Antimony (Sb)	5	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	0.02
Total Arsenic (As)	1	0.05	0.06	<0.01	0.08	0.04	0.07	0.09	0.1	0.12
Total Bismuth (Bi)	5.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Cadmium (Cd)	0.7	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Chromium (Cr)	5.0	<0.01	<0.01	<0.01	0.01	<0.01	0.01	0.01	0.01	0.02
Total Cobalt (Co)	5.0	0.003	0.003	<0.002	0.004	0.006	0.004	0.003	0.003	0.006
Total Copper (Cu)	2.0	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Total Iron (Fe)	50.0	0.58	0.7	0.22	0.6	0.98	0.69	1.2	0.46	0.55
Total Lead (Pb)	2.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Manganese (Mn)	5.0	0.33	0.32	0.01	0.22	0.74	0.35	0.32	0.097	0.18
Mercury (Hg)	0.01	<0.00010	<0.00010	<0.00010	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Molybdenum (Mo)	1.0	0.12	0.13	<0.005	0.17	0.1	0.17	0.38	0.23	0.36
Total Nickel (Ni)	2.0	0.063	0.072	<0.005	0.093	0.065	0.081	0.08	0.11	0.16
Total Phosphorus (P)	10.0	1.8	2.2	0.45	3.4	1.3	2.2	2.8	3.7	4.9
Total Selenium (Se)	1.0	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Silver (Ag)	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Tin (Sn)	5.0	<0.02	<0.02	<0.02	<0.02	0.02	0.05	<0.02	0.02	0.04
Total Titanium (Ti)	5.0	0.012	0.016	<0.005	0.024	0.023	0.039	0.018	0.037	0.059
Total Vanadium (V)	5.0	0.034	0.05	<0.005	0.057	0.042	0.059	0.04	0.074	0.11
Total Zinc (Zn)	2.0	0.045	0.046	0.01	0.009	0.052	0.039	0.016	0.015	<0.005
<b>Semivolatile Organics</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Di-N-butyl phthalate	80	<20	<8	<8	<10	<10	<8	<8	<100	<8
Bis(2-ethylhexyl)phthalate+	280	<20	<8	<8	<10	<10	<8	<8	<100	<8
3,3'-Dichlorobenzidine	2	<8	<3	<3	<4	<4	<3	<3	<40	<3
Pentachlorophenol	5	<10	<4	<4	<5	<5	<4	<4	<50	<4
Phenanthrene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Anthracene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Fluoranthene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Pyrene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Benzo(a)anthracene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8



GFL - STONEY CREEK REGIONAL FACILITY MONTHLY ANALYTICAL TEST RESULTS HAMILTON SEWER USE BY-LAW (22-103)	Hamilton Sewer Use By-Law	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
		25-Nov-15	29-Dec-15	25-Jan-16	24-Feb-16	29-Mar-16	26-Apr-16	8-Jun-16	21-Jul-16	15-Aug-16
Chrysene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Benzo(b,j)fluoranthene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Benzo(k)fluoranthene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Benzo(a)pyrene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Indeno(1,2,3-cd)pyrene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Dibenz(a,h)anthracene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Benzo(g,h,i)perylene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Dibenzo(a,i)pyrene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Benzo(e)pyrene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Perylene	none	<2	<0.8	<0.8	<1	<1	<0.8	<0.8	<10	<0.8
Dibenzo(a,j) acridine	none	<4	<2	<2	<2	<2	<2	<2	<20	<0.8
7H-Dibenzo(c,g) Carbazole	none	<4	<2	<2	<2	<2	<2	<2	<20	<2
Calculated Parameters	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Total PAHs (18 PAHs)	5	<9.6	<3.8	<3.8	<4.8	<4.8	<3.8	<3.8	<48	<3.8
Volatile Organics	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Benzene	10	<2	<2.5	<5.0	<5.0	<5	3	<2.5	<2.5	<0.20
Chloroform	40	<2	<2.5	<5.0	<5.0	<5	<2.0	<2.5	<2.5	<0.20
1,2-Dichlorobenzene	50	<4	<5.0	<10	<10	<10	<4.0	<5.0	<5.0	<0.5
1,4-Dichlorobenzene	80	<4	<5.0	<10	<10	<10	<4.0	<5.0	<5.0	<0.5
cis-1,2-Dichloroethylene	4000	<2	<2.5	<5.0	<5.0	<5	<2.0	<2.5	<2.5	<0.5
trans-1,3-Dichloropropene	140	<4	<5.0	<10	<10	<10	<4.0	<5.0	<5.0	<0.40
Ethylbenzene	160	<2	<2.5	<5.0	6	5.1	4.5	<2.5	<2.5	<0.20
Methylene Chloride(Dichloromethane)	2000	<10	<13	<25	<25	<25	<10	<13	<13	<2.0
1,1,2,2-Tetrachloroethane	1400	<4	<5.0	<10	<10	<10	<4.0	<5.0	<5.0	<0.50
Tetrachloroethylene	1000	<2	<2.5	<5.0	<5.0	<5.0	<2.0	<2.5	<2.5	<0.20
Toluene	16	10	<5.0	<10	96	66	55	24	<5.0	<0.20
Trichloroethylene	400	<2	<2.5	<5.0	<5.0	<5	<2.0	<2.5	<2.5	<0.20
p+m-Xylene	1400	2.1	<2.5	<5.0	11	8.8	8.6	3.6	<2.5	<0.20
o-Xylene	1400	<2	<2.5	<5.0	6	<5	4.7	<2.5	<2.5	<0.20
Total Xylenes	1400	2.1	<2.5	<5.0	17	8.8	13	3.6	<2.5	<0.20
Pesticides & Herbicides	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aldrin	0.2	<0.05	<0.05	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.05
Dieldrin	0.2	<0.05	<0.05	<0.005	<0.007	<0.05	<0.005	<0.005	<0.005	<0.05
a-Chlordane	100	<0.05	<0.05	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.05
g-Chlordane	100	<0.05	<0.05	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.05
o,p-DDT	0.1	<0.05	<0.05	<0.007	<0.007	<0.05	<0.005	<0.005	<0.005	<0.05
p,p-DDT	0.1	<0.05	<0.05	<0.02	<0.01	<0.05	<0.005	<0.005	<0.005	<0.05
Lindane	none	<0.03	0.03	0.013	<0.007	<0.05	<0.003	<0.005	<0.005	<0.03
Hexachlorobenzene	0.1	<0.05	<0.05	<0.005	<0.005	<0.05	<0.005	<0.005	<0.005	<0.05
Mirex	100	<0.05	<0.05	<0.02	<0.01	<0.05	<0.005	<0.005	<0.005	<0.05
Total Endosulfan	None	<0.05	<0.05	<0.005	<0.005	<0.005	<0.005	<0.005	n/a	n/a
Heptachlor + Heptachlor epoxide	None	<0.05	<0.05	<0.005	<0.005	<0.005	<0.005	<0.005	n/a	n/a
Total PCB	1	<0.05	<0.5	<0.05	<0.2	<0.05	<0.05	<0.05	n/a	n/a

