

January 30, 2023

Project: Halifax Regional Municipality Materials Recovery Facility Container Line Front-end Upgrades and Process Improvements Final Report

Project Overview

Halifax Regional Municipality (HRM) owns the Materials Recovery Facility (MRF) located at 20 Horseshoe Lake Dr in Bayers Lake Business Park, Halifax, NS. The facility is operated under an agreement with a contracted operator (currently Royal Environmental (REgroup)) for the period April 1, 2019 to March 31, 2024. The facility has a container sort line and a separate fiber (paper and cardboard) sort line for processing recyclables received from HRM curbside collection and other commercial generators. HRM in conjunction with Regroup proposed upgrades to the front end of the container sorting line at the MRF to increase the efficiency and effectiveness of the processing system.

These upgrades are intended to optimize the operations and processing of incoming container recyclables to increase the capture rate and decrease the quantity of residuals that are sent to landfill. The front-end upgrades and process improvements utilize best practices to increase safety and productivity. HRM's curbside recyclables are collected in two separate streams: containers in blue bags and fiber collected together as bagged paper with bundled cardboard. The MRF receives curbside residential collection material from all of Halifax Regional Municipality and Chester, with Industrial, Commercial and Institutional recyclables making up 22% of the incoming approximately 25,000 tonnes annually of recyclables. With Extended Processor Responsibility (EPR) legislation potentially being implemented in Nova Scotia, this facility would be well placed as a central processing facility.

HRM applied for and received funding from DIVERT NS for the following upgrade projects at the MRF:

1A. Reconfigure Conveyors and Chutes

The first portion of this project, which has been completed, is the reconfiguration of two conveyors and six chutes on the front-end sorting platform to allow for increased capture of film plastic. This has also included the removal of the non-operational manual tie film baler that had reached the end of its useful life. The manual tie baler was also not being used due to excessive processing time requirements. Prior to the upgrades, the film plastic was being piled in the corner of the building and then pushed out with a forklift to the infeed conveyor of one of two facility balers.

The film plastic is now sorted and directed to the exterior compactor as it is much larger and automated, rather than using the compactor for residue. This change has opened up the first eight pre-sort stations to allow for a more efficient and complete capture of the plastic film from the recyclable stream. The residue is now managed in a front-end container. Figure 1 below shows some of the new chutes and the existing conveyor that was repositioned for the collection and transport of the film plastic to the external compactor.

Figure 1 – New Chutes and Repositioned Existing Conveyor



1B. External Compactor Refit

The second portion of this project, also completed, is the refit of the external compactor for the new duty of compacting the increased amounts of plastic film. The external compactor was originally installed in 2008 and used continually but required a refit including frame and wearbar repairs, along with some electrical and hydraulic repairs to continue trouble free operation. Figure 2 below shows the exterior compactor which originally collected residue, that has been refit to compact the plastic film.

Figure 2 – Refurbished Exterior Compactor and Bin



Data and Reporting

HRM monitors the operation of the MRF by the contractor, REgroup, and this includes monthly waste audits at which the back-end residual material is collected from the compactor bin and sorted by both HRM and REgroup staff. The various categories are then weighed and counted to determine the percentage of recyclable material remaining in the waste stream. HRM conducts these Residue Audits monthly in conjunction with the facility operator – REgroup. During the Residue Audits conducted at the MRF, the current operator had been averaging over 12% film plastic in the residual stream, which equates to up to 734 tonnes of residual plastic film going to the landfill, or about one third of the incoming recyclable film plastic. The purpose of these upgrades is to allow for capture of a much larger percentage of the film plastic and this can be tracked in the monthly Residue Audits performed at the facility.

The below tables show the results from the monthly Residue Audits, presenting the percentage of film plastic, broken glass and several high value materials present in with the residue, since the implementation of the upgrades in May, 2022, including the eight month study period average for 2022, and the averages for the past three fiscal periods.

