



Region of Waterloo

CIF # 1090 – Inbound Contamination Definition & Impact Analysis

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RPWCO Committee Members

RPWCO Members

- Jon Arsenault, Waterloo, RPWCO lead
- Cameron Walsh, Guelph
- Erwin Pascual, Peel Region
- Emil Prpic, Niagara Region
- Jay Stanford, London
- Lindsay Milne, York Region

CIF Staff Representatives

- Carrie Nash, CIF, Senior Program Manager
- Mike Birett, CIF, Director

Problem with Inbound Contamination



- Inbound contamination is an on-going issue for municipalities
- Materials have significant impact on sorting operations
- Large items are easy to identify (e.g. scrap metal, toys, car parts)
- “Wishcycling” and complex packaging types compounded the issue
- Hired EcoCompass Inc. supported by Circular Matters LLC for this project

Project Breakdown

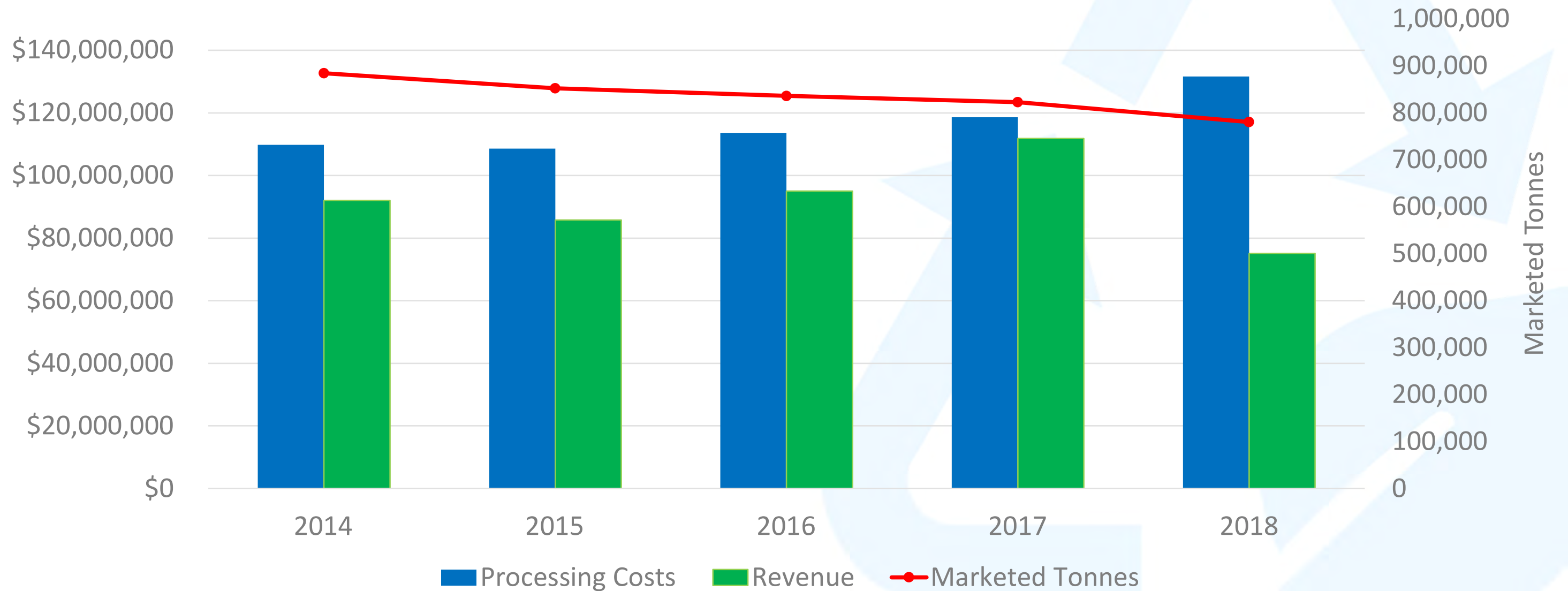
Five Project Phases:

1. Defining Inbound Contamination
2. Develop an Audit Methodology
3. Develop a Financial Impact Model
4. Ground Truth the Draft Methodology and Model
5. Finalize Guidance and Deliverables