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		12-Sep-16	14-Oct-16	28-Nov-16	30-Dec-16	24-Jan-17	23-Feb-17	29-Mar-17	27-Apr-17	30-May-17
<b>Calculated Parameters</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Animal/Vegetable Oil and Grease	150	20.0	4.8	12	5.9	8.8	3.3	14.0	0.9	4.6
<b>Inorganics</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Biochemical Oxygen Demand BOD (5)	300	160	57	31	56	100	44	63	36	56
Fluoride (F-)	10	4.4	4.5	4.5	4.2	2.7	1.9	2.3	1.9	2.0
Total Kjeldahl Nitrogen (TKN)	100.0	160	170	260	220	140	88	110	70	65
pH	6.0-11.0	8.37	8.35	8.32	8.39	8.02	8.01	7.91	7.72	7.99
Phenols-4AAP	1.0	0.074	0.021	1.5	0.12	0.26	0.037	0.092	0.02	0.069
Total Suspended Solids (TSS)	350	76	64	57	53	50	40	62	37	43
Sulfate (SO4)	1500	670	570	570	670	760	780	720	630	650
Sulphide (as H2S)	1									
Cyanide (Total CN-)	2	0.33	0.35	0.51	0.41	0.29	0.14	0.18	0.14	0.13
Chloride (Cl-)	1500	2700	2600	2500	2800	2000	1400	1700	1200	1200
<b>Petroleum Hydrocarbons</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Oil & Grease	150	21	4.8	13	6.6	9.9	3.3	16	6.6	4.6
Total Oil & Grease Mineral/Synthetic	15	0.6	<0.50	1.4	0.7	1.1	<0.50	1.8	0.9	1.9
<b>Metals</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Aluminum (Al)	50.0	<0.1	<1	0.2	<0.1	<0.1	<0.1	<0.1	0.1	0.1
Total Antimony (Sb)	5	<0.02	<0.2	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Arsenic (As)	1	0.12	0.1	0.16	0.14	0.08	0.04	0.05	0.05	0.04
Total Bismuth (Bi)	5.0	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Cadmium (Cd)	0.7	<0.002	<0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Chromium (Cr)	5.0	0.02	<0.1	0.02	0.02	0.02	<0.01	<0.01	0.01	0.01
Total Cobalt (Co)	5.0	0.006	<0.02	0.006	0.006	0.005	0.003	0.003	0.002	0.003
Total Copper (Cu)	2.0	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
Total Iron (Fe)	50.0	0.63	0.8	1.2	0.95	0.66	0.46	0.44	0.49	0.53
Total Lead (Pb)	2.0	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Manganese (Mn)	5.0	0.18	0.17	0.22	0.22	0.28	0.15	0.17	0.16	0.23
Mercury (Hg)	0.01	<0.0001	<0.0001	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Molybdenum (Mo)	1.0	0.34	0.4	0.45	0.42	0.22	0.15	0.18	0.15	0.21
Total Nickel (Ni)	2.0	0.15	0.16	0.18	0.17	0.11	0.072	0.083	0.064	0.079
Total Phosphorus (P)	10.0	4.4	4.5	5.9	6.6	3	1.9	2.3	1.4	1.6
Total Selenium (Se)	1.0	<0.02	<0.2	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Silver (Ag)	5.0	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Tin (Sn)	5.0	0.04	<0.2	0.04	0.04	0.03	<0.02	0.02	0.06	0.04
Total Titanium (Ti)	5.0	0.054	0.05	0.056	0.056	0.036	0.018	0.027	0.038	0.05
Total Vanadium (V)	5.0	0.12	0.1	0.11	0.11	0.075	0.045	0.051	0.048	0.055
Total Zinc (Zn)	2.0	<0.005	<0.05	0.01	0.014	0.036	0.047	0.045	0.067	0.044
<b>Semivolatile Organics</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Di-N-butyl phthalate	80	<20	<8	<8	<20	<2	<8	<2	<2	<8
Bis(2-ethylhexyl)phthalate+	280	<20	<8	<8	<20	<2	<8	<2	<2	<8
3,3'-Dichlorobenzidine	2	<8	<3	<3	<8	<0.8	<3	<0.8	<0.8	<3
Pentachlorophenol	5	<10	<4	<4	<10	<1	<4	<1	<1	<4
Phenanthrene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Anthracene	none	<2	0.9	<0.8	<2	<0.2	<0.8	<0.2	0.6	<0.8
Fluoranthene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Pyrene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Benzo(a)anthracene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8