Table 1 - Monthly Residue Audit Results for Select Materials

	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
Film Plastic	10.37%	9.03%	9.47%	10.40%	6.85%	13.42%	8.17%	6.75%
Residue Broken Glass	8.65%	3.30%	6.58%	5.92%	8.35%	4.18%	3.59%	3.97%
Aluminum Cans	0.45%	0.07%	0.42%	0.31%	0.07%	0.22%	0.00%	0.13%
Deposits	1.34%	0.50%	2.11%	0.87%	0.50%	0.55%	0.30%	0.53%
Aluminum	0.30%	0.14%	0.36%	0.25%	0.21%	0.33%	0.20%	0.13%
HDPE #2	2.83%	0.43%	2.84%	1.37%	1.64%	0.77%	0.70%	0.40%
Tubs/Lids	1.79%	0.79%	1.45%	0.81%	0.64%	1.21%	0.60%	0.40%

Table 2 – Average Annual Residue Audit Results for Select Materials

	2022 Average (8 month study period)	2021-2022 Average	2020-2021 Average	2019-2020 Average
Film Plastic	9.31%	11.39%	12.37%	12.67%
Residue Broken Glass	5.57%	8.97%	15.20%	12.10%
Aluminum Cans	0.21%	0.24%	0.40%	0.54%
Deposits	0.84%	0.84%	1.95%	5.09%
Aluminum	0.24%	0.37%	0.55%	0.74%
HDPE #2	1.37%	1.04%	1.97%	3.32%
Tubs/Lids	0.96%	1.59%	2.63%	3.71%

With the front-end upgrades complete, the monthly Residue Audit results are showing that the film plastic not recovered and ending up in with the residue has been reduced by almost 25% since the upgrades were completed in May 2022 over previous fiscal years (decreased to 9.31% as shown in Table 2). Three of the five high value materials (i.e., aluminum cans, aluminum, and tubs/lids) show a decrease in the percentage reaching the residue stream, meaning they are being more effectively picked and recovered from the recyclable stream. One of the high value materials, deposit containers, so far continues with a similar residual percentage from the previous year. The remaining high value material, HDPE #2 so far has a slight increase over last year

but has stayed well below the previous two years. The Residue Audit trend results show a notable benefit from the front-end upgrades.

See Attachment 1 that shows the full results of the monthly Residue Audits (for all materials) over the period May 2022 to December 2022.

These two upgrade projects were aimed to improve the capture rate for the film plastic on the front-end of the container sort line in order to positively impact the capture rates of other high value recyclable materials on the main sort conveyor, as visibility of these materials for sorters increases with less of the bulky film plastic present. With more of the plastic film removed from the sorting stream, the recyclable materials are more visible allowing sorters to capture additional recyclables which will now be recovered on the main sorting conveyor.

Since the upgrades, the reduction of film plastic on the main sort conveyor is also visible through the cameras that monitor the facility. The additional space for each of the plastic film sorters allows more effective collection of the film and therefore more efficient sorting of the other materials.

The increases in capture rate of the film plastic and the other recyclables will be continually assessed in the ongoing monthly Residue Audits which track the quantities of the various items within the residue stream.

The other noticeable trend from the Residue Audits is that the residual stream is consisting of less recyclables and more actual garbage, showing the efficiency of picking the recyclables has increased even if there is no change in the quality of the incoming materials. The tables below show the increase in garbage percentage as a portion of the overall sample from the Residue Audits.

Table 3 – Monthly Garbage as a Percentage of Overall Sample in Residue Audits

	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
Garbage	43.55%	66.05%	41.34%	54.92%	59.89%	49.06%	53.98%	67.79%

Table 4 – Annual Garbage as a Percentage of Overall Sample in Residue Audits

	2022 Average (8 month study period)	2021-2022 Average	2020-2021 Average	2019-2020 Average
Garbage	54.57%	45.83%	35.71%	29.88%

Recommendations

These front-end upgrades appear to have increased the effectiveness of the sorters at the recycling facility and have increased the recovery of film plastic from the front end of the blue bag container processing line. By collecting and removing the large bulky film plastic early in the process, the sorters on the main conveyor can more easily see and separate the other recyclables from the waste stream. We recommend that any other recycling facility processing bagged container recyclables aim to collect the film plastic early in the system to allow more effective sorting of the recyclables. Another recommendation is adding separation between the sorters and alternating positions on either side of the conveyor, this allows the sorters to reach more material without interfering with each other. An added benefit with the sorting platform configuration is that after passing by the first three sorting positions, the conveyor drops down onto a second conveyor travelling perpendicular, which flips the material. This flipping action reduces the need for the sorters to turn over the materials and allows them to concentrate on picking off the already visible film plastic.

