Introduction

This report is being submitted in accordance with the requirements of Nova Scotia Environment (NSE) Approval # 2008-062534-A01, dated November 18, 2016, issued to permit operations of the Halifax Ragged Lake Source Separated Organics Compost Facility (Facility), located at 61 Evergreen Place in Halifax, Nova Scotia. This report covers the operating period for the Facility from January 1, 2016 to December 31, 2016, inclusive.

On Sept 30, 2016, New Era Technologies Ltd (Hatch) ended their contract with the Halifax Regional Municipality (HRM) in regards to operation of the Facility. New Era had historically been the long-term owners and operators of the Facility, but ownership of the Facility was transferred to the HRM in 2015. In 2016, the operation of the Facility was tendered out by HRM in search of a new Facility operator. Aim Environmental Group Inc. (AIM) based in Stoney Creek, Ontario was the successful proponent and AIM was awarded the operations of the Facility on behalf of HRM effective October 1, 2016.

The technology employed is an in-vessel containerized technology, utilizing 24 container vessels, each with a capacity of approximately 25 tonnes payload. After the container process, materials are cured in an aerated static pile process for at least another twenty-one days, prior to final screening and testing of finished materials.

Reporting Requirements

As noted above, the facility operates under Approval 2008-062534-A01 issued by the NSE. The Approval requires the submission of annual report on or before March 15th of each year that provides the following required information:

Approval Condition 7c): The Approval Holder shall determine the volume of waste water taken off site for treatment and report the results to the Department along with the wastewater quality data on an annual basis.

Approval Condition 8c): The surface water monitoring results should be submitted annually [covering both storm water and surface water].

Approval Condition 9b): The [groundwater monitoring] results shall be reported to the Department annually.

Approval Condition 11b(iv): The results of compost sampling shall be submitted to the Department on an annual basis.

Approval Condition 12:

a) A summary of feedstock received at the site including:

(i) Types of materials received at the Site during the period.
(ii) Quantities of each specific feedstock received at the Site during the period.
(iii) Quantities of feedstock composted.
(iv) Quantities of feedstock rejected and sent for disposal.
(v) Quantities of overs produced and their disposal location.

b) A summary of the compost quality testing results for the year.

c) A chronological summary of all the water quality (surface water, storm water pond discharge, groundwater, liner sump and wastewater) analysis results for the year. This will be a summary of the water quality analysis and shall include an assessment of the results by a qualified independent agency.

d) Any registered complaints and the actions taken to resolve the issue.

e) Results of the building floor inspection and repair program specified in item 13.3.

Approval Condition 13g): The results of the liner sump monitoring shall be reported to the Department annually.

2016 Results

The following sections presents the results of the 2016 operations of the facility, in numerical order of the reporting requirements in the Approval:

Approval Condition 7c): Total Amount of Wastewater Taken Off-site

The total amount of wastewater removed from the site between January 1st and December 31st, 2016 is as follows:

- Leachate removed from the In-Vessel system was **4,131,231** litres. This liquid is a combination of leachate from the container composting process and any liquids collected on the floors of the receiving and curing buildings. This liquid was taken to S.F. Rendering Ltd in Canard, Nova Scotia for disposal.

- Wastewater removed from the fibreglass and bio-filter tanks was **2,769,682** litres. This liquid is the combination of water collected in the underground liquid collection piping, any liquids collected on the floor of the screening building, and any excess biofilter leachate water which all combines in the fiberglass holding tank. This liquid was also taken to S.F. Rendering Ltd. in Canard, Nova Scotia for disposal.

Approval Condition 8c), 9c), and 12c: **Stormwater, Surface Water, Groundwater, and All Water Quality, Monitoring**

The Facility collects samples from the storm water pond and submits them to an external laboratory for analysis in accordance with Condition 8b) of the Approval. The results of these samples are included in **Attachment 2**. All samples from the pond met the Approval requirements before water discharge by authorized staff.

The Facility engages Englobe to perform its required surface water, groundwater and potable well water monitoring at various principle locations across the site. These locations were determined historically and approved historically by NSE and are sampled and analysed in accordance with the Approval.

Englobe has provided an Annual report with analysis and comparisons of all historical data to date ***(see Attachment 4).*** While Attachment 4 details all the water monitoring carried out at the site, in summary the results for all water quality sampling are consistent with historic results for the facility and no anomalies or specific areas of concern were identified in 2016.

Approval Condition 11b(iv) and 12b): **Compost Testing and Quality**

The facility produced 7,380.90 tonnes of compost in 2016. Trained on-site staff collected and managed all samples for lab analyses by Maxxam Laboratories Ltd up to Sept 30, 2016 and from October - Dec 2016 by A&L Canada Laboratories. Dr. Paul Arnold of Bio-Logic continues to carry out all germination testing on the finished compost product.