GFL - STONEY CREEK REGIONAL FACILITY MONTHLY ANALYTICAL TEST RESULTS HAMILTON SEWER USE BY-LAW (22-103)	Hamilton Sewer Use By-Law	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
		12-Sep-16	14-Oct-16	28-Nov-16	30-Dec-16	24-Jan-17	23-Feb-17	29-Mar-17	27-Apr-17	30-May-17
Chrysene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Benzo(b,j)fluoranthene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Benzo(k)fluoranthene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Benzo(a)pyrene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Indeno(1,2,3-cd)pyrene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Dibenz(a,h)anthracene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Benzo(g,h,i)perylene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Dibenzo(a,i)pyrene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Benzo(e)pyrene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Perylene	none	<2	<0.8	<0.8	<2	<0.2	<0.8	<0.2	<0.2	<0.8
Dibenzo(a,j) acridine	none	<4	<0.8	<2	<4	<0.4	<2	<0.4	<0.4	<2
7H-Dibenzo(c,g) Carbazole	none	<4	<2	<2	<4	<0.4	<2	<0.4	<0.4	<2
<b>Calculated Parameters</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Total PAHs (18 PAHs)	5	<9.6	<3.8	<3.8	<9.6	<0.96	<3.8	<0.96	<0.96	<3.8
<b>Volatile Organics</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Benzene	10	<2.5	<2.5	<1.0	0.45	<5.0	<5.0	<5.0	<2.5	<10
Chloroform	40	<2.5	<2.5	<1.0	<0.20	<5.0	<5.0	<5.0	<2.5	<10
1,2-Dichlorobenzene	50	<5.0	<5.0	<2.5	<0.50	<10	<10	<10	<5.0	<25
1,4-Dichlorobenzene	80	<5.0	<5.0	<2.5	<0.50	<10	<10	<10	<5.0	<25
cis-1,2-Dichloroethylene	4000	<2.5	<2.5	<2.5	<0.50	<5.0	<5.0	<5.0	<2.5	<25
trans-1,3-Dichloropropene	140	<5.0	<5.0	<2.5	<0.40	<10	<10	<10	<5.0	<20
Ethylbenzene	160	<2.5	<2.5	<1.0	1	<5.0	<5.0	<5.0	<2.5	<10
Methylene Chloride(Dichloromethane)	2000	<13	<13	<10	<2.0	<25	<25	<25	<13	<100
1,1,2,2-Tetrachloroethane	1400	<5.0	<5.0	<2.5	<0.50	<10	<10	<10	<5.0	<25
Tetrachloroethylene	1000	<2.5	<2.5	<1.0	<0.20	<5.0	<5.0	<5.0	<2.5	<10
Toluene	16	<5.0	<5.0	<1.0	11	17	<10	<10	<5.0	<10
Trichloroethylene	400	<2.5	<2.5	<1.0	<0.20	<5.0	<5.0	<5.0	<2.5	<10
p+m-Xylene	1400	<2.5	<2.5	<1.0	1.6	<5.0	<5.0	<5.0	<2.5	<10
o-Xylene	1400	<2.5	<2.5	<1.0	0.86	<5.0	<5.0	<5.0	<2.5	<10
Total Xylenes	1400	<2.5	<2.5	<1.0	2.5	<5.0	<5.0	<5.0	<2.5	<10
<b>Pesticides &amp; Herbicides</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aldrin	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005	<0.05	<0.005
Dieldrin	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.007	<0.005	<0.05	<0.005
a-Chlordane	100	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005	<0.05	<0.005
g-Chlordane	100	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005	<0.05	<0.005
o,p-DDT	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.007	<0.005	<0.05	<0.005
p,p-DDT	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.005	<0.05	<0.005
Lindane	none	<0.03	<0.03	<0.03	<0.03	<0.03	<0.003	<0.003	<0.03	<0.003
Hexachlorobenzene	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005	<0.05	<0.005
Mirex	100	<0.05	<0.05	<0.05	<0.05	<0.05	<0.02	<0.005	<0.05	<0.005
Total Endosulfan	None	n/a	n/a	<0.05	<0.05	<0.05	<0.007	<0.005	<0.05	<0.005
Heptachlor + Heptachlor epoxide	None	n/a	n/a	<0.05	<0.05	<0.05	<0.007	<0.005	<0.05	<0.005
Total PCB	1	n/a	n/a	<1	<0.5	<0.5	<0.05	<0.05	<0.5	<0.05

