

E&E Project Evaluation Form

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Project Name/Number/Priority area: York Collection and Processing Optimization Study, #207, MRF Rationalization
Lead Sponsor/competed by/date: Shaun Spalding, York Region; October 2006
Project Duration: 5 months
Total project value: \$67,300
E&E funding amount: \$39,645

Section 1 –To be completed by Project Applicant

1) What were the Project Goals and Objectives (as per the E&E Application and/or Contract)?

To determine an optimal compaction rate during collection of blue box recyclables that provided an acceptable feedstock to allow for effective and efficient MRF processing operations.

As the blue box system involves collection and processing, the optimal compaction rate would be one that maximized collection efficiency while at the same time providing material to the MRF in a manner that could be processed to produce products that met market specifications.

This project involved two aspects:

- A survey of jurisdictions across North America, with a focus on Ontario, to understand the practices and gain knowledge on the usage of compaction during collection and MRF processing.
- A series of compaction tests through York Region's MRF of blue box materials compacted to different levels to evaluate the quality of the end products.

2) Were the goals and objectives met? (and if not why not?)

From the survey component, valuable information was obtained on the prevalence of compaction. From the functional tests, a range of compaction rates and MRF operational changes were identified.

The results of the survey were that there is no consistent compaction policy (if any at all) in use by the jurisdictions that participated in the survey. This suggests that such a policy should be developed.

The results of the compaction tests showed that by processing compacted blue box materials without MRF processing modifications, the end products examined did not meet end market specifications. As such, the required product quality could be achieved if the MRF operations were adjusted. These adjustments could include all or some of the following: reduction in belt speeds, increase in staff, or adding equipment.

3) **Summary of Project Accomplishments** (*i.e. what did the project do/achieve?*):

Survey

- The overall finding of the survey was that across North America, and in particular Ontario, there is no standard policy regarding compaction during collection nor is there a standard for MRF processing operations.
- The survey found no correlation between population size, distance traveled between collection point and MRF / transfer station or program type and the use of compaction.
- Of the jurisdictions that use compaction to collect blue box recyclables, there is no clear relationship between the compaction rate in use and the incidence of operational problems during processing. Additionally, there is no correlation between compaction and high or low residue rates.

Compaction Tests

- There needs to be MRF operational changes when processing compacted blue box recyclables, such as a decrease in belt speed and/or increase in sorting staff and/or the addition of equipment.
- Without process changes, end market quality specifications are not achieved.
- Supplementary sorting equipment should be installed to decrease contamination in some of the end products, such as the mixed broken glass stream.
- Recyclables in the MRF residue increased as the compaction rate increased.
- The MRF equipment supplier's compaction ratio recommendation of 2.5 to 1 can be considered valid if adjustments are made to the MRF operations. If operational adjustments cannot be made, a lower compaction rate, such as 2 to 1 could be used as a 'better practice'.
- An additional study should be undertaken to determine the exact extent of savings to collection versus the increase in cost to MRF operations for processing compacted blue box recyclables.
- This report did not evaluate the potential of 'compounding compaction'. 'Compounding compaction' is a result of multiple handling of blue box materials prior to processing. This occurs when blue box material is collected using a compaction vehicle, delivered to a transfer station, further compacted onto a transfer trailer destined for a MRF. If this happens, the compaction rate has the potential to be greater than the recommended upper compaction rate for MRF processing. Therefore, a supplementary study is suggested to evaluate the impact 'compounding compaction' has on the overall blue box system.

4) **Summary of Project Limitations** (*e.g. is there anything that should have been done differently?*)

Survey

- Of the 140 jurisdictions across North America that were contacted, only 66 completed the survey. By increasing the survey population, more information could have been gathered which may impact on the results.
- In several instances, the results are ambiguous. This may be a function of the respondents not being completely honest with some responses. This is evident when comparing the compaction rate in use to the problems encountered at MRF's. When compaction increases, there appears to be no effect on MRF operations which is contrary to the findings of the MRF processing tests.

- A direct comparison of blue box composition as it relates to compaction could not be done as most respondents were unable or unwilling to provide this data.

Compaction Tests

- Only three compaction tests were done. By increasing the number of tests at different compaction rates, a more refined 'better practice' may be achievable.
- The composition of the blue box stream fluctuates and this variability may impact on the results.
- The MRF staff was aware of the study and this may have impacted on their actions.

5) What do you consider to have been the key “lessons learned” from this project? Does your project/activity represent a “best practice”?

Survey

- Although the use of compaction has the potential to provide cost savings to collection and the overall blue box program, the survey did not reveal the existence of a consistent compaction policy in the jurisdictions that responded.

Compaction Tests

- A 'better practice' is to use compaction to collect blue box recyclables only if the cost reduction to collection offsets the increase in MRF operation cost.
- Based on the results of this study, adjustments to the MRF operation are required as the quality of the newspaper and mixed paper did not meet the contractual specifications during the baseline tests. Once this has been remedied, an average compaction rate of 2 : 1 could be used as a 'better practice' without major adjustments to the process. To achieve a greater system cost reduction, a compaction range from 2 : 1 to 3 : 1 could be a 'better practice' provided more / different adjustments are made to the MRF.

