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IMPROVING THE EFFICIENCY AND CAPACITY OF THE MATERIAL RECOVERY FACILITY

The Solid Waste Management Committee recommends the adoption of the recommendation contained in the following report, August 22, 2008, from the Commissioner of Environmental Services subject to the following additional recommendation:

- 2. Regional Council's authorization be based on obtaining Provincial funding for 50% of the gross capital costs for the combination technology-based and third shift option.**

1. RECOMMENDATION

It is recommended that:

1. Regional Council authorize the proposed capital upgrades to the Material Recovery Facility as described in this report at an estimated net cost of \$1,295,000 and a third shift as required for peak demand periods.

2. PURPOSE

This report will provide the additional information requested by Solid Waste Management Committee detailing labour costs to operate the facility on a third shift or weekend shift as well as costs associated with proposed capital improvements.

3. BACKGROUND

A report on expanding the Material Recovery Facility was submitted to the Solid Waste Management Committee on June 4, 2008. That report was referred back to staff by Committee along with a request that the proposed capital improvements be compared with processing efficiency and labour costs for a third shift or weekend shift at the Material Recovery Facility. Additional information on the engineering and design costs for the proposed capital upgrades was also requested.

4. ANALYSIS AND OPTIONS

The Material Recovery Facility has an input processing capacity of 90,000 tonnes of blue box material per year when operating two shifts per day, five days per week. In 2009, it is anticipated that the Region will need to process a minimum of 98,000 tonnes of blue

box recyclables. In the year 2015, it is anticipated that the Region will be required to process up to 125,000 tonnes of blue box materials.

This report considers provision of additional processing capacity through a third shift, weekend shifts, the installation of capital upgrades, and a combination of these options. The analysis below presents the options including implications on processing efficiency, facility throughput and associated cost for each option.

Options considered in this report are to meet the processing capacity requirements through 2015 and are intended to maximize the capacity of the current facility. Additional processing capacity (i.e. above 125,000 tonnes per year) will require an expansion of the facility, construction of a new facility or contracting with another facility to process the excess additional recyclables. This matter is the subject of a future report which will consider the Region's long term recycling needs.

4.1 LABOUR-BASED INCREASED PROCESSING

Annual Labour Costs for a Third Shift are estimated at \$674,000

The first option to provide additional processing capacity is to operate the facility on a third shift, Monday through Friday. Operation of the two processing lines on a third shift requires a minimum of 48 staff per shift to achieve the current average processing rate of 25 tonnes per hour.

The current Material Recovery Facility operator was asked to evaluate the viability of a third shift and provide a quote to the Region for a third shift. Operation of a third shift (assuming a full sorting staff complement of 48 and an average processing rate of 25 tonnes per hour) will cost \$12,700 per shift. Between 2009 and 2015, using the blue box forecast and the forecasted number of third shifts required (i.e., months in which blue box processing requirements exceed 8,000 tonnes), the average annual cost to operate a third shift is estimated to be \$674,000 per year (see Table 1 for yearly summary). In 2009, the annual cost is estimated to be \$394,000 for 31 third shifts and in 2015 the estimated annual cost is \$1,003,000 for 79 third shifts. Increasing number of third shifts correspond with increased blue box materials. Costs estimates are in today's dollars and have not been adjusted for CPI.

This option has the potential to increase the facility's capacity to between 100,000 and 110,000 tonne per year (taking into account scheduled and unscheduled downtime for maintenance) assuming the hourly processing rate of the facility remains the same. Current material recovery and processing rates are predicated on a staffing mix of approximately 70% full time employees (FTE) and 30% temporary employees (TE). Pricing provided by the Region's contractor includes a moderate shift premium to increase the likelihood that the recommended staffing mix will be achieved. Without this

premium, it is unlikely that sufficient, fully qualified staff will be retained and consequently product quality and productivity will be impacted

Annual Labour Costs for Weekend Shifts are estimated at \$1 million

The current operating agreement for the Material Recovery Facility requires that it be open to receive materials on Saturdays following a statutory holiday and, if necessary, be operated to process accumulated quantities of blue box recyclables up to 80,000 tonnes per year. The cost for this activity is included in the current operating contract. However, should the Region direct the current contractor to operate the Material Recovery Facility on a Saturday (or Sunday) due to high inbound tonnes and this does not follow a statutory holiday, the Region is subject to an overtime processing rate.

The cost of operating the Material Recovery Facility on weekends (i.e., Saturday and Sunday) has been priced by the Region's contractor at \$18,950 per day. Between 2009 and 2015, using blue box forecasts and anticipating the number of weekend shifts required to manage tonnage in excess of current facility capacity, the average annual cost to operate the Material Recovery Facility on weekends is estimated to be \$999,000 per year (see Table 1 for yearly summary). In 2009, the cost is estimated to be \$587,000 for 31 weekend shifts and in 2015, the estimated cost is \$1,497,000 for 79 weekend shifts. Costs estimates are in today's dollars and have not been adjusted for CPI.

