Glass Recycling Update
SMI has the Largest Network of Glass Recycling Plants in North America – the facilities are strategically located near our customers allowing for lower shipping costs and better service.
What We Do – Products Using Recycled Glass

- Glass Beads
- Insulation
- Matches
- Wine Bottles
Challenges to Glass Value ...

Before

2% yield Loss

Some reasons for the quality slide of glass:

- Collection favored convenience over quality
- Higher contamination being placed in curbside recycling by homeowners
  Insufficient education, smaller garbage bins, Recycling is free vs garbage, automated collection vs manual (no inspection), etc.
- Production issues ... Older Mrf line layouts, lines running over capacity, poor metrics, etc.
- No glass specification by cities
- Mrf’s are unprofitable and some are pushing costs on to secondary processor, moving residue to profit share
**3-MIX Single Stream Matrix (market specific)**

Steps taken:

- Share our quality measurement system
- Directly tie pricing to quality received which created today's **friction point**.

<table>
<thead>
<tr>
<th>Undersize</th>
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<th>5.0%</th>
<th>10.0%</th>
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<th>20.0%</th>
<th>25.0%</th>
<th>30.0%</th>
<th>35.0%</th>
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</thead>
<tbody>
<tr>
<td>NGR</td>
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</table>

**Sample**

Poor Value is often misinterpreted as Poor Markets
### Proposed Glass Specification

**Material Recovery Facility-derived 3-Color Mixed Container Glass** ("MRF Glass") **DESCRIPTION FOR ISRI REVIEW:** MRF Glass consists of crushed or whole scrap flint (clear), Amber (brown), and Green (emerald) container/bottle glass made from soda-lime-silica. All MRF glass must be free of medical or hazardous wastes and poisonous or other harmful substances or liquids. These standards and practices apply to 3-color mixed glass for purchase or sale in the United States and Canada. Transactions covering shipments to or from other countries may also be in accordance with these standards and practices and may be modified by mutual agreement between buyer and seller. These specifications are guidelines for buying and selling MRF glass are always subject to the buyer and seller’s agreement. It is recognized that MRF Glass can be mixed with other materials for the convenience of recycling and efficient collection and that quality levels and pricing varies widely based on the amount of contamination mixed in with the glass. Outthrow and Prohibitive tolerances for Material Recovery Facility-derived 3-Color Mixed Container Glass are:

<table>
<thead>
<tr>
<th>Outthrows</th>
<th>Description</th>
<th>Examples</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Glass Residuals (NGR)</td>
<td>Common program and non-program materials found in Recyclable Single and Dual Streams recycling programs entering a Material Recovery Facility</td>
<td>Non-Glass and organic materials such as paper, wood, food-or plant particles, metal/plastic closures, rocks, and other inert materials and fines</td>
<td>Varies...See below chart</td>
</tr>
<tr>
<td>Undersized or pulverized material (&quot;Fines&quot;)</td>
<td>Undersize Glass particles &lt; 3/8” (or &lt; 1/8”**)</td>
<td>Mixed color glass particles crushed so small as to render optical sortation useless</td>
<td>Varies...See below chart</td>
</tr>
<tr>
<td>Ceramics</td>
<td>Broken bits of household ceramic</td>
<td>Dinner plates, mugs, cups, etc.</td>
<td>2% Maximum</td>
</tr>
<tr>
<td>Moisture</td>
<td>Excessive water mixed with glass**</td>
<td>Rain, snow, ice</td>
<td>5% Maximum</td>
</tr>
</tbody>
</table>

#### Quality Levels and Pricing

The quality levels and pricing of MRF Glass vary widely based on the amount of contamination mixed in with the glass. The amount of contamination is measured by the percentage of non-glass residuals (NGR) and undersized or pulverized material ("Fines"). The NGR is the percentage of non-glass materials found in MRF glass, while the "Fines" is the percentage of undersized or pulverized material found in MRF glass.

**Non-Glass Residual (NGR)**

- **Grade A 3mix Glass:** This glass has been processed by a MRF with glass cleaning equipment that runs the -2” screen material thru vacuum pickup points which removes the light fractions such as paper shred, paper and plastic labels, small plastic pieces typically found in MRF glass. This specialized equipment can be found in new and retrofitted MRFs. This material commands the highest value as the MRF has prioritized a high glass value above convenience.

- **Grade B 3mix Glass:** This glass has been processed by a MRF with minimal glass cleaning equipment or one with glass cleaning equipment that is not performing properly or where the MRF is running over capacity. This material does not command the highest value as it has some MRF residue.

- **Grade C 3mix Glass:** This glass has been processed by a MRF with no glass cleaning equipment or one with glass cleaning equipment that is not performing properly or where the MRF is running over capacity. This material has the lowest value as it is heavily contaminated with residue.

**Prohibitives**

- **Material which is Prohibited and subject to load Rejection:** Materials which contaminate whole loads of MRF glass rendering it unusable for melting.

- **Examples:** PyroCeramics (Fireplace glass); gypsum/wallboard/drywall (including glass from construction demolition processing with mixed CaCO3 fines); common moisture-absorbing desiccants (silica gel beads, alumina pellets, closet paks).

**Tolerance:** .025% Maximum

**Cities and MRF Operators need to agree on a glass specification to drive transparency and accountability**
Hot spots, often have, no fiberglass markets/plants and inconsistent usage rates by container industry.

Efforts are underway to develop new markets and/or export material to resolve market issues.
Southeast Glass Review

- Fiberglass markets exist in Georgia and use 25-75% recycled content.
- Container Industry has many plants in region but they typically run only 20-40% cullet.
  - Poor Plant performance where they produce in house cullet. Need to ratchet usage up to absorb regions surplus
- Container industry imports substantial amounts of cullet from other regions into the SE.
- Industries and companies have different ways to economically model cullet usage
  - Batch (cost savings model)
  - Batch + fusion + energy savings+ furnace life savings+ air emissions (total cullet value model)
  - Difference of approx. $50/ton in value