Commingled Recycling Systems – Preventing Contamination at the Curb, Material Recovery Facility (MRF), and Mill

Overview

- What is ‘commingled’ and how did we get here?
- What is the problem with the current system?
- Working towards solutions – A regional effort
- Collection and Processing Standards & Guidelines
- Writing local policies and contracting for quality
- Contacts

Collection Methods

3-Bin (or more)

Dual-Stream

Single-stream

‘Commingled’

Commingled Collection's Rapid Rise

- **In Washington**:
  - 3-bin systems were the first, but are declining in favor of commingled collection
  - Dual- stream system hit the curb in 1998
  - Single-stream systems started in 2003
  - Of the 80% of Washington residents that have access to curbside recycling, the vast majority are using a commingled system or are living in a community that will soon make the switch
  - Glass collection methods vary (commingled with all materials or just containers, separate bin at curb, and depots)

Commingled Collection's Rapid Rise

- **In Oregon**:
  - Most cities had multiple-bin programs by 1986
  - Commingling began in the mid to late 1990's
  - Two jurisdictions experimented with single stream, but later separated out glass
  - The first carts were used in 2000
  - Most program now use carts for all recyclables except glass and motor oil
  - None of the programs include glass in the commingled stream (use depots or separate curbside bin instead)

Why Go Commingled?

- Commingling allows for automated collection
- Benefits of automated collection:
  - Increased efficiency
  - Decreased worker injuries
  - Wheeled cart with lid provide convenience and privacy to residents
- Little or no sorting required = greater participation by residents

Commingled collection also means materials need to be sorted prior to recycling

What is the problem with the current commingled recycling system?

- Collection does not equal recovery—Recyclable materials are getting 'lost' in other commodities
- Lost materials equals lost resources—Recycling is about resource conservation, not landfill space
- In a global marketplace, current trade association standards are not working to ensure quality at the mills
- Problematic materials reduce efficiencies at MRFs and mills, and end up as garbage
- Confusion by customers about what can be commingled

Collection ≠ Recovery

King County (WA) Puget Sound MRF Assessment (2006)

Curbside Material	Sent to Proper Market	Cross-Contaminant or Residue
Newspaper, Mixed Paper	98-99%	1-2% lost
PET (Plastic)	47%	53% lost
HDPE (Plastic)	72%	28% lost
Aluminum	64%	36% lost
Tin	77%	23% lost
Glass	90%	10% lost

Collection ≠ Recovery

Metro (Oregon) MRF Contamination Study (2004-05)

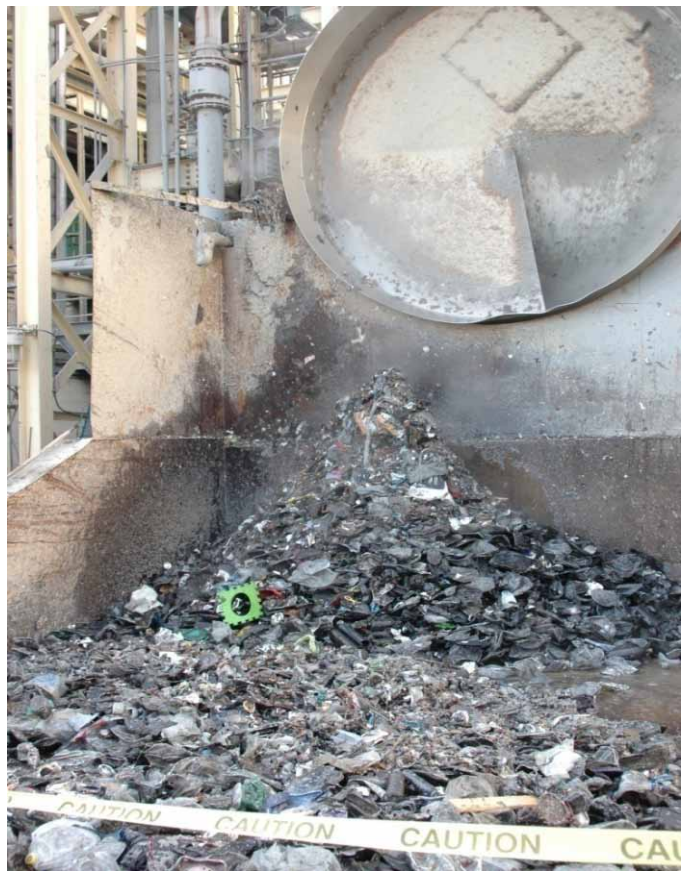
Curbside Materials	Tons Collected	Tons Lost	Loss Rate
Newspaper	66,936	694	1%
Cardboard	20,067	4,153	21% lost
Metal	4,062	583	14% lost
Plastic Bottles	3,390	800	24% lost

How are recyclables getting lost?

