



## JOINT ADVISORY ON DESIGNING CONTRACTS FOR PROCESSING OF MUNICIPAL RECYCLABLES

### A. PREFACE

For more than a decade, Chinese mills and processors have been the largest buyers of recyclables in the world. Even as commodity pricing fluctuated, recovered materials continued to move to end markets. With its enactment of strict contamination standards and restrictions on certain types of imported materials, China has significantly limited market access and again triggered declines in market revenues, which highlight existing and create new challenges for recycling programs in the United States and Canada.

With this change in the recyclable end markets, North America recycling programs and recycling service providers – both public and private – have begun to re-examine current practices at a foundational level. Potential solutions include upgrading processing systems, reducing contamination, and re-evaluating program guidelines for acceptable materials. These changes, and their chances for success, rest on strong partnerships among the entities that collect materials, those that process materials and the proactive participation of the communities served.

In 2015, NWRA and SWANA issued this joint advisory with the intention of providing professionals throughout the solid waste industry a tool that contributed toward achieving best practices in contracting for recycling processing. As the effect of China's waste import restrictions become increasingly evident on recycling programs and markets around the world, we believe it is appropriate to re-issue the document.

At a time of major and sustained change in a key market and given the uncertain availability of other domestic or foreign markets with the capacity to accept all recyclables previously sent to China, NWRA and SWANA join in reiterating our support for contracts that reflect and accommodate changing market conditions and that address the risks and benefits available to all parties in such agreements.

### B. INTRODUCTION

This joint advisory is being issued by the National Waste & Recycling Association (NW&RA) and the Solid Waste Association of North America (SWANA). The purpose of the advisory is to provide both the public and private sector professionals in solid waste management with guidance, protocols and standards regarding contracting for processing of municipal recyclables. As such, the information in this Advisory is primarily focused on situations where recyclables are collected from the residential sector and delivered to a Material Recovery Facility (MRF) for processing and preparation for sale. There may be other circumstances for processing recyclables where the information in this Advisory is also

applicable.

This Advisory presents options and considerations to guide the local agency and the contractor on anticipating and managing scenarios that may arise.

A local agency that intends to execute a contract for managing recyclables should consider their options to ensure a competitive marketplace and options to ensure the highest level of service at fair prices. Likewise, a private sector contractor will have interests to ensure the safety of employees, high quality materials are delivered to the MRF for processing to ensure the highest and best use for the materials and to reduce the quantity of materials that is required to be disposed, in order that the contractor makes a fair profit.

**The information provided in this Advisory is for general guidance only and not for the purpose of providing legal advice. Public entities should consult with their legal counsel to obtain legal advice with respect to any particular contract, issue or problem. The application and impact of laws can vary widely based on the specific locality and facts involved.**

### **The Changing Waste Stream**

The characteristics of the solid waste stream are in flux due to many factors including the increase in use of electronic devices, the decline in the publication of newspapers, more products made using plastic, light-weighting of products, redesign of packaging, increase in online shopping and home delivery, new waste diversion programs, and many other factors. These changes create challenges in the marketplace for defining fair value for both the local agency (municipalities, counties, townships, and other political subdivisions) and the contractor. In addition, the recycling markets can be volatile. Within very short order, prices for commodities can rise or fall significantly.

### **The Contracting Process**

A local agency interested in selecting a service company to manage and process recyclables will need to make decisions on how that process will move forward. Decisions on important topics such as ownership of the recyclables, the type of program used to collect the recyclables, and the services necessary to deliver the recyclables to the processing service company (such as a MRF) must be

evaluated in advance of starting the public selection process. After the parameters of the program are determined, the local agency should commence and complete the contracting process in the manner provided by state, provincial or local law, as the case may be, and in consultation with its legal counsel.

## **C. ESTABLISHING CONTRACT PROCUREMENT PROTOCOLS**

One option for public entities to consider is developing a competitive bidding process, which could include one or more of the following:

- Expressions of Interest
- Requests for Qualifications
- Request for Proposals
- Tender

## **Obtaining Initial Feedback**

Prior to releasing a request for proposal or bid documents, the local agency could solicit input through public workshops from the recycling community, local haulers, elected officials and the general public. These workshops could help in defining the scope of work for the services requested and minimize confusion through the proposal/bid process. A pre-bid meeting with potential contractors could also be advertised and follow as part of the procurement process. Any questions, comments or concerns that are raised during this pre-bid meeting can be dealt with through an addendum to the contract.

## **Contents of Bid Documents**

It is recommended that local agencies work with their legal counsel when preparing bid documents. Bid documents should include standard contractual provisions and consider the following for recycling contracts: Fully disclose business risk allocation (e.g. who assumes the risk; or % of risk), who owns the recyclable materials, and those situations that may protect the contractor or procurement agency from breach of contract. Some of these may include:

- changes in law
- labor disturbances
- acts of God, etc.