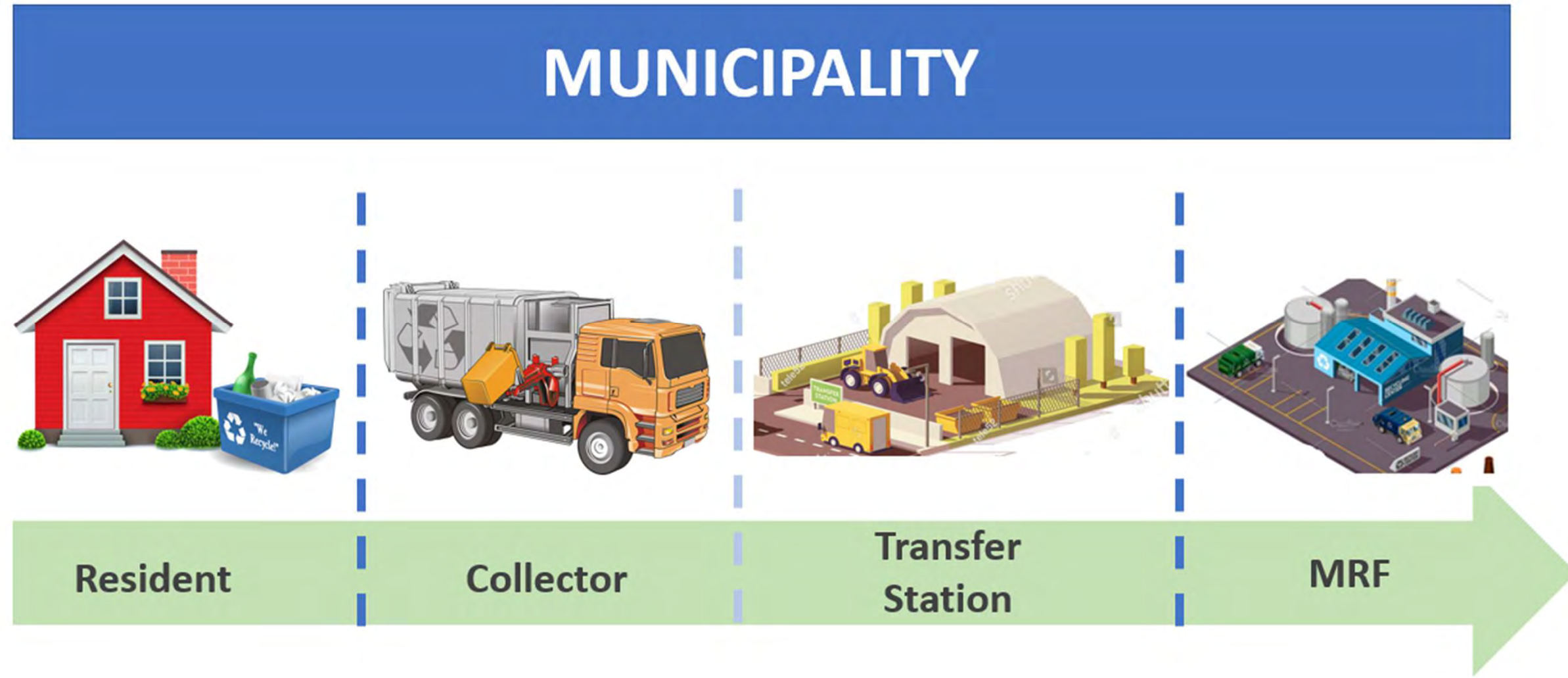
Contamination Categories

- Inbound Contamination can be grouped into three (3) broad categories:
 - Prohibited or Unsolicited Materials
 - E.g.: Garden hoses, propane tanks, needles, construction waste, etc.
 - Difficult to Recycle Materials
 - E.g.: Black plastics, coffee cups, coffee pods, plastic film, expanded polystyrene, etc.
 - Degraded or Contaminated Materials
 - E.g.: Full ketchup bottle, soaked newspaper, partially full aerosol container, etc.

ON Historic Trends



Responsibility for Materials



Online Research

- ISRI “Scrap Specifications Circular,” April 16, 2018 edition.
- ISRI “Inbound Residential Single-Stream Specification.”
- ISRI “Inbound Residential Dual-Stream Specification.”
- Association of Plastic Recyclers “APR Design® Guide for Plastics Recyclability,” Dec. 9, 2019 update.
- Association of Plastic Recyclers, “Model Bale Specifications: MRF Curbside Film”
- Novelis “North American UBC Product Quality Specification,” January 2019.
- The Recycling Partnership “Best Management Practices for Capture Rate Studies (*internal working draft*).”

Stakeholder Outreach

Municipalities	Other Stakeholders	Other Stakeholders
Bluewater Recycling Association (SS)	Canadian Plastics Industry Association (CPIA)	NORPAC Paper
City of Guelph (SS)	Canadian Stewardship Services Alliance (CSSA)	Paper and Paperboard Packaging Environmental Council (PPEC)
Niagara Region (DS)	Continental Paper Grading	ReMM
Peel Region (SS)	EFS	Stewardship Ontario (SO)
City of Toronto (SS)	Emterra/ReVital	Triple M
Region of Waterloo (DS)	Machinex	Van Dyk Recycling Solutions
York Region (SS)	Miller Group	

Challenge with Defining Contamination

- Unwanted/undesired inbound and/or outbound materials.
- Stakeholder goals sometimes compete against each other.
 - Maximize diversion
 - Reduce collection times
 - Maximize commodity revenue
 - Minimize capital investments
 - Minimize labour costs
 - Etc.
- Competing goals result in varying definitions for certain materials.