- MRFs are seeing more non-program recyclables coming in, adding to the difficulty in un-commingling recyclables
- While some of the 'lost' recyclable materials are ending up in the residue at the MRF, a larger problem is these materials are getting sent to the wrong markets, mixed up with another commodity—and become garbage

Lost Materials = Lost Resources

- When metal and plastic containers arrive in a bale of paper at a mill, then pass through the pulper, these once recyclable products are rejected and end up as garbage



NORPAC **Paper Mill**
Longview WA, Feb 2008

Lost Materials = Lost Resources

- Pulper rejects have increased 7-10 times as suppliers have switched to commingled collection systems

Blue Heron **Paper Mill**
Oregon City, Oregon, Feb 2008

Recycling is about resource conservation, not landfill space

- The benefits of recycling are realized when those materials replace raw materials in product manufacturing
- Upstream impacts in manufacturing are 10-20 times greater than end of life impacts. These lost resources amount to much more than lost landfill space. This becomes even more important as the focus shifts to looking at how recycling plays a role in reducing greenhouse gas emissions

What about existing standards?

- Institute of Scrap Recycling Industries (ISRI) is the existing market standard

- According to King County 2006 MRF Assessment Study, “MRF performance and product quality is *almost never measured* against ISRI’s formal specifications”

Existing standards are not working to ensure material recovery

Standard: **ISRI #8: Special News, De-ink Quality (#8 ONP)**
Prohibitive materials……..None Permitted
Total Outthrows may not exceed……¼ of 1%

NORPAC Paper Mill Longview, WA

Supplier	NORPAC Supply System	Sold As (ISRI)	% Outthrows (Non-news fiber)	% Prohibitives (Non-fiber)	% Glass
2001 and Prior Average ALL Suppliers	100% Source Separated	#8	0.25 – 0.5	0.0	0.0
Sep 2006 – Dec 2006 Weighted Average ALL Suppliers	68% Co-mingled	#8, #7	15.0	3.4 % Pulper Rejects	0.33

Problematic Materials

- MRFs are designed to process flat fiberstock (paper, cardboard) and containers

- Anything small, such as broken glass, or flexible, like plastic bags, causes problems when commingled—impacting efficiencies at MRFs and the quality of the other commodities when they reach the mills

Customer Confusion

- Commingled collection carts look like garbage cans
- Residents know materials will be sorted ("when in doubt, throw it in" behavior)
- Recycling programs' Yes/No lists vary even from neighboring jurisdictions that use the same MRF

Working Towards Solutions – A Regional Effort

- Convened by Region 10 EPA in 2007, stakeholders in the states of Oregon and Washington:
  - Agreed there was a problem with the current commingled recycling system
  - Agreed to work together for one year to look at the problem and create standards for collection and processing
  - Agreed a market-based standard was the best approach
  - Agreed on a vision and mission

Commingled Recycling Systems Standards and Guidelines Initiative

Vision Statement

To develop a standards and guidelines for commingled recycling systems such that:

1. Cross-contamination of recyclable materials would be reduced;
2. The quality and quantity of materials recycled would be increased;
3. The highest percentage of materials that are intended to be recycled would be captured.

Commingled Recycling Systems Standards and Guidelines Initiative

Mission Statement

To agree to a clear and measurable standards and guidelines that:

1. Allows governments and other contracting entities to easily and consistently specify that their materials are collected and processed according to the standard and guidelines for haulers and MRFs;
2. Allows haulers and MRFs to achieve a higher market value by meeting the standard and guidelines;
3. Increases the overall quantity and quality of material recycled;
4. Reduces the quantity of recyclable material lost as either outthrow or prohibitive materials in other recycling streams;
5. Has a consistent measurement and evaluation system that is cost effective and transparent;
6. Encourages and rewards more effective and efficient collection systems.

Commingled Recycling Systems Standards and Guidelines Initiative

- **Division of work into subgroups:**
  - Standards and Guidelines
    - Collection
    - Processing
  - Evaluation and Measurement
  - Marketing

Collection Standards & Guidelines Subgroup

- **Guidelines** for commingled collection systems
- **Measurable standards** for incoming commingled materials to MRFs

- **Tools:**
  - Decision flowchart
  - Material specification
  - Annual audit at the curb (<5% prohibitives)
  - Consistent customer education

Decision Flowchart for Commingled Recycling Collection Programs

Examples:

- **Is the MRF which processes collected materials designed (and permitted, if applicable) to sort and capture the materials being considered for recycling purposes?**
  - If no, look at alternative means of collection
  - If yes, next
- **Does the material considered routinely become a MRF residual, or outthrow or prohibitive in another commodity stream?**
  - If yes, set performance standards and measure performance. Policy decision
  - If no, next
- **Does the MRF routinely sort the material such that the level of prohibitives and outthrows meet end market standards?**
  - If no, set performance standards and measure performance. Policy decision
  - If yes, next