Very specific definitions need to be included in the bid documents to provide a level playing field for all bidders. Some provisions may be negotiated during the contract negotiations period.

## **D. PRESCRIBING PERFORMANCE SPECIFICATIONS AND STANDARDS.**

### **Contract Documents**

The content of the contract is a key element of a successful relationship between the contractor and local agency. The contract should:

- Ensure that the service specifications and standards meet the needs of the identified waste generators (e.g. residents) demands of law realistic processing capabilities and market conditions, as applicable.
- Recognize that the residential recycling stream is dynamic in terms of material types, volume or weight, and value of materials. Careful record keeping and review of this data will help identify changes. Also, audit protocols of the materials should be established, and audits should be performed by the contractor and local agency or an impartial third party to ensure accurate assessments of changes to the collected materials as they arrive at the MRF
- Identify provisions for compensating both parties due to market fluctuations.
- Ensure the local agency and contractor take reasonable steps to promote and ensure the quantity and quality of the recyclable material streams. If there is a third party hauler, then they need to be part of the education of the customers as well.
- Recognize the value of the materials (and the ability to process efficiently) is dependent on the quality of the inbound stream and define acceptable levels of contamination, moisture, and other factors.

## **Fundamental Contract Provisions**

Contracts should include the following fundamental provisions:

- A well-drafted contract contains definitions of key terms. Pay particular attention to the following words and phrases: “Applicable Law”, “Recyclables”, “Maximum Non -Recyclables Level” (sometimes called contamination rate), “Non-Recyclables”, “Residue”, “Uncontrollable Circumstances” (sometimes called Force Majeure or acts of God)
- Contract term/length, including mutual extension rights/obligations, or a contractor bonus that can be earned through performance
- Specify obligations that survive the term (such as indemnifications, certain reporting requirements, etc.)
- Termination rights, such as cure periods for defaults, no-fault termination for lack of funding, or convenience.
- Local agency’s responsibilities and rights, e.g. (dis)approval rights with respect to key personnel and contract delegation and assignment (including sales, mergers, bankruptcy, transfer of ownership, etc.)
- Contractor’s responsibilities and rights
- Performance specifications and standards (e.g. receiving hours, vehicle tipping/turnaround times, weighing protocols (including scale house operation, fee collection/security), throughput capacity requirements, identification of acceptable materials; hazardous waste load checking protocol (including responsibility/protocol for handling and paying for hazardous wastes and processing residue), and load rejection rights.
- When the contract is for a municipally owned facility: utility consumption guaranties (if local agency pays utility charges), routine and extraordinary maintenance and repair, and replacement of publicly owned equipment and facility.
- Other specifications may include waste composition preconditions and reject limits, recovery guaranties and residue management/disposal, allowable levels of non-recyclables and moisture, marketability guaranties, product specifications, materials marketing obligations (including market risk allocation), performance/recovery incentive(s), recovered materials revenue sharing options, and rebate requirements for materials delivered by haulers to the facility
- Collection service details, such as: type of customers (e.g. residential, commercial, multi-family, institutional, governmental, seniors and ), service days and hours, collection method (e.g. containers, trucks, number of sorts), use of alternative fuels
- Public education and outreach program
- Contract administration tools with feedback loops. Record keeping, reporting (performance, operations and financial), responsiveness standards, access to facility and inspection protocols, performance (dis)incentives should be reviewed together on a routine schedule
- Compensation/payment structure. Note: if compensation will include the marketing of the recyclables, material valuations should be taken into account and they should include:
  - agreed upon value for materials sold – actual value or recognized indices
  - what the material is worth at the processing facility, i.e. make allowance for transportation
  - negative values of marketed materials and disposal costs

- tip fees where applicable
- consideration of who assumes responsibility for disposal costs, recognizing that inbound material quality and processing efficiencies affect these costs.
- Adjustments over time to the percentages of each recyclable and non-recyclable component set at the inception of the contract. Adjustments through jointly agreed upon protocols for audits should be done at regular intervals
- Allowances for changes in the contract over time due to such circumstances as: acts of God, changes in market conditions (including but not limited to lack of commercially reasonable market availability for processed recyclables, changes in market specifications affecting the salability of recyclables, changes in law (e.g. bottle bills) affecting the recyclability of materials, changes in the quantity, quality or composition of the inbound recyclables). Note: quantities could be affected by the removal of more valuable commodities from the mix or allowance of scavenging, and these issues should be addressed. Any other change which prevents, precludes or substantially affects the benefit(s) bargained for under the agreement (mutually agreed upon by local agency and contractor)
- Compensation adjustment methodologies for any increase or decrease in services or other obligations required of the Contractor due to changes in contract conditions and at time of any contract extensions, such as increases in cost due to mandated wage increases and/or changes in fuel costs.
- Flexibility for the contractor to dispose of recyclables when no reasonable commercial market exists (mutually agreed upon by local agency and contractor pursuant to predetermined standards)
- Defaults, cure periods, and remedies
- Representations and continuing warranties
- Dispute resolution and enforcement options
- Performance assurance (e.g. bonds, letter of credit) where the ability to perform may be in doubt