GFL - STONEY CREEK REGIONAL FACILITY MONTHLY ANALYTICAL TEST RESULTS HAMILTON SEWER USE BY-LAW (22-103)	Hamilton Sewer Use By-Law	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
		28-Jun-17	25-Jul-17	29-Aug-17	27-Sep-17	24-Oct-17	29-Nov-17	27-Dec-17	31-Jan-18	26-Feb-18
<b>Calculated Parameters</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Animal/Vegetable Oil and Grease	150	12.0	10.0	23.0	6.7	9.7	1.9	3.0	7.8	4.2
<b>Inorganics</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Biochemical Oxygen Demand BOD (5)	300	64	110	130	100	50	47	47	35	16
Fluoride (F-)	10	2.9	2.9	3.1	3.3	2.6	1.7	2.3	1.7	1.2
Total Kjeldahl Nitrogen (TKN)	100.0	120	120	140	160	100	77	110	83	28
pH	6.0-11.0	8.05	8.07	8.14	8.27	8.04	7.81	7.92	7.73	7.96
Phenols-4AAP	1.0	<1.0	0.12	<0.50 (1)	1.7	<0.020	0.49	0.38	1	<0.10 (1)
Total Suspended Solids (TSS)	350	64	43	51	73	120	25	42	31	17
Sulfate (SO4)	1500	770	750	760	790	690	760	830	630	540
Sulphide (as H2S)	1									
Cyanide (Total CN-)	2	0.34	0.27	0.27	0.64	0.19	0.094	0.19	0.19	0.058
Chloride (Cl-)	1500	1900	2000	2400	2500	2000	1400	1900	1500	600
<b>Petroleum Hydrocarbons</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Oil & Grease	150	12	12	26	8.1	11	1.9	3	9.4	4.2
Total Oil & Grease Mineral/Synthetic	15	0.8	1.4	3.2	1.4	1.4	<0.50	<0.50	1.6	<0.50
<b>Metals</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Aluminum (Al)	50.0	0.2	0.2	0.1	0.1	0.5	0.1	<0.1	0.1	<0.1
Total Antimony (Sb)	5	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Arsenic (As)	1	0.09	0.09	0.1	0.12	0.08	0.03	0.06	0.06	0.02
Total Bismuth (Bi)	5.0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Total Cadmium (Cd)	0.7	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Total Chromium (Cr)	5.0	0.02	0.02	0.02	0.02	0.02	<0.01	0.01	0.01	<0.01
Total Cobalt (Co)	5.0	0.004	0.003	0.004	0.005	0.004	0.002	0.003	0.002	<0.002
Total Copper (Cu)	2.0	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
Total Iron (Fe)	50.0	0.52	0.44	0.7	0.59	2.9	0.5	0.44	0.61	0.31
Total Lead (Pb)	2.0	<0.01	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	<0.01
Total Manganese (Mn)	5.0	0.18	0.11	0.12	0.11	0.26	0.13	0.085	0.14	0.076
Mercury (Hg)	0.01	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Total Molybdenum (Mo)	1.0	0.38	0.37	0.43	0.43	0.32	0.16	0.23	0.16	0.049
Total Nickel (Ni)	2.0	0.14	0.13	0.14	0.16	0.13	0.05	0.091	0.073	0.022
Total Phosphorus (P)	10.0	3.1	3.1	4.1	4.4	3.5	1.6	2.1	1.7	0.57
Total Selenium (Se)	1.0	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Total Silver (Ag)	5.0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Total Tin (Sn)	5.0	0.05	0.05	0.04	0.06	0.03	<0.02	0.02	0.03	<0.02
Total Titanium (Ti)	5.0	0.074	0.071	0.062	0.063	0.042	0.016	0.022	0.032	0.01
Total Vanadium (V)	5.0	0.085	0.087	0.095	0.1	0.071	0.024	0.044	0.045	0.015
Total Zinc (Zn)	2.0	0.01	<0.005	<0.005	<0.005	0.15	0.024	0.015	0.027	0.033
<b>Semivolatile Organics</b>	ug/L	ug/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Di-N-butyl phthalate	80	<8	<8	<8	<8	5	<2	<2	<2	<2
Bis(2-ethylhexyl)phthalate+	280	<8	<8	<8	<8	<2	<2	<2	<2	<2
3,3'-Dichlorobenzidine	2	<3	<3	<3	<3	<0.8	<0.8	<0.8	<0.8	<0.8
Pentachlorophenol	5	<4	<4	<4	<4	<1	<1	<2	<1	<1
Phenanthrene	none	<0.8	<0.8	<0.8	<0.8	0.3	<0.2	<0.2	<0.2	<0.2
Anthracene	none	<0.8	<0.8	<0.8	<0.8	0.5	0.4	<0.2	0.3	<0.2
Fluoranthene	none	<0.8	<0.8	<0.8	<0.8	0.3	<0.2	<0.2	<0.2	<0.2
Pyrene	none	<0.8	<0.8	<0.8	<0.8	0.3	<0.2	<0.2	<0.2	<0.2
Benzo(a)anthracene	none	<0.8	<0.8	<0.8	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2

