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MATERIAL RECOVERY FACILITY EXPANSION

The Solid Waste Management Committee recommends the adoption of the recommendations contained in the following report, May 28, 2007, from the Director, Solid Waste Management:

1. RECOMMENDATIONS

It is recommended that:

1. Regional Council authorize staff to establish a Capital Budget, funded from Reserve Funds, for process modifications (residue clean up system and optical sorting for plastics and fibre products) at the Region's Material Recovery Facility.
2. Regional Council direct staff to issue a Request for Proposal (RFP) for the above modifications.

2. PURPOSE

This report will provide the rationale for process optimization changes at the Regional Material Recovery Facility.

3. BACKGROUND

In July, 2005, the Region commissioned the Garfield Wright Waste Management Centre. The new facility was designed, in consultation with the local municipalities, to process commingled blue box recyclables to meet the needs of the growing population and reduce municipal collection costs.

York Region and all of the local municipalities jointly approved the Joint Waste Diversion Strategy (JWDS) in the fall of 2006. In the strategy, expansion/upgrading of the Region's MRF was identified as an objective to meet the local municipal needs and contribute to meeting the diversion target of 65% from landfill.

In September 2006, staff retained a consultant to conduct a review of the Region's Material Recovery Facility to identify potential process modifications in response to the Joint Waste Diversion Strategy. This review was done to address two key issues:

- Optimizing the efficiency of the Material Recovery Facility.
- Upgrading it to meet growing processing requirements.

The review's primary purpose was to assess areas for improvement in:

- Product recovery.
- Product quality and facility throughput.

Furthermore, the review was to determine if the Material Recovery Facility, as it is currently designed, can manage the expected growth in blue box tonnes and if it could not, what potential design modifications could be implemented. A financial analysis was prepared for all of the potential design modifications.

The secondary purpose of this review was to assess the operational and financial implications of changing the current blue box program to using alternative collection containers along with the addition of new materials. As well, this review will evaluate other changes to the Material Recovery Facility to improve operational efficiencies. Staff will prepare a separate report on the findings from this review in the fall of 2007.

4. ANALYSIS AND OPTIONS

The amount of blue box recyclable material has increased significantly since July, 2005 when the comingled single-stream blue box program was launched throughout the Region. Initiatives such as weekly collection of blue box recyclables, Source Separated Organics (SSO) diversion and bi-weekly collection of waste have also contributed to this growth. While these initiatives have contributed to increase diversion from landfill, the Material Recovery Facility will not be able to sustain the growth in blue box tonnes without process modifications.

It was anticipated that in the first calendar year of operations, 55,000 tonnes of blue box recyclables would be processed. During that year, 80,000 tonnes of blue box recyclables were processed. The Material Recovery Facility has a capacity of 91,000 tonnes per year when operating two shifts per day, five days per week. In 2009, it is anticipated that the Material Recovery Facility will be required to process a minimum of 99,500 tonnes of blue box recyclables.

In order to accommodate the expected growth in blue box recyclables, there are a number of options:

- Continue with the current design but add more staff.
- Modify the current design by incorporating new sorting technologies.
- Continue with the current design but add more operating hours.
- Construct another Material Recovery Facility.

In both of the first two options, the Material Recovery Facility will have to be operated at a much faster rate. A consequence of processing at a faster rate is the quantity of Material Recovery Facility residue will increase.

4.1 Increasing Productivity by Using More Manual Labour

In this option, the Material Recovery Facility design will not change but it will require more manual sorting staff. This increase in sorting staff will be from the current 40 to a minimum of 53 per shift. The reason for the increase is that more sorting staff are required to maintain product quality as the facility operates faster. However, operating the facility faster causes the efficiency of all sorters to decrease. Therefore, to ensure products being marketed for recycling continue to meet the required quality specifications, more staff are required.