## **E. CONCLUSIONS**

This Advisory highlights important issues that come into play during a public process to select processing services for recyclables. Contracts should ultimately be designed to ensure that they are functional and cost effective for both public entities and contractors and ensure high quality service that return recyclables to the marketplace as commodities.

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

## **Understanding Material Composition – *Stream Composition Study***

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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.

## *The Joint Advisory on Designing Contracts for Processing of Municipal Recyclables Attachment 2:*

# Methods of Determining the Value of Recyclables Handled at a Processing Facility

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This document serves as an Addendum to the SWANA and National Waste & Recycling Association (NWRA) Joint Advisory on Designing Contracts for Processing of Municipal Recyclables, which is a joint effort of the two organizations to enhance contracting practices for residential recycling. The intent of this Addendum is to share information on methods for determining the value of recycled commodities based on the blend of materials delivered to the processing facility. Cooperatively addressing both changes in the residential recycling stream and price fluctuations for recyclable commodities are key aspects of designing successful recycling programs and contracts.

### **Sharing Recyclables Revenue**

The Advisory notes that recyclable processing contracts might include **recovered materials revenue sharing** or **rebate requirements**, which share risk between the local government and contractor to varying degrees; though a discussion of this issue is beyond the scope of this Addendum, it is an important one that needs to be addressed in contracts.

### **Calculating the Value of Recyclables**

It is possible to estimate the overall value of recyclables recovered by a recycling program by considering the individual values of each component material that falls within the scope of the program delivered to the processing facility. The total value of the material may also include any residue (i.e. associated non-recyclable contaminants and non-recoverable recyclables). These components are evaluated as a percentage of the total blend of materials. (See “Understanding Material Composition – Stream Composition Study”).

The two most commonly accepted means for establishing the value of recovered materials are Actual Sales Value and Indexed Sales Value:

- A. Actual Sales Value:** This is an evaluation of information derived from the ‘**Net Revenue**’, i.e. the actual sales receipts (income) minus any invoices (charges) for recyclable sales or other disposition, including residue disposal, and transportation costs, for each recyclable processed during a designated period (such as a month). The valuation of material should be simple and transparent and supported by documentation of the types, quantities, and prices of materials sold. In some cases, the value may be a cost, e.g. certain types of glass. Residue disposal may also be

factored into the Net Revenue. The cost of residue may be determined by adding together the cost of transportation and disposal, or by using a pre-determined, fixed cost. By including the cost of residue in the valuation, both parties deriving revenue from the material will have an incentive to reduce the amount of non-recyclables collected, governed by performance measures – discussed later in this document.

Particularly when recycling markets are volatile and because indices are not updated as quickly as material price changes, the Actual Sales Value approach may be more accurate than the Index Sales Value Approach (see below). The Actual Sales Value approach should be supported by weight records, sales receipts and cost invoices. This will provide some assurance of accuracy.

- B. Indexed Sales Value:** This approach uses sales values established by reference to regional, recognized, independent, third-party indices and material grade designations for the sales period. Indices are provided on single lists of recyclable pricing. The result is that administration costs are lower than using Actual Sales Value, as contractors do not need to add together all weight records and sales receipts/invoices for each outgoing-shipment of recovered recyclables and local governments do not have to confirm/audit the Actual Sales Value.

## Reflecting Material Values in Contracts

There are three main methods of reflecting material values in contracts:

1. **Floating Price:** Contracts can be written so that sales revenues (i.e. the price received for recovered materials) vary with market prices and material quality standards. This floating price approach provides the greatest incentive for both parties to monitor both the price of recyclable commodities and the quality of materials collected within the program. Contracts with floating sales values should include transparent methods for evaluating changing market or material quality conditions to allow each party to understand the risks and rewards associated with fluctuating markets and material quality.
2. **Fixed Revenues:** Contracts may be designed with fixed revenues, which are set for a period (e.g., a quarter or a year), with specified data and procedures for revising revenues. Indexed sales values can be used as the basis for determining fixed revenues. Such fixed value contracts should be revisited for possible adjustment at the end of each set period and must have a clearly defined method for adjustment. Fixed revenues can preclude knowing the true net worth of what is being delivered, though using indexed sales values in conjunction with periodic adjustments may help create an average that gradually tracks with overall market fluctuations.
3. **Floating AND Fixed:** In any contract, it may be appropriate to negotiate fixed values for some components for which pricing does not routinely change - for example, the unit cost for residue disposal.