Collect in a Single Stream Program

Yes – OK to mix together	With Preparation	Collect separately	Questionable	
Newspaper **Junk mail** **Scrap paper** **Cardboard** **Magazines** **Plastic bottles and tubs 6 oz. or larger*** **Rigid plastic plant pots 4 inches or larger** **Plastic buckets of 5 gallons or less** **Aluminum** **Scrap metal** **Tin**	Shredded paper in a paper or plastic bag depending on requirement of incoming MRF. Empty metal paint cans, small metal items in can	Glass Batteries Yard debris Food waste Motor oil Food contaminated paper Loose metal less than 2 inches Metal larger than 30 x 8 inches or more than 30 pounds Loose shredded paper Frozen food boxes Plastics: Bags and film Foam/expanded plastics Large items (e.g., toys, lawn furniture, storage crates) Lids and trays Clamshells and bakery containers Food contaminated Biodegradable plastics Cups, plates, silverware Blister packaging Any plastics with a capacity of less than 6 ounces.	Ream wrappers Beer/soda paperboard carriers Aseptics Gable tops	

Effective Customer Education Tools

- **Label on Lid of Recycling Cart**:
  - Use photos
  - Use type/shape of plastics, not resin numbers

Effective Customer Education Tools

- **In-home outreach**:
  - Use photos
  - Use type/shape of plastics, not resin numbers

Processing Standards & Guidelines Subgroup

- **Identified obstacles** that increase cross contamination and reduce efficiency

- **Measurable standards** on outgoing materials
  - Goal to measure the first year to set baseline
  - Set multi-year standards off baseline

Barriers for the MRF

Dangerous: Sharps and other biohazard waste

- **When commingled**, these are responsible for the majority of contamination, damage and inefficiencies at MRFs:
  1. **Glass**
  2. **Plastic bags**
  3. Shredded paper
  4. Flattened containers

Standards for MRFs Processing Commingled	Estimated Current Status of Recovery*	Goal: Going to the proper market after the first year of implementation
Paper – News compatible - Brown Kraft	98% 75%	98% 80%
Plastic – All	70-75%	80%
Metal - All		80%
Glass (If part of commingled collection)	80%	80% to non-disposal market Measure: ○ % going to glass to glass ○ % going to aggregate ○ % in paper
Recyclables in Residual	Measured	Measured
Total Residual		Measured
Total Prohibitives		Measured incoming

*Based on the MRF studies in King County, WA (2006) and Metro, Oregon (2004-05)

Why aren't we trying to recover 100%?

- We don't know what the current status of recovery is until we get a baseline measurement

- Due to the volume and nature of commingled materials, there will be losses due to breakage and mis-sorts as the materials are uncommmingled

Evaluation & Measurement Protocol Subgroup

- **Goal:** An evaluation system for the commingled standards and guidelines that includes financing, roles, and accountability

- **Deliverable:**
  - Draft plan on how to measure contamination levels coming in and leaving participating MRFs

Evaluation & Measurement Protocol for Commingled Standards

- Sampling Plan for **Outbound Materials**
  - Twice a year per facility in the first year
  - May sample at mills
  - No prescheduled visits
  - Third party sampling
  - Consistent method and reporting
  - Transparent results
  - Example: 8 samples of news (200 lbs each); 2 samples of each: mixed grade paper, all plastic grades, tin, and aluminum (100-200 lbs each); 4 samples of residue (100 lbs each)

Evaluation & Measurement Protocol for Commingled Standards

- Sampling Plan for **Inbound Materials**
  - Twice a year in the first year
  - At MRF or curb
  - Third party sampling
  - Measure by total volume or by jurisdiction
  - Consistent method and reporting
  - Record hauler information & type of route
  - Example: 1 sample per vehicle (300-500 lbs) for a of total 15 vehicles (if by volume)

Evaluation & Measurement Protocol for Commingled Standards

- **Cost estimate**
  - Labor: 3 days, crew of 4 per facility
  - Cost: $6,000 to $7,000 per sampling period, per facility

Creating Market Demand Subgroup

- **Goal:** A plan to ensure that the commingled standards and guidelines are incorporated into contracts, purchasing, policy, and permitting to create a market demand

- **Tools:**
  - Informational Slide Show
  - White Paper
  - Collection Sample Format
  - MRF Sample Format

[If you are unable to access the links above, please contact staff on the next slide to have the document emailed to you]

Contacts

- **EPA :** Viccy Salazar
  Region 10
  (206) 553-1060
  Salazar.Viccy@epa.gov
- **Oregon :** Peter Spendelow
  Department of Environmental Quality
  (503) 229-5253
  Spendelow.Peter@deq.state.or.us
- **Washington:** Shannon McClelland
  Department of Ecology
  (360) 407-6398
  Mcsh461@ecy.wa.gov