Sincerely,

Solid Waste Resources – Public Works
Halifax Regional Municipality

Attachment 1 – 2022 MRF Residue Audit Results

2022-2023 MRF Monthly Residue Audits - % Weight Distribution of Sample													
Category	Commodity Market	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Averages	Totals		
Residue	Garbage/Residue	43.55%	66.05%	41.34%	54.92%	59.89%	49.06%	53.98%	67.79%	54.57%	60.14%		
	Residue Broken Glass	8.65%	3.30%	6.58%	5.92%	8.35%	4.18%	3.59%	3.97%	5.57%			
Fibre	OCC	0.75%	0.43%	0.54%	0.19%	0.00%	0.99%	1.79%	1.72%	0.80%	5.94%		
	ONP	0.30%	0.64%	0.97%	0.75%	0.50%	1.21%	0.60%	0.66%	0.70%			
	Mixed Paper	5.74%	3.15%	7.30%	4.48%	2.93%	3.85%	4.28%	3.70%	4.43%			
Blue Bag	Glass Containers (intact)	0.89%	0.29%	0.78%	0.19%	0.43%	0.33%	0.20%	0.00%	0.39%	33.09%		
	Metal Pots & Pans	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.40%	0.05%			
	Non-Deposit Aluminum	0.30%	0.14%	0.36%	0.25%	0.21%	0.33%	0.20%	0.13%	0.24%			
	Steel/Tin	0.97%	0.14%	0.36%	0.19%	0.21%	0.22%	0.10%	0.13%	0.29%			
	Film Plastic	10.37%	9.03%	9.47%	10.40%	6.85%	13.42%	8.17%	6.75%	9.31%			
	HDPE #2	2.83%	0.43%	2.84%	1.37%	1.64%	0.77%	0.70%	0.40%	1.37%			
	Tubs/Lids	1.79%	0.79%	1.45%	0.81%	0.64%	1.21%	0.60%	0.40%	0.96%			
	Mixed Plastics	Black/Clamshell	10.37%	7.81%	13.46%	8.09%	6.07%	11.11%	13.75%	7.54%		9.77%	
		Mixed #1-7	11.04%	6.81%	10.74%	10.27%	11.63%	12.43%	10.76%	5.42%		9.89%	
	Non-deposit Tetra (& Milk Cartons)	0.45%	0.36%	0.66%	0.44%	0.00%	0.33%	0.60%	0.26%	0.39%			
	Milk Cartons	0.67%	0.14%	1.03%	0.87%	0.14%	0.00%	0.40%	0.20%	0.43%			
	Deposits	Aluminum Cans	0.45%	0.07%	0.42%	0.31%	0.07%	0.22%	0.00%	0.13%		0.21%	0.84%
		Plastic Bottles	0.52%	0.14%	0.72%	0.31%	0.29%	0.11%	0.30%	0.40%		0.35%	
Aseptic (Tetra)		0.37%	0.29%	0.60%	0.25%	0.14%	0.22%	0.00%	0.00%	0.23%			
Glass bottles		0.00%	0.00%	0.36%	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%			
Total Sample Weight (kg)		134.10	139.60	165.70	160.60	140.10	90.90	100.40	151.20	135.33	100%		

CHART SUMMARY	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22
Residue	52.20%	69.34%	47.92%	60.83%	68.24%	53.25%	57.57%	71.76%
Fibre	6.79%	4.23%	8.81%	5.42%	3.43%	6.05%	6.67%	6.08%
Recoverable Containers	39.68%	25.93%	41.16%	32.88%	27.82%	40.15%	35.46%	21.63%
Deposits	1.34%	0.50%	2.11%	0.87%	0.50%	0.55%	0.30%	0.53%