GFL - STONEY CREEK REGIONAL FACILITY MONTHLY ANALYTICAL TEST RESULTS HAMILTON SEWER USE BY-LAW (22-103)	Hamilton Sewer Use By-Law	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
		28-Jun-17	25-Jul-17	29-Aug-17	27-Sep-17	24-Oct-17	29-Nov-17	27-Dec-17	31-Jan-18	26-Feb-18
Chrysene	none	<0.8	<0.8	<0.8	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(b,j)fluoranthene	none	<0.8	<0.8	<0.8	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(k)fluoranthene	none	<0.8	<0.8	<0.8	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	none	<0.8	<0.8	<0.8	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2
Indeno(1,2,3-cd)pyrene	none	<0.8	<0.8	<0.8	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2
Dibenz(a,h)anthracene	none	<0.8	<0.8	<0.8	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(g,h,i)perylene	none	<0.8	<0.8	<0.8	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2
Dibenzo(a,i)pyrene	none	<0.8	<0.8	<0.8	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(e)pyrene	none	<0.8	<0.8	<0.8	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2
Perylene	none	<0.8	<0.8	<0.8	<0.8	<0.2	<0.2	<0.2	<0.2	<0.2
Dibenzo(a,j) acridine	none	<2	<2	<2	<2	<0.4	<0.4	<0.4	<0.4	<0.4
7H-Dibenzo(c,g) Carbazole	none	<2	<2	<2	<2	<0.4	<0.4	<0.4	<0.4	<0.4
Calculated Parameters	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Total PAHs (18 PAHs)	5	<3.8	<3.8	<3.8	<3.8	1.4	<0.96	<0.96	<0.96	<0.96
Volatile Organics	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Benzene	10	<1.0	<5	<4.0	<10	<0.20	<5.0	<10	2.8	<2.5
Chloroform	40	<1.0	<5	<4.0	<10	<0.20	<5.0	<10	<2.0	<2.5
1,2-Dichlorobenzene	50	<2.5	<10	<10	<25	<0.50	<10	<25	<5.0	<5.0
1,4-Dichlorobenzene	80	<2.5	<10	<10	<25	<0.50	<10	<25	<5.0	<5.0
cis-1,2-Dichloroethylene	4000	<2.5	<5	<10	<25	<0.50	<5.0	<25	<5.0	<2.5
trans-1,3-Dichloropropene	140	<2.0	<10	<8.0	<25	<0.40	<10	<20	<4.0	<5.0
Ethylbenzene	160	1.6	<5	<4.0	<10	0.36	<5.0	<10	3.9	<2.5
Methylene Chloride(Dichloromethane)	2000	<10	<25	<40	<100	<2.0	<25	<100	<20	<13
1,1,2,2-Tetrachloroethane	1400	<2.5	<10	<10	<25	<0.50	<10	<25	<5.0	<5.0
Tetrachloroethylene	1000	<1.0	<5	<4.0	<10	<0.20	<5.0	<10	<2.0	<2.5
Toluene	16	4.6	<10	14	<10	<0.20	22	<10	37	<5.0
Trichloroethylene	400	<1.0	<5	<4.0	<10	<0.20	<5.0	<10	<2.0	<2.5
p+m-Xylene	1400	3.3	<5	<4.0	<10	0.37	<5.0	<10	7.5	<2.5
o-Xylene	1400	1.9	<5	<4.0	<10	0.26	<5.0	<10	4.2	<2.5
Total Xylenes	1400	5.2	<5	<4.0	<10	0.63	<5.0	<10	12	<2.5
Pesticides & Herbicides	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aldrin	0.2	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005
Dieldrin	0.2	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005
a-Chlordane	100	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005
g-Chlordane	100	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005
o,p-DDT	0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005
p,p-DDT	0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005
Lindane	none	<0.03	<0.03	<0.003	<0.03	<0.03	<0.03	<0.03	<0.003	<0.003
Hexachlorobenzene	0.1	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005
Mirex	100	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005
Total Endosulfan	None	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005
Heptachlor + Heptachlor epoxide	None	<0.05	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.005	<0.005
Total PCB	1	<0.5	<0.05	<0.05	<0.5	<0.5	<0.5	<0.5	<0.05	<0.05