6) What specifically are municipal staff doing with the experiences and data from this project? Do you have plans to apply these lessons in your program? Please explain how.

The results of this study will be applied to both the MRF operations and collection. First, the MRF operations will be addressed in areas that have been identified as needing attention based on the current compaction rate in York Region (average is 1.6 : 1). Second, the results will be provided to the Local Municipalities for their consideration to adjust the collection fleet to include more compaction vehicles. As the York northern six municipalities have recently issued a tender for collection, a recommendation of using more compaction vehicles may be made. If the fleet is modified to increase the compaction rate, the recommended MRF operation changes will be introduced.

7) Has your municipal council been informed about the project and its results?

Council will be advised through routine communication.

8) Do you think there are opportunities to share/replicate the successful elements of this project with other Ontario programs? If yes, how and where?

The survey has valuable information and the results are applicable to every blue box program. The results may be valuable for planning and constructing future collection and processing systems and setting equipment specifications in tenders.

The results of the compaction tests are most relevant to single stream programs (as the testing was done with York Region's single stream blue box material), but aspects can be applied to any program. By following the methodology in the study (or by contacting York Region), the optimal compaction rate that maximizes collection while maintaining an efficient MRF operation can be determined and can lead to a potential reduction in the overall system cost. York Region will discuss the results of this study with any interested municipality.

9) Did this project result in either reduced costs per tonne of Blue Box waste recycled and/or increased Blue Box tonnes diverted? (Please explain)

By implementing the recommended compaction rates and operational changes, the cost per tonne of the blue box program may be reduced. Further study to determine the exact extent of the cost savings is recommended.

Section 2 –To be completed by Stewardship Ontario (and reviewed by applicant)

9) Did this project do what it set out to do? If not, what were the reasons/ barriers?

The objective of this project was to determine the optimal compaction on single stream collection vehicles (to reduce the number of collection vehicles required) while maintaining MRF processing efficiency and end-product quality. The project was structured around the following three phases:

- Phase 1: York Region current system overview, a survey of other jurisdictions regarding collecting compacted recyclables and the development of audit criteria to measure the MRF performance during the three compaction tests
- Phase 2: carry out three separate compaction tests to determine how well the MRF processes different levels of compacted material (effectiveness at separating the recyclables compared to the baseline data; amount of time required by MRF staff to adjust screens)
- Phase 3: summarize findings and prepare report; report on the optimal compaction rate (as expressed in kilograms per cubic yard) for collection that maximizes collection effectiveness and efficiency while maintaining MRF processing effectiveness and efficiency.

With regards to phase 1 objectives, information from other jurisdictions was successfully collected and revealed that no consistent compaction policy was currently in use in the 66 jurisdictions that participated in the survey.

With regards to phase 2 objectives, the compaction tests showed that the MRF could not produce newspaper or mixed paper that met the end market specifications at the tested compaction rates (2.4 to 1 for the first test; 2.8 to 1 for the second test; and 3.0 to 1 for the third test). The report therefore concludes that York Region's MRF equipment supplier's recommendation of 2.5 to 1 compaction could be acceptable only if the MRF processing operations are modified to accommodate the compacted feedstock. Determining the actual adjustments and associated costs (i.e. exact reduction in belt speed, how many additional sorting staff and/or changes in processing equipment) required to meet the end product specifications with this higher compaction ratio was outside the scope of this project, and future studies are therefore required to determine this.

Processing compacted blue box material at a rate that exceeds York Region's current practice (1.6:1 current compaction rate) without process modifications results in products that either fail to meet end market specifications or result in increased costs or decreased revenue. The research found that if the appropriate adjustments cannot be implemented, a lower compaction rate, such as 2 to 1, could be used. Further studies are required to determine this.

10) What are the key learnings from this project? Are there any next steps? What is being done to share the results?

This report highlights the absence of clear and consistent compaction policies in the jurisdictions that participated in the survey, and the need for more research in this area.

Although there is general agreement on the system cost saving opportunities associated with compaction (through a reduction in the number of collection vehicles required; collection cost savings; reduced wear in infrastructure (i.e roads); improved air quality, etc), these need to be balanced with the investments and additional labour costs made necessary by compaction. More research is therefore needed to determine the business case for moving towards increased compaction.

The findings from this project will be forwarded to the Recycling Program Enhancement and Best Practices Assessment project team for their review and input.

11) Was the project good value for the money (e.g. were there measureable program or system cost reduction benefits, cost effective tonnage increases, etc?)

The findings are of important value and form the necessary basis for future research.

12) Does this project represent "best practices"? If yes, explain.

The preliminary compaction 'better practice' for York Region is to implement a compaction ratio of 2 to 1. This is lower than the 2.5 to 1 ratio suggested by the MRF equipment manufacturer, but higher than York's current compaction practice of 1.6 to 1. This 'better practice' would result in cost savings for York Region (more research is required to determine exactly how much) without necessitating major operational adjustments to the Region's MRF.

More research is needed to determine whether and under which conditions compaction can be termed an overall "best practice". As mentioned above, the findings from this project will be forwarded to the Recycling Program Enhancement and Best Practices Assessment project team for further input.