Analytical results and testing reports, and letters from Dr. Paul Arnold are attached ***(see Attachment 1).*** Results are compared against the Canadian Council of Ministers Environment (CCME) guidelines for Class A Compost.

The product being shipped from the facility between January and December of 2016 met all the requirements of Class “A” product in accordance with the Approval issued by NSE.

Approval Condition 12a(i): **Summary Feedstock Received - Types of Material**

The Facility receives source separated organic materials from the following principal sources and is generally comprised of material described as:

a) Residential green cart program in the HRM – which is comprised of food waste, leaf and yard waste and some boxboard, along with other fiber and contaminating materials.

b) Source separated organics from commercial sources in the HRM – generally this stream is generated from sources such as restaurants,

grocery stores, fish processing facilities, and to a lesser degree apartment and condominium buildings.

Generally, the Halifax residential green cart material is paper rich resulting in a high carbon to nitrogen ratio. The material from Halifax's commercial sector is reasonably clean. Halifax banned corrugated cardboard from the IC&I sector in late September 2001 and have had great success with alleviating the plastic wrapped and packaged material from IC&I sector through the education process. Further to this, in the early spring of 2015, the Municipality implemented a ban on grass clippings entering the curbside green carts. Along with this, the Municipality allowed boxboard in the curbside paper recycling program thus diverting some boxboard from the green cart organic waste stream.

Approval Condition12a(ii) and 12a(iii): **Quantities of Specific Feedstock Received and Composted**

Table 1 below summarizes the raw materials received from both residential and commercial streams, material rejected and tonnage composted. The total tonnage composted is equal to the material received less the material rejected. **Appendix I**, presents monthly totals for each stream.

Source	Tonnage
HRM Residential	9456.63
HRM Commercial	8018.93
Total Received	**17475.56**
Tonnes Rejected	177.49
Total Tonnes Composted	**17,298.07**

Table 1 – Summary of 2016 Facility Tonnage

Early in 2016, the roll-off truck which maneuvers the In-Vessel containers - which was severely damaged - was off-site at Nova Enterprise in Truro, NS for major repairs. The roll-off truck did not return to normal operations until late February 2016. After return of the roll-off, time was needed to fully re-establish the full in-vessel process at the facility. During this period, some incoming feedstocks were exported to Fundy Compost in Brookfield, NS for processing on behalf of the HRM and additionally some loads were diverted directly to Miller Waste, HRM's contracted organics facility located in Dartmouth, NS. This is shown in **Appendix I** where negative volumes are shown for incoming residential materials in February and lower than normal residential raw material volumes in March. Overall, this resulted in a lower total annual tonnage processed by the facility in 2016. For the entire year, the total amounts of material that were not sent to the Ragged Lake facility for processing as would normally be the case were approximately as follows:

- Exported to Fundy Compost 1882.74 tonnes
- Diverted to Miller Waste 320.03 tonnes

2202.77 tonnes total

Approval Condition 12a(iv): **Quantities of Feedstock Rejected and Sent for Disposal:**

Ragged Lake received 17,475.56 tonnes of feedstock in the year 2016. The Facility sorted and rejected 177.49 tonnes of this feedstock at the front end. Thus 17,298.07 tonnes of raw material was composted by the facility in 2016. This raw material tonnage complies with the Approval capacity.

The front-end rejected materials were sent to Otter Lake Waste Processing and Disposal Facility for disposal and consisted predominately of fibrous materials and other non-compostable materials such as metals and plastics.

Ragged Lake shipped an additional 505.91 tonnes of rejected residual material from our back-end process ("back-end residuals"), consisting primarily of plastics, metals and lined or waxed fibrous materials. These materials were shipped to the Kaizer Meadow Landfill in Chester for disposal.

The total amount of front and back end rejected materials was 683.40 tonnes.

Approval Condition 12a(v): **Quantities of overs produced and their disposal location**

Overs are temporarily stored in the Screening Building and transferred by dump truck to the Receiving Hall for re-processing. These are re-introduced and mixed in with the daily incoming loads of feedstock, both residential and commercial. In doing so this not only helps to absorb the wet commercial organic waste but also assists by kick starting the decomposition stage within the containers (In Vessel Process). Furthermore, by mixing the recycled overs and incoming feedstock, the required porosity is provided in the mixture to ensure adequate airflow and aerobic conditions. Finally, returning overs to the front end further allows removal of any contaminants missed originally.

The total amount of overs recirculated to the front end of the process was 3973.20 tonnes (representing 22.74 % of the incoming raw material tonnage).

Approval Condition 12d): **Summary of Registered Complaints (see Attachment 3)**

Ragged Lake maintains a log of complaints made to the site regarding off site odours and the actions taken to resolve the concern. There were no complaints registered to the Ragged Lake Compost Facility for 2016.