GFL - STONEY CREEK REGIONAL FACILITY MONTHLY ANALYTICAL TEST RESULTS HAMILTON SEWER USE BY-LAW (22-103)	Hamilton Sewer Use By-Law	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
		28-Nov-18	22-Oct-19	11-Dec-20	16-Dec-21	23-Nov-22
<b>Calculated Parameters</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Animal/Vegetable Oil and Grease	150	<0.50	6.4	1.5	2.8	<0.50
<b>Inorganics</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Biochemical Oxygen Demand BOD (5)	300	3	96	7	36	9
Fluoride (F-)	10	1.2	1.4	1.2	2.2	1.4
Total Kjeldahl Nitrogen (TKN)	100.0	16	85	21	66	48
pH	6.0-11.0	7.91	7.53	7.8	7.78	8.1
Phenols-4AAP	1.0	0.0034	0.22	0.0031	0.086	0.0057
Total Suspended Solids (TSS)	350	11	55	20	45	37
Sulfate (SO4)	1500	830	900	980	710	1000
Sulphide (as H2S)	1					0.046
Cyanide (Total CN-)	2	0.0065	0.10	0.016	0.091	0.0061
Chloride (Cl-)	1500	520	1500	710	1200	1300
<b>Petroleum Hydrocarbons</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Oil & Grease	150	<0.50	7.7	2.7	3.8	<0.50
Total Oil & Grease Mineral/Synthetic	15	<0.50	1.3	1.2	1	<0.50
<b>Metals</b>	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Total Aluminum (Al)	50.0	<0.1	<0.1	0.2	0.2	0.5
Total Antimony (Sb)	5	<0.02	<0.02	<0.02	<0.02	<0.02
Total Arsenic (As)	1	<0.01	0.03	<0.01	0.03	0.01
Total Bismuth (Bi)	5.0	<0.05	<0.05	<0.05	<0.05	<0.05
Total Cadmium (Cd)	0.7	<0.002	<0.002	<0.002	<0.002	<0.002
Total Chromium (Cr)	5.0	<0.01	<0.01	<0.01	<0.01	<0.01
Total Cobalt (Co)	5.0	<0.002	0.002	<0.002	0.015	<0.002
Total Copper (Cu)	2.0	<0.01	<0.01	<0.01	<0.01	<0.01
Total Iron (Fe)	50.0	0.34	0.59	0.69	0.45	0.89
Total Lead (Pb)	2.0	<0.01	<0.01	<0.01	<0.01	<0.01
Total Manganese (Mn)	5.0	0.19	0.11	0.36	0.2	0.074
Mercury (Hg)	0.01	<0.0001	<0.0001	<0.0001	<0.00010	<0.00010
Total Molybdenum (Mo)	1.0	0.019	0.12	0.036	0.14	0.079
Total Nickel (Ni)	2.0	0.008	0.058	0.017	0.071	0.034
Total Phosphorus (P)	10.0	0.24	1.1	0.28	1.2	0.38
Total Selenium (Se)	1.0	<0.02	<0.02	<0.02	<0.02	<0.02
Total Silver (Ag)	5.0	<0.01	<0.01	<0.01	<0.01	<0.01
Total Tin (Sn)	5.0	<0.02	<0.02	<0.02	0.02	<0.02
Total Titanium (Ti)	5.0	<0.005	0.008	0.006	0.014	0.013
Total Vanadium (V)	5.0	0.007	0.018	0.005	0.028	0.013
Total Zinc (Zn)	2.0	0.032	0.022	0.095	0.023	0.021
<b>Semivolatile Organics</b>	ug/L	mg/L	mg/L	ug/L	ug/L	ug/L
Di-N-butyl phthalate	80	<2	<8	<2	<8	<8
Bis(2-ethylhexyl)phthalate+	280	<2	<8	<2	<8	<8
3,3'-Dichlorobenzidine	2	<0.8	<3	<0.8	<3	<3
Pentachlorophenol	5	<1	<4	<1	<4	<4
Phenanthrene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Anthracene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Fluoranthene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Pyrene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Benzo(a)anthracene	none	<0.2	<0.8	<0.2	<0.8	<0.8