Just as in the third shift option, the hourly processing rate is assumed to remain unchanged from its current average of 25 tonnes per hour. With this in mind, this option has the potential to increase the facility's capacity to between 100,000 and 110,000 tonne per year (taking into account scheduled and unscheduled downtime for maintenance).

The blue box forecast in 2015 is expected to range from 110,000 tonnes to 125,000 tonnes. The estimated number of additional shifts (both third shift and weekend shifts) is dependant on the actual amount of blue box material received in the year. Table 1 below presents the low forecast for blue box tonnes, with additional shift requirements, and the associated costs for additional shifts.

Table 1
Labour-based Options Summary through 2015

Item	2009	2010	2011	2012	2013	2014	2015
Estimated Blue Box Tonnes (Low Forecast)	98,000	100,700	102,500	104,300	106,500	108,700	110,700
Estimated # of Additional Shifts	31	36	44	50	61	70	79
Third Shift Estimated Annual Average Operating and Maintenance Cost	\$394,000	\$457,000	\$559,000	\$635,000	\$775,000	\$889,000	\$1,003,000
Weekend Shift Estimated Annual Average Operating and Maintenance Cost	\$587,000	\$682,000	\$834,000	\$948,000	\$1,116,000	\$1,327,000	\$1,497,000

Note: All values rounded to the nearest \$1,000 and cost estimates are in today's dollars and have not been adjusted for CPI.

4.2 INCREASING CAPACITY THROUGH TECHNOLOGY-BASED CAPITAL UPGRADES

In 2007 staff retained a consultant to conduct a review of the Material Recovery Facility operations to identify process modifications required to meet the objectives of the Joint Waste Diversion Strategy. The review identified several opportunities to improve processing throughput and material recovery. These options include installation of a second container processing line, a conveyor to by-pass the baling system and optical sorting equipment for plastics. All of these minor capital upgrades are recommended by staff. These capital improvements will allow the facility to operate at a faster rate and increase the annual processing capacity to between 110,000 and 120,000 tonne per year. Since only two operating shifts will be required in this option, the regular maintenance program will not be affected. This option has the added benefit of additional sorting capacity (second container line and optical sorting). These benefits mean that the processing efficiency of the facility will significantly improve.

The facility's current design incorporates only one container processing line. This single line is the key limiting factor to increasing throughput and product recovery. Current trends in the consumer market place show that the amount of single serving beverage containers is increasing exponentially. The increase in single serving beverage containers will require sorting capacity that extends beyond the current facility design. A second container line, in combination with optical sorting equipment would operate in parallel with the current sorting line and would require an increase of six sorting staff per shift. The estimated annual average cost for six additional sorting staff is \$324,000. In 2009,

the cost is estimated to be \$84,000 (assuming that the capital upgrades are completed by October 2009, there would be 60 operating days in 2009). In 2015, the estimated cost is \$364,000 (assuming 260 operating days). Costs estimates are in today's dollars and have not been adjusted for CPI.

This capital improvement would allow the processing rate to increase to an average of 35 tonnes per hour, a 30% increase to the current average processing rate. Also, because of the addition of optical sorting and more sorting stations the container capture rate is estimated to increase by 9%. In 2009, this increase in capture rate would potentially reduce disposal costs by \$51,000 and increase revenue from the sale of the containers by \$207,000. Furthermore, a second container line would ensure that container processing does not become a bottleneck to future growth.

As the blue box tonnage into the Material Recovery Facility increases, so do baling requirements. The current baling operation has become a bottleneck to facility throughput and the facility will not be able to meet future processing requirements if it is not redesigned.

The facility is currently designed with two balers and a series of conveyors to deliver the sorted products to them. The current design is limited in that during the majority of the operating day, one of the two balers is unavailable. This is because the conveyor system that delivers product to it is transferring newspaper to the newspaper storage bunker. The only time that this baler is available for use is during shift breaks.

Installation of a new conveying system to bypass the baling conveyors and transfer newspaper to the storage bunker is recommended to amend this design deficiency. The system would be designed so that the current method of transferring newspaper is still available in the event that it is needed (i.e. contingency/emergency operations).

The consumer sector is rapidly moving towards more single serving food and beverage containers. Most 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 labour capacity. In order to improve sorting efficiency and adapt to the growth in plastic tonnage, optical sorting for plastics will satisfy the processing requirements while at the same time reduce labour costs.