Approval Condition 12e): **Results of Floor Inspection and Repair Program**

The NSE Approval No. 2008-062534-A01 for the facility requires in Condition 13d) that the floors in the receiving building and curing building be checked on a regular and ongoing basis for cracks, and that cracks be repaired immediately.

Prior to AIM's assumption of Facility management effective October 1, 2017, the Facility when operated by New Era was required to submit quarterly reports to NSE, including reports on the building floor crack inspection and repair programs. The updated approval issued to AIM reduced all required reporting to one annual report, to be submitted annually on or before March 15th of each year.

Attachment 5 presents the last two quarterly reports prepared by New Era, one dated April 12, 2016 and one dated July 11, 2016. The October 2016 quarterly report became no longer required for submission to the NSE as per the conditions in the updated permit.

In regards to work completed in 2016 and work planned for 2017:

Receiving Building:

- Inspections and crack repairs were completed in February and June of 2016; and,

- The receiving building cladding and some structural work will be conducted by an HRM contractor, likely in April 2017, during which the floors will be inspected and repaired as needed.

Curing Building:

- Original planned schedule for 2016 and work completed in 2016:

West (container turner end) **East**

70' section	70' section	80' section	110' section	110' section
Planned Apr. 2016	Planned October 2016	Scheduled for Feb 2017	Planned for Mar. 2016	Planned for Feb 2016
Completed Apr. 2016	Deferred to April 2017	Deferred to Apr. 2017	**Completed in Jan. & Mar. 2016**	**Completed in Feb. 2016**

- The reason for deferring the 70' section planned for October 2016 to April 2017 are as follows:

- High material volumes and equipment issues in Q4-2016 led to decision to defer work to ensure no negative impact to composting process; and,

- HRM's planned reconstruction of the receiving building provides a three-week window in April 2017 to more readily allow inspections and repairs to be carried out, as incoming raw material volumes will be significantly lower during this construction work.

- The updated inspection program for the curing building is as follows:

West (container turner end) **East**

70' section	70' section	80' section	110' section	110' section
Feb. 2018	Apr. 2017	Apr. 2017	Jul. 2017	Feb 2018

- The middle 80' section was deferred from February 2017 to April 2017 to align with the receiving building rebuild and planned three-week shutdown.

The NSE will be notified if there are any significant variations from the 2017 planned floor inspection and repair work for either building as presented in this report.

Approval Condition 13g) **Results of Liner Sump Monitoring**

The liner sump monitoring program is carried out by Englobe and the detailed program findings are including in Attachment 4. In 2016, the liner sump was dry for all monitoring events.

Halifax Ragged Lake Compost Facility 2016 Report

Month	Residential	Commercial	HRM Totals	HRM NET	Compost	Compost %	Overs	% Overs	Front End Residue	% Front End Residue	Back End Residue	% Back End Residue
January	814.08	635.87	1,449.95	1,409.05	1,070.57	73.83%	12.90	0.89%	28.00	1.93%	**0.00**	**0.00%**
February	(459.46)	629.71	170.25	(252.73)	147.00	86.34%	378.40	222.26%	0.00	0.00%	**44.58**	**26.19%**
March	332.53	673.98	1,006.51	380.65	-	0.00%	563.30	55.97%	19.63	1.95%	**42.93**	**4.27%**
April	852.80	646.95	1,499.75	1,031.65	158.84	10.59%	408.50	27.24%	17.11	1.14%	**42.49**	**2.83%**
May	771.99	615.24	1,387.23	945.17	864.65	62.33%	387.00	27.90%	11.41	0.82%	**43.65**	**3.15%**
June	617.11	660.12	1,277.23	781.59	653.61	51.17%	430.00	33.67%	13.67	1.07%	**51.97**	**4.07%**
July	1,051.82	638.17	1,689.99	1,628.62	340.71	20.16%	0.00	0.00%	9.55	0.57%	**51.82**	**3.07%**
August	1,163.97	666.98	1,830.95	1,419.04	525.06	28.68%	356.90	19.49%	10.56	0.58%	**44.45**	**2.43%**
September	908.84	728.36	1,637.20	1,112.91	654.23	39.96%	464.40	28.37%	7.78	0.48%	**52.11**	**3.18%**
October	1,134.13	709.78	1,843.91	1,482.78	475.42	25.78%	305.30	16.56%	11.86	0.64%	**43.97**	**2.38%**
November	1,361.68	715.28	2,076.96	1,686.85	1,081.84	52.09%	326.80	15.73%	20.75	1.00%	**42.56**	**2.05%**
December	907.14	698.49	1,605.63	1,193.38	1,408.97	87.75%	339.70	21.16%	27.17	1.69%	**45.38**	**2.83%**
Total Tonnes	**9,456.63**	**8,018.93**	**17,475.56**	**12,818.96**	**7380.90**	**42.24%**	**3973.20**	**22.74%**	**177.49**	**1.02%**	**505.91**	**2.89%**