GFL - STONEY CREEK REGIONAL FACILITY MONTHLY ANALYTICAL TEST RESULTS HAMILTON SEWER USE BY-LAW (22-103)	Hamilton Sewer Use By-Law	RESULTS	RESULTS	RESULTS	RESULTS	RESULTS
		28-Nov-18	22-Oct-19	11-Dec-20	16-Dec-21	23-Nov-22
Chrysene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Benzo(b,j)fluoranthene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Benzo(k)fluoranthene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Benzo(a)pyrene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Indeno(1,2,3-cd)pyrene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Dibenz(a,h)anthracene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Benzo(g,h,i)perylene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Dibenzo(a,i)pyrene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Benzo(e)pyrene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Perylene	none	<0.2	<0.8	<0.2	<0.8	<0.8
Dibenzo(a,j) acridine	none	<0.4	<2	<0.4	<2	<2
7H-Dibenzo(c,g) Carbazole	none	<0.4	<2	<0.4	<2	<2
<b>Calculated Parameters</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Total PAHs (18 PAHs)	5	<0.96	<3.8	<0.96	<3.8	<3.8
<b>Volatile Organics</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Benzene	10	<0.20	<10	<10	<10	<10
Chloroform	40	<0.20	<10	<10	<10	<10
1,2-Dichlorobenzene	50	<0.50	<25	<20	<20	<20
1,4-Dichlorobenzene	80	<0.50	<25	<20	<20	<20
cis-1,2-Dichloroethylene	4000	<0.50	<25	<25	<25	<25
trans-1,3-Dichloropropene	140	<0.40	<20	<20	<20	<20
Ethylbenzene	160	<0.20	<10	<10	<10	<10
Methylene Chloride(Dichloromethane)	2000	<2.0	<100	<100	<100	<100
1,1,2,2-Tetrachloroethane	1400	<0.50	<25	<20	<20	<20
Tetrachloroethylene	1000	<0.20	<10	<10	<10	<10
Toluene	16	<0.20	25	<10	12	<10
Trichloroethylene	400	<0.20	<10	<10	<10	<10
p+m-Xylene	1400	<0.20	<10	<10	<10	<10
o-Xylene	1400	<0.20	<10	<10	<10	<10
Total Xylenes	1400	<0.20	<10	<10	<10	<10
<b>Pesticides &amp; Herbicides</b>	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Aldrin	0.2	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	0.2	<0.005	<0.005	<0.005	<0.005	<0.005
a-Chlordane	100	<0.005	<0.005	<0.005	<0.005	<0.005
g-Chlordane	100	<0.005	<0.005	<0.005	<0.005	<0.005
o,p-DDT	0.1	<0.005	<0.005	<0.005	<0.005	<0.005
p,p-DDT	0.1	<0.005	<0.005	<0.005	<0.005	<0.005
Lindane	none	<0.003	<0.003	<0.003	<0.003	
Hexachlorobenzene	0.1	<0.005	<0.005	<0.005	<0.005	<0.005
Mirex	100	<0.005	<0.005	<0.005	<0.005	<0.005
Total Endosulfan	None	<0.005	<0.005	<0.005	<0.005	
Heptachlor + Heptachlor epoxide	None	<0.005	<0.005	<0.005	<0.005	
Total PCB	1	<0.05	<0.05	<0.05	<0.05	<0.05