## Calculating Blended Value

The following description and table provides information on calculating the combined value for a ton of recyclables comprising many individual materials, at varying associated prices, also known as the **Blended Value** per ton.

The value of a load of mixed recyclables may be estimated by considering the individual values of each component recyclable. The value can be either positive or negative depending on the quality and quantity of recyclables and non-program materials/contamination collected and market conditions. It may be a part of overall contract pricing considerations, e.g. contract price paid by a municipality plus (or minus) any revenues received. The calculation can be based on Actual Sales Value (Net Revenue) or an Indexed Sales Value.

The table below outlines one possible method of calculating the Blended Value of recyclables and the parameters to consider when calculating it. The parameters are as follows:

- (1) **Audited Material Composition (%):** The contract should provide for an agreed-upon method, such as a prescribed audit protocol, to determine the percent that each type of recyclable comprises of the total load by weight. Residue can be included or not, though if excluded is more likely to be disregarded as a program improvement need. In the example below, the table lists 13 types of recyclable commodities and the residue.<sup>1</sup> The sum of all included materials should equal 100%.
- (2) **Reference Index:** If the Indexed Sales Value is used, the contract should specify the index or value that applies to each commodity.
- (3) **Unit Rate Based on Referenced Index or Actual Sales Value (\$/Ton):** May be a negative or positive value. Residue would be shown with a negative value.
- (4) **Unit Rate X Composition (\$):** Multiply each audited material composition by its corresponding value using the Actual Sales Value or Indexed Sales Value.
- (5) **Blended Value (\$/Ton):** Add up the value of each commodity/ton and divide by the total tonnage. The resulting value is the Blended Value or the *“Average Commodity Revenue,” “Average Material Value”* or a similar term.

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<sup>1</sup> **Changes in Commodities.** The contract can be written to allow the addition of new commodity categories to the blended value calculation. This addition can result in changes to revenue as well as changes to processing costs due to the need to source new equipment or to add labor to handle new separation requirements. Similarly, a contract that provides for the addition of commodities can also provide for an opening to consider the discontinuation of materials and provide a process for revisiting associated changes in revenues and costs. However, it should be recognized that there would have to be a significant reason that is specifically spelled out in the contract to get the public sector to drop a material even if the value plummets after the program is underway as the propensity of residents to continue placing an item(s) out for recycling is very high.

**Sample Table for Calculating Blended Value of Recyclables**

<b>Commodity (per the agreed upon contract categories)</b>	<b>(1) Audited Material Compositio n %</b>	<b>(2) Referenced Index</b>	<b>(3) Unit Rate based off Reference d Index \$/ton</b>	<b>(4) Unit Rate X Compositi on %</b>
	<b>A</b>		<b>B</b>	<b>AxB</b>
<b>OCC</b>	x%	<i>Insert which index or value tool will be used to determine value for each commodity. Certain materials, such as residue and glass, may have a negative unit rate. Rates should fluctuate according to the agreed upon index or value tool.</i>	\$y	\$z
<b>Mixed paper</b>	x%		\$y	\$z
<b>ONP</b>	x%		\$y	\$z
<b>PET</b>	x%		\$y	\$z
<b>Natural HDPE</b>	x%		\$y	\$z
<b>Pigment HDPE</b>	x%		\$y	\$z
<b>Mixed plastic (3-7)</b>	x%		\$y	\$z
<b>Mixed glass</b>	x%		\$y	\$z
<b>Steel</b>	x%		\$y	\$z
<b>Aluminum (UBC)</b>	x%		\$y	\$z
<b>New material A</b>	x%		\$y	\$z
<b>New material B</b>	x%		\$y	\$z
<b>New material C</b>	x%		\$y	\$z
<b>Residue</b>	x%	\$y	\$z	
	100.00%	<b>(5) Blended Value of each ton of recyclables:</b>		<b>Σ \$z /total tonnage</b>

## **Performance Measures Governing Residues**

Performance measures to minimize residue are important elements of any recycling program because they provide an incentive for the processor to capture available recyclables and for the municipality to support those efforts through the education and enforcement efforts in the collection systems that fall within its purview. This is even more important when residue is part of the value calculation. This subject will be discussed in more detail in a future paper but performance measures should be considered during contract development.