There is a limitation to this option. Due to the facility's current design, there is a maximum number of sorters that can be physically put on to the sorting lines. If the amount of blue box recyclables requiring processing exceeds the processing capacity of the Material Recovery Facility, additional sorting lines will be required which will require even more staff and additional capital expenditure. Also, the installation of a residue clean-up system will be required due to the manual sorting inefficiencies related to the increased processing rate.

4.2 Increasing Productivity through the Use of Automated Equipment

As an alternative to the previous option, upgrading the facility with new sorting technologies will, in addition to meeting the required processing requirements, decrease the number of manual sorters required. This automation would involve using optical sorting technology to sort plastic and fibre products.

Optical sorting technology uses beams of light to differentiate between different types of materials. The light is directed at and reflected from an object and a sensor in the machine determines the type of product. The machine then "sorts" the materials according to its type. In this way, the optical sorting technology can replace a large portion of the manual sorting that is required in the Material Recovery Facility. It should be noted that the Material Recovery Facility will not become 100% efficient with this system and, therefore, will require the installation of a residue clean up system.

4.2.1 Optical Sorting for Plastics

The consumer sector is rapidly moving towards more and more single serving food and beverage containers. The overwhelming majority of these containers are plastics. The current manual sorting demand for plastics is very high and at times in the year, is greater than the Material Recovery Facility's current capacity. In order to improve sorting efficiency and adapt to the growth in plastic tonnes, optical sorting for plastics will satisfy the processing requirements and reduce labour costs. It is expected that the optical sorting technology for plastics will reduce the manual labour complement by four staff per shift from its current amount of seven staff per shift. The City of Toronto and Region of Peel are in the process of installing optical sorting for plastics in their material recycling facilities.

4.2.2 Optical Sorting for Fibres

The composition of materials in the blue box is approximately 70% fibre products and 30% container products. In order to accommodate the growth in blue box tonnes, the Material Recovery Facility will be required to operate faster. A faster processing rate will increase the manual sorting demand. This increased demand will decrease the manual sorting efficiency to the point where the fibre products will not meet the required quality requirements. In order to mitigate this, optical sorting technology will be required. It is expected that the optical sorting technology for fibres will reduce the manual labour staff by eight per shift from its current level of 18 per shift. The City of Toronto is currently installing optical sorting for fibres in its Material Recovery Facility that is operated by Metro Waste.

4.3 Improving on Processing Efficiency

It is inherent in all industrial facilities that there is loss during processing. Every machine is intrinsically inefficient and requires a quality control station to mitigate loss. In the Material Recovery Facility, the efficiency of the mechanical screens to sort fibre products from container products is determined by the processing rate. At higher processing rates, the efficiency of the mechanical screens is considerably decreased resulting in recyclables ending up in the residue. In order to manage the anticipated growth in blue box tonnes, the Material Recovery Facility will be required to operate at a faster processing rate and will require a residue clean up system.

A residue clean up system would involve a manual sorting station to recover recyclables and re-direct them back into the facility. This manual sorting station would be accompanied by conveying equipment that would transfer the recovered recyclables to their appropriate storage bunker.

4.4 Expanding Capacity through Increasing Operating Hours

Increasing the operating hours is an alternative to operating the Material Recovery Facility with more staff and optical sorting technology to meet the processing requirements. This can be done by adding a third operating shift or operating on weekends.

In order to maintain the facility in good working order, the time during the third shift is used to conduct preventative maintenance on the equipment. By using this time to process material rather than maintain the equipment, there is the elevated risk of equipment failure which would result in the inability to process materials. Equipment failure would significantly impact the delivery of service to the local municipalities and residents. Furthermore, operating the equipment longer reduces its life expectancy requiring replacement ahead of schedule. Similarly, operating the Material Recovery Facility on weekends would result in increased operating costs as the staff would be working on an overtime basis in combination with increased wear on the equipment. Therefore, expanding processing capacity through the use of increased operating hours is not recommended.