Currently, four sorters are used to sort plastics bottles with the #1 recycling symbol (PET bottles). Optical sorting can reduce this number to two and these two persons would be reassigned to quality control elsewhere in the facility. A second container line would not require any manual sorters for PET bottles if optical sorting equipment is installed. By installing optical sorting for plastics and a second container line, only six additional sorters would be required per shift. If a second container line is installed and optical sorting is not, 12 additional sorters per shift would be required at an annual operating cost of \$728,000. Costs estimates are in today's dollars and have not been adjusted for CPI.

Unlike the labour-based option, the technology-based option will not require the current maintenance activities to change, there is less risk of unscheduled facility shut downs for maintenance, and there will be no change to the current equipment maintenance cycle.

Combination of Technology-based and Third Shift Recommended to Meet 2015 Target

A combination of technology-based processing with the addition of a third shift has also been considered to meet estimated increases in blue box materials to the year 2015. The capital upgrades discussed and recommended in this report would remain the same under this option. In order to achieve the expected processing requirement of 125,000 tonnes per year, a third shift would be required during peak times but only as required.

The challenges identified in the third shift labour-based option are typical when a third shift is required on a regular basis. Given that staff are recommending the combination approach during high demand periods, the challenges associated with preventative maintenance can be mitigated.

As mentioned previously, the capital upgrades will allow the processing rate to increase to an average of 35 tonnes per hour. Also, the estimated annual operational cost for the capital upgrades is \$324,000. When the processing requirement requires the use of a third shift, the estimated annual operational cost for the combination option is \$203,000. In 2009, the estimated cost is \$84,000 and in 2015, the estimated cost is \$430,000. Costs estimates are in today's dollars and have not been adjusted for CPI.

Scope and Budget for Consulting Work for Design Work and Contract Administration

Staff recommends that a consultant with specific expertise in Material Recovery Facility processing equipment and design be retained to provide the following services as part of the engineering and design costs for the technology-based option at an estimated cost of \$150,000:

- Prepare a conceptual design and cost estimate for the proposed technology-based upgrades, taking into consideration various options to maximize processing capacity while minimizing capital and operating costs;
- Prepare a detailed design and specification for tendering of the Material Recovery Facility upgrade;
- Assist the Region with tendering and provide an evaluation of bid submissions;
- Provide Contract inspection and administration services;
- Assist with coordination of the work with staff at the Material Recovery Facility; and,
- Provide operational support to the Region and its operating Material Recovery Facility operating Contractor during commissioning.

The budgeted engineering cost is approximately 6% of total estimated capital costs which is well within industry norms for retrofit design work.

5. FINANCIAL IMPLICATIONS

Table 2 below summarizes the various options described in this report and highlights the key advantages and limitations of each. It also presents the projected annual average operation and maintenance costs over the 7 year forecasting period to 2015 (beginning in 2009).

It is recognized that the technology-based equipment upgrades alone will not provide adequate processing capacity to 2015. Therefore, it is recommended that the capital upgrades be installed and the third shift be used in combination with the capital upgrades when warranted.

Additionally:

- The labour-based weekend processing option includes one shift on Saturday and one shift on Sunday;
- The gross capital costs for the technology-based and combination options are estimated at \$2,290,000 for which 50% provincial funding is available;
- The projected annual average operation and maintenance costs would be in addition to the current operation and maintenance costs; and
- The \$2,290,000 capital cost is based on the July 2007 consultant's report entitled "*York Region Material Recovery Facility Capacity Study*" and the July 2008 supplemental report entitled "*Blue Box Processing Options Report – York Region*".

Table 2
Pro and Con Summary of the Expansion Options over a 7 Year Life Cycle

Option	Pros and Cons Summary	Capital Costs*	Projected Annual Operation & Maintenance Costs (2009 / 2015)
Labour based – Third shift (weekdays, fully staffed)	Pro: Increase annual processing capacity up to 110,000 tonnes per year. Con: High long-term operation costs and isn't expected to improve material capture rates, increase revenue or reduce disposal costs. Con: Will not provide processing capacity to 2015.	\$0	Between \$394,000 and \$1,003,000
Labour based – Weekend (Saturday & Sunday, fully staffed)	Pro: Increase annual processing capacity up to 110,000 tonnes per year. Con: High long-term operation costs and isn't expected to improve material capture rates, increase revenue or reduce disposal costs. Con: Will not provide processing capacity to 2015.	\$0	Between \$587,000 and \$1,497,000
Technology based- Equipment upgrades	Pro: Increase in annual processing capacity up to 120,000 tonnes per year will improve material capture rates and increase revenue and reduce disposal costs. Pro: 50% Provincial funding for the capital upgrades. Con: Requires capital investment. Con: Will not provide processing capacity to 2015.	\$1,295,000	Between \$84,000 and \$364,000
Combination – Technology based and Third shift (weekdays, fully staffed)	Pro: Increases processing capacity to 125,000 tonnes per year and improve material capture rates, increase revenue and reduce disposal costs. Pro: 50% Provincial funding for the capital upgrades Pro: Will provide processing capacity to 2015. Con: Requires capital investment	\$1,295,000	Between \$84,000 and \$430,000

Note: All values rounded to the nearest \$1,000 and cost estimates are in today's dollars and have not been adjusted for CPI.