# **Attachment 2**

## **LTS Systems Adjustments**



**GFL Stoney Creek Regional Facility**  
**Modifications to Leachate Treatment System**

Date	Pumping Location	FeCl Added	H2O2 Added	Changes	Notes
21-Jul-23	-	no	no	Brought in ferric chloride	-
24-Jul-23	-	no	no	-	Bench testing conducted on FeCl
25-Jul-23	-	no	no	-	Ferric chloride was placed by tile and dosing pump was installed
26-Jul-23	LCB	yes	no	-	Began pumping from the Leachate Collection Blanket (LCB) and drip dosing ferric chloride into the tile.
1-Aug-23	LCB	yes	no	-	It was investigated that the infrastructure was not in place for effective treatment. Recommendation for weir box, bio box, and aeration modification were made.
2-Aug-23	LCB	yes	no	The LCB was shocked with ferric chloride (1 tote)	-
3-Aug-23	LCB	yes	no	-	Weir box was constructed
8-Aug-23	LCB	yes	no	-	Bio box was constructed, but needs wood
9-Aug-23	LCB	yes	no	Crew came in to install modifications. The LCB shocking with ferrous sulphate began on a as needed basis	Installation of weir box, pvc port for dosing into the inlet prior to discharge into the tile, aerator placement
10-Aug-23	LCB	yes	no	-	Wood being added to the bio box
14-Aug-23	LCB	yes	no	Bio box was placed and connected	-
16-Aug-23	LCB	yes	no	Leachate and treatment system initialized. Decreased FeCl dosage from initial	Initial modifications were finished. Decreased FeCl dosage to see how odours would change at the tile. Trial only ran for 40 min
17-Aug-23	LCB	yes	no	Pumping rate was increased	Pumping was done at the end of the day and was shut down.
18-Aug-23	LCB	yes	no	Pumping rate was decreased	Short circuiting was observed and a correction to pumping rate was made. Pump was reinitialized at a lower pump rate to maintain retention time at Interim Leachate Pump Station (ILPS)
23-Aug-23	LCB	yes	no	Increased FeCl dosage	Mild odour was detected around the lagoon increased FeCl dosage around 9:15 am, inspected the pond after dose increase at 9:45 am and no odours were detected. Ministry arrive later and detected odour, additional increase in dosage was applied.
28-Aug-23	LCB	yes	no	Decreased FeCl dosage, decreased pumping rate	It was noticed that when the access hatch at the tile was left open, the lagoon was less odorous. Further modifications were needed to draw the offgassing from the tile to the bio box. Pungent odours detected at Echo Valley. Odour complaints arose. Reduced dosage and pumping rate.
5-Sep-23	LCB	yes	no	Decreased pumping rate	Decreased pumping rate to adjust and prevent treatment short circuiting in the tile. After adjustment was made it was observed that the tile was off gassing the majority of the odours.
7-Sep-23	LCB	yes	no	Placed rubber gasket on tile access hatch, decreased pumping rate, increased FeCl dosage	Further decreased pumping rate to adjust and prevent treatment short circuiting in the tile. Detected rotten egg smell by the pond and sewer house, increased dosage to mitigate odour.
8-Sep-23	LCB	yes	no	Added another off gas line from the tile to the bio box	Bio box showed biological growth. An additional line was provided to create a vacuum pressure in the tile to minimize odour leakage from the tile.
12-Sep-23	LCB	yes	no	increased pumping rate, decreased FeCl dosage	Through investigation the leachate pumping rate was adjusted to provide optimum flow (maximizing flow rate without short circuiting). Ferric chloride dosage was decreased to reduce odours
13-Sep-23	LCB	yes	no	Decreased FeCl dosage, decreased pumping rate	Low levels of H2S was detected at the sewer house. Reduced FeCl to further reduce odours. The tile foamed over and dosage and flow was reduced to reassess and restart, over foaming was most likely linked to over aerating at the time. It was tested to see how much aeration the system can handle before over foaming occurred.
15-Sep-23	LCB	yes	no	The LCB shocking with ferrous sulphate stopped	-
25-Sep-23	LCB	yes	no	Increased flow rate	Bench testing conducted on the leachate from the permanent leachate pumping station. Increased flow rate back to optimal flow.
2-Oct-23	LCB	yes	no	Increased pumping rate, Increased FeCl dosage	Conducted bench test with combinations of ferric chloride with hydrogen peroxide. H2S readings were found at the tile, increased FeCl dosage to address
4-Oct-23	LCB	yes	no	Injection port installed on the discharge side of tile for addition of hydrogen peroxide	Conducted bench test with just hydrogen peroxide and just ferric chloride.
6-Oct-23	LCB	yes	no	Increase FeCl Dosage	H2S readings observed at various points, increased FeCl dosage to address

**GFL Stoney Creek Regional Facility**  
**Modifications to Leachate Treatment System**

Date	Pumping Location	FeCl Added	H2O2 Added	Changes	Notes
10-Oct-23	PLPS	yes	no	Switched location of leachate pumping from the LCB to the Permanent Leachate Pumping Station (PLPS), decreased FeCl dosage	Switched pumping location as the blanket was generating odours, lowered and maintained FeCl dosage as at this rate it does not produce excessive odours. The blanket began increasing in H2S. The PLPS has a high H2S concentration at the source. Prior to this the H2S was fairly low at the source at the blanket. Secondary fan was turned off so odours increased at the tile and decreased at the bio box, decrease FeCl because the smell was too odorous
11-Oct-23	PLPS	yes	yes, post FeCl	Injection of hydrogen peroxide began	Adding additional treatment to address H2S. Bench test results showed FeCl and H2O2 both reduce H2S concentrations from OR to 0 ppm
13-Oct-23	PLPS	yes	yes, post FeCl	-	A carbon filter air scrubber was brought to site for installation. Prepared the PLPS for pretreatment dosage. Electrical and other infrastructure built to support dosing station.

# **Attachment 3**

## **GFL Odour Complaint Procedures**

### **GFL – Odour Complaint Investigations and Reporting Procedure**

- All complaints received will be assigned a control number and recorded electronically.
- Details of the complaint are forwarded to GFL Management for follow-up.
- GFL Management will ensure that the complaint is investigated and resolved in a timely manner.
- Determine where the odour complaint originates from, typically provided by the complainant.
- Using online meteorological data to establish wind direction, a determination will be made if the odour is being carried from the landfill to the source of the complaint.
- If the investigation is determined that the odour is not caused by the landfill through sufficient evidence, then the information and observations will be recorded, and a formal letter will be sent to the complainant.
- If an occurrence is deemed to be sourced from the landfill, immediate mitigation measures will be taken to deal with the odour issues. The information and observations will be recorded, and a formal letter will be sent to the complainant.
- In addition, copies of complaints and responses will be sent to the Community Liaison Committee, the City and the MECP.
- Complaints will be summarized for inclusion in the Annual Report.