

The Joint Advisory on Designing Contracts for Processing of Municipal Recyclables Attachment 1:

Understanding Material Composition – Stream Composition Study

The materials composition of residential recyclables changes constantly. Recyclables might be added or removed from collection programs. Materials markets can develop or disappear. Consumers could buy more, less, or different recyclable products.

This Attachment to *The Joint Advisory on Designing Contracts for Processing of Municipal Recyclables* paper is intended to help contract parties *quantify* and *identify* those changes by auditing the content of their recyclable materials. They should conduct audits initially (before procurement) and then at regular intervals (throughout the contract term). They might audit materials *delivered to* processing facilities (*material composition* study), marketed recyclables and/or residual materials *transported from* the facilities (*through-put* study).

This paper is organized as follows:

1. **Initial Audits.** First, this paper explains reasons to conduct pre-procurement studies
2. **Routine Audit.** Second, this paper discusses the importance of defining acceptable and unacceptable materials, and audit frequency. It also recommends conducting ongoing audits, both mandatory and discretionary composition studies, with the need and timing determined by the results of through-put studies
3. **Audit Characteristics.** Lastly, this paper enumerates important audit features to specify in the contract, such as:
 - The process to ensure statistical relevance in samples (sources, number and selection)
 - Frequency and timing
 - Methodology standards

Initial stream composition study

Before soliciting qualifications, proposals or bids for new or revised recycling services, a municipality should conduct a composition study (audit) of the in-bound recyclables stream delivered to the MRF under its current contract. A composition study identifies types and quantity of incoming materials. Composition studies are a specialized field of study requiring statistical expertise as well as knowledge of solid waste. Municipalities should be careful to engage firms that have qualifications and experience specifically related to recyclable material audits. Procurement questions should ask for information related to the number of audits conducted, for whom, the methodologies used, and the data produced.

The materials audit serves three primary purposes:

1. **Realistic Performance Specifications.** The audit results provide important data in establishing the nature, scope and level of processing operations and contractual

obligations. Results may provide insight into such topics as:

- Potential value of recovered materials, which in turn can affect revenue sharing, rebate requirements, compensation, and risk allocation decisions
- Composition preconditions and residue limits
- Allowable levels of non-recyclables and moisture
- The identification and need to handle unacceptable material such as hazardous waste
- Recovery guarantees
- Residue management/disposal
- Product specifications
- Performance/recovery incentive(s)

2. **Better Proposals.** The audit gives potential contractors information that enables them to submit a more responsive operating proposal and a firmer price. They can propose operations targeted at the known quantities and types of recyclables and contamination. Proposers can more accurately project both service cost and revenues and make better decisions related to choosing technology (e.g., balance of mechanical and manual sorters) and understanding market volatility.
3. **Anticipated Change.** If the materials composition changes for any reason after the start of the contract, including as a result of changes in collection programs, the initial audit gives the parties a basis for negotiating any consequent changes in operations, costs and service fees.

“Acceptable materials”: Before conducting the audit, it is recommended to define what materials the contractor must accept for processing. A composition study identifies the type and amount of materials collected for delivery to the processing facility (such as materials recovery facility (MRF)) for sorting and processing. In the study, it is best to specify the types of material accepted in the collection program and how those materials will be delivered (i.e. loose, bagged, etc.).

- **Type.** Anything not included on the list of materials required to be processed may be considered not acceptable by the processor.
- **Contamination.** In addition, even if a material is acceptable in the collection program, it might be too contaminated to process at the MRF or otherwise outside of MRF processing specifications (e.g., a PET container filled with liquid, paper or glass too small or fragmented to be sorted). MRF operations and contract specifications vary.

By defining “acceptable” clearly, the understanding of unacceptable will also come into focus, even if the term is not formally defined.

In the initial procurement solicitations for processing recyclables (requests for qualifications, proposals or bids) identifying both acceptable and unacceptable recyclables is recommended, as well as addressing the handling of unacceptable materials and hazardous waste. Results of the recyclables-stream composition study should also be included.

Routine stream-composition or through-put studies

1. Composition Studies of In-Bound Materials. Over the term of the contract, the composition and weight of the recyclables stream will change. The longer the contract duration, the greater the change is likely to be from the initial stream composition study. Therefore, it is recommended to regularly and routinely conduct composition studies throughout the life of the contract.

The recyclables processing contract should specify the frequency and timing of the ongoing audits. At a minimum, annual audits are recommended. Such annual studies will reveal changes in the stream but will not be an undue cost burden to the contracting parties. Further consideration should be made to allow either party to the contract to request additional audits. All parties need to agree on who pays and the amounts, for both the planned and off-schedule/requested audits.

Some say that it is appropriate to average the results of all audits (types, amounts) for the previous 12 months on a rolling basis. Others believe the purpose of any audit is to address composition changes and hold that blended value should be based on the most current composition. The contract should determine in advance which approach will be used.

2. Through-put Studies of Outbound Materials. A through-put study evaluates the composition of all material after processing. Since inbound stream composition studies are expensive, alternatively consider performing a throughput study of materials *transported* from the MRF to save costs.

A through-put study can be done to determine MRF production overall, or on a customer by customer basis, with the cost of completing the through-put study increasing in relation to the level of customer specificity.

Residue is the sum of the materials left after processing and is composed of materials that are unacceptable due to type or condition, as well as process losses. The results of composition and through-put studies cannot be directly compared. However, based on the results of the through-put study, it is possible to determine if the more detailed and expensive stream composition study is needed. For example, if the composition of out-bound materials is relatively unchanged, parties may conclude that the in-bound materials have not changed much either and determine that a full composition study is not necessary.

Sorting Methodology

Sorting methodologies are a specialized science. It is not realistic to pre-set all the terms of such an event in a processing contract covering a period of years. However, these notes identify some of the parameters of such a study that should be addressed when each is to be conducted.

Select a protocol that is statistically valid and produces desired information. When designing the specific study, address, at a minimum, these issues:

Samples:

- **Collect a sufficient number** to establish a statistically valid result

- Uniform-sized samples – typically each about 200 to 300 pounds – as needed to handle about the same total amount of weight and to be statistically representative of the targeted material streams
- **Truck selection:** the number and origin of truck-loads from which to sample incoming materials. Selection should be based on the heterogeneity of the incoming recycling stream. Selection may be from specified geographical areas, types of generators, specific haulers, or totally at random, as needed to meet the purpose of the study

Sampling protocol

- (1) Require appropriate safety precautions, including personal protective equipment such as gloves and boots.
- (2) Hand sort the materials into the established types of categories.
- (3) Weigh each material category.
- (4) Note factors that could affect the results of the study results, such as weather, season, population fluctuations and tourism.

Some contracts incorporate established methodologies such as the Recycling Council of Ontario *Standard Waste Audit Method*, April 2015. ASTM is in the process of establishing standards.

Conclusion

The composition of the recyclables delivered to the processing facility affects the nature, scope and level of contract specifications.

Pre-procurement Audit. The results of the pre-procurement audit help establish in the contract the type and amount of change that excuses the contractor from performance obligations, such as a recovery guaranty.

Routine Audit. Subsequent regular audits document change and determine whether that change will trigger excused performance, contract changes or changes in blended value. The rights and obligations of the parties should be detailed in the course of negotiating contract amendments and the parameters of renegotiation, such as corresponding changes in the recovery guaranty or revenue sharing/compensation, or even contract termination.