*Capital costs assume 50% funding from Waste Diversion Ontario's Continuous Improvement Fund.

Table 3 below presents the business case and a life cycle comparison of the two labour-based options considered in this report, with the combination option (technology upgrades and third shift).

Table 3
Comparison of Material Recovery Facility Expansion Options to 2015

Cost / Revenue Items	Labour based – Third shift (weekdays, fully staffed)	Labour based – Weekend (Saturday & Sunday, fully staffed)	Combination – Technology based and Third shift (weekdays, fully staffed)
Engineering and Design	\$0	\$0	\$150,000
Second Container Line	\$0	\$0	\$433,000
Baler By-pass	\$0	\$0	\$457,000
Optical Sorting	\$0	\$0	\$1,400,000
Sub-Total Capital Costs	\$0	\$0	\$2,440,000
Maintenance	\$0	\$0	\$63,000
Operating	\$4,712,000	\$6,991,000	\$1,424,000
Capital Financing (4% per year assumption)	\$0	\$0	\$556,000
Total Cost Items	\$4,712,000	\$6,991,000	\$4,483,000
Provincial Funding	\$0	\$0	\$1,145,000
Additional Revenue & Disposal Savings	\$0	\$0	\$1,806,000
Total Revenue Items	-\$0	-\$0	-\$2,951,000
<u>Net Life Cycle Cost</u>	<u>\$4,712,000</u>	<u>\$6,991,000</u>	<u>\$1,532,000</u>

Note: All values rounded to the nearest \$1,000 and cost estimates are in today's dollars and have not been adjusted for CPI.

The capital costs for the second container line, baler by-pass and optical sorting have been amortized over seven years using straight line depreciation. As such, approximately half of the capital costs have been written off in the first seven years. The combination technology-based and third shift option is expected to improve the Material Recovery Facilities effectiveness and efficiency by increasing the sorting capacity. By doing this, more recyclables will be captured and in doing so, decrease the amount of Material Recovery Facility residue produced. By achieving a higher capture rate, additional revenue will be received and lower disposal costs will be incurred.

The combination option has another possible additional revenue stream (this potential additional revenue was not included in the life cycle cost comparison because it is

variable and cannot be forecasted). This expansion option would provide the Material Recovery Facility with up to 120,000 tonne per year capacity as well as increase the processing rate to an average of 35 tonne per hour. During certain times of the year, this processing rate will not be needed due to the normal seasonal fluctuations in blue box volumes. During times of low volume, the Material Recovery Facility could be opened to provide processing capacity to neighbouring jurisdictions. If this happens, there is the potential for additional revenue from the capture and sale of recyclables.

Both of the labour-based options presented in Table 3 above are not expected to generate any additional revenue or result in disposal savings. While these labour-based options will provide for additional processing capacity (up to 110,000 tonne per year) neither will necessarily improve upon the current material capture rates. Without improving the capture rates, the revenue generated from the sale of blue box materials and disposal costs for Material Recovery Facility residue will remain unchanged. Additionally, neither of these labour-based options improve upon the current hourly processing rate which would mean that the opportunity to provide processing capacity to other jurisdictions is not available.

6. LOCAL MUNICIPAL IMPACT

As the population of York Region continues to grow, the Material Recovery Facility must be able to process the increasing quantity of blue box recyclable materials. Upgrading the Material Recovery Facility with new sorting conveyors and optical sorting technology will contribute to achieving this result and ensure the Region and local municipalities achieve their collective goal of 65% diversion from landfill.

7. CONCLUSION

Implementing the capital upgrades in combination with a third shift will improve efficiency and throughput as well as capture rates at the Material Recovery Facility. The combination technology-based and third shift option will provide processing capacity through 2015. The third shift can be implemented over the next seven years in combination with the capital upgrades to deal with peak demand during the year.

Options for improving the capacity of the Material Recovery Facility are in line with the objectives of the Joint Waste Diversion Strategy. Installing these process modifications will enable the Region to achieve a higher diversion rate and an increase in revenue from the sale of recyclable materials. This advancement will result in increased provincial funding received by the Region and local municipalities.

Report No. 5 of the Solid Waste Management Committee
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The Senior Management Group has reviewed this report.