4.5 Expanded Capacity by Adding Infrastructure

Constructing another MRF or adding a third processing line to the existing Material Recovery Facility are possibilities to expand processing capabilities. In the year 2015, between 110,000 and 130,000 tonnes of blue box recyclables will be generated from York Region sources and will require processing. At this time, investing in this infrastructure is not recommended as this is an expensive option and the alternative options presented in this report will fulfil the processing requirements.

5. FINANCIAL IMPLICATIONS

In order to deal with the anticipated quantity of recyclables by 2009, the Material Recovery Facility operations will have to be modified. These modifications will require a higher throughput and a residue clean up system in combination with either more staff or optical sorting equipment.

It is expected that using the current Material Recovery Facility design with more manual sorters will require at least 13 additional sorters per shift (26 per day) by the end of 2009. Using a conservative annual salary of \$50,000 per sorter, this equates to \$1.3 million in extra labour costs per year. However, despite this addition of sorters, the quality of materials marketed for recycling will decrease. This fact will reduce the revenue from the sale of recyclables, increase the Region's cost for disposal and decrease the diversion rate.

By using optical sorting technology to displace manual sorting, it is expected that there will be a reduction in full time manual sorting staff of 12 per shift (24 per day). Using the same conservative annual salary, this equates to an annual labour savings of \$1.2 million. Despite the reduction in manual sorters, the products for recycling will meet the required quality specifications. The anticipated capital expenditure required for the optical sorting technology for plastics and for fibre products is approximately \$4.4 million. This equates to a pay-back period of approximately 3.7 years.

In 2006, approximately 4,250 tonnes of recyclables (or 5.3% of the processed material) was lost to the residue. This equates to approximately \$600,000 in lost revenue and approximately \$319,000 in landfill costs for a net loss of \$919,000. The capital cost for a residue clean up system would be approximately \$354,000. The residue clean up system would operate using two manual sorters at an operational cost of approximately \$100,000. Conservatively, if the residue clean up system were able to recover 50% of the recyclables, there would be an annual savings of \$359,500. This would equate to a pay-back period of approximately one year.

Table 1
Cost Implications of Processing Modifications

Options	Projected Cost (Annualized)		
	Capital Cost	Operating Cost	Payback (years)
Current Design with Additional Manual Sorting	\$0	\$1,300,000	N/A
Reduced Manual Sorting with Optical Sorting Technology	\$4,400,000	\$(1,200,000)	3.7
Residue Clean Up System	\$354,000	\$(359,500)	1.0

York Region and the local municipalities receive funding from the Province of Ontario for blue box processing and diversion from landfill. Each year, the provincial funding is split equally between the Region and local municipalities. The funding that the Region has received in the past has been set aside in reserve and will be used for the purpose of projects such as those described in this report. To date, York has put \$4.6 million in reserve to finance upgrades. The 2007 Capital Budget planned for most of this plant expansion to happen in 2009/2010. Given the urgency of the project, the funds need to be advanced to 2007/2008. It is, therefore, proposed that a new Capital Budget for this program be established and funded from the Solid Waste Management Reserve Fund.

6. LOCAL MUNICIPAL IMPACT

As the population of York Region continues to grow, the Material Recovery Facility must be able to process the increase in blue box tonnes to achieve 65% diversion from landfill. Upgrading the Material Recovery Facility with optical sorting technology and a residue clean up system will achieve this result.

By installing these process modifications, the Region will achieve a higher diversion rate, a reduction in operating costs and an increase in revenue from the sale of recyclable materials. These facts will result in increased provincial funding which will increase the amount of money received by the local municipalities.

7. CONCLUSION

It is recommended that the Region issue a Request for Proposal (RFP) for the process modifications to the Material Recovery Facility. The RFP should be for the installation of optical sorting equipment for plastics and fibres and for a residue clean up system.

It is not recommended to upgrade the facility with more manual sorters, modify the operating hours or construct another Material Recovery Facility.

The options for improving the Material Recovery Facility, as outlined in this report, are inline with the objectives of the Joint Waste Diversion Strategy. The proposed upgrades are expected to increase operating efficiency by 50%.

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The Senior Management Group has reviewed this report.