Defining Undesired & Unwanted Materials

- **Prohibited Materials (Inbound)**
 - Defined as items never allowed and includes any material that contains medical, organic, food, hazardous, poisonous, radioactive or toxic waste and other harmful substances or liquids.
 - Sharps and Needles, batteries, hazardous materials, etc.
- **Contamination (Inbound)**
 - Not considered acceptable in the specification unless specifically agreed to in writing between buyer and seller.
 - Shredded paper, plastic bags & film, aerosol cans under pressure or partly filled, etc.
- **Cross-Contamination (Inbound for Multi-Stream Programs)**
 - Acceptable materials that are placed in the wrong container. Some programs will expect MRF operators to recover these materials, while others will consider it as Contamination.
 - Newspaper found in the Container bin.
- **Outthrows (Outbound)**
 - Defined as materials that are undesirable for consumption for the grade specified. Typically consists of other recyclables found within a grade.
 - Corrugated cardboard within Sorted Residential Paper #56
- **Prohibitive Materials (Outbound)**
 - Defined as materials, in excess of the amount allowed, will make the commodity unusable as the grade specified or damage equipment. Typically consists of Prohibited Materials and other recyclables.
 - Broken glass or needles within Sorted Residential Paper #56

“Contamination”?



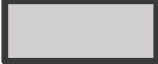
Materials	Stakeholder Issues
Bagged Recyclables	<ul style="list-style-type: none">• Collectors do not prefer ‘garbage-size’ bagged recyclables as they increase risk of injury; also additional handling time for cart based programs.• Can create significant issues in MRF’s without bag breakers (both grocery- and garbage-sized bags)
Black Plastics	<ul style="list-style-type: none">• End markets typically want the black PP (#5) plastics only. Will accept other black plastics as they recognize it cannot be optically sorted at MRFs.
Shredded Paper	<ul style="list-style-type: none">• Difficult to manage at the MRF. Even bagged shredded paper can rip, leading to increased glass contamination
EPS and rigid PS packaging	<ul style="list-style-type: none">• EPS is bulky and can cube out trucks/carts faster, increasing collection operation costs.• EPS has similar issue to shredded paper at the MRF; prone to breaking into smaller pieces and ending up in glass.• Rigid PS is not desired by end markets; Combined amounts of rigid #1, #3, #6, and #7 plastics should not exceed 20% in Mixed Plastic bales.

“Contamination”? (continued)

Materials	Stakeholder Issues
Beer and LCBO Containers	<ul style="list-style-type: none">Issue from MRF operators around Beer and LCBO containers are directly related to the abrasive nature of glass. Would prefer to see all glass collected separately.
Small Materials / Bottle Caps	<ul style="list-style-type: none">MRF equipment vendors indicate materials smaller than 2.5 – 3” will likely end up in glass
Pizza Boxes*	<ul style="list-style-type: none">Recent study from West Rock, indicates “no significant technical reason to prohibit post-consumer pizza boxes from the recycle stream.” CAUTION: The study indicates that most Pizza boxes currently found in the recycling stream have an average grease content of approximately 1 - 2% by weight level

* Link to report: <https://www.westrock.com/greasecheesestudy>

End Market Specifications

	Accepted in commodity		Contamination within commodity (Outthrows)		Contamination but not commonly found within commodity (Prohibitive Materials)
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Market Grades	OCC	Mixed Paper	Sorted paper/ news	Cartons	Bulky rigids	PET bottles	HDPE bottles	PP	Mixed rigid plastics	Film	Scrap metal	Food cans	UBCs	Foil	Glass
GRADE-SPECIFIC CONTAMINANTS															
Newspapers	X														
Magazines & Telephone Directories	X														
Sunburned newspapers or > four months	X	X	X												
Waxed OCC	X	X													
Boxboard	X		X												
Papers/containers/pizza boxes with "excess" grease or food residue	X	X	X												
Polycoated paper, cups, refrigerated boxboard	X	X	X	X											
Cartons	X	X	X												
Wet paper (>12% moisture)	X	X	X	X											
Containers with residual contents					X	X	X	X	X			X	X		

End Market Specifications (continued)

Market Grades	OCC	Mixed Paper	Sorted paper/ news	Cartons	Bulky rigids	PET bottles	HDPE bottles	pp	Mixed rigid plastics	Film	Scrap metal	Food cans	UBCs	Foil	Glass
GRADE-SPECIFIC CONTAMINANTS															
Plastics with degradability additives					X	X	X	X	X	X					
Plastic containers that have held motor oil or hazardous chemicals					X	X	X	X	X	X					
Addition of mineral fillers					X	X	X	X	X	X					
#7 Other						X	X	X	X						
PETG containers or labels						X									
Colors other than clear, green, light blue						X									
Full bottle sleeve labels						X	X	X	X						
Film other than polyethylene										X					
Non-packaging scrap metal															
Aluminum foil and trays													X		
Aluminum foil and trays with food contamination													X	>5%	
Aerosol cans under pressure												X			
Aluminum cans with plastic components or sleeve labels													X		
Aluminum can moisture													>4%		

Measuring Contamination

Level of Effort

- Visual Inspections (Curbside, Transfer Stations and MRFs)
- Time and Motion Study
- Inbound Audit
- Bale / Bunker Audit
- Curbside Waste Audit
- MRF Mass Balance and Efficiency Audit

Frequency

Regularly

Monthly

Quarterly

Annually

Chain of Custody



Resident

- Visual Inspection
- Curbside audit

Collector

- Visual Inspection
- Inbound Audits

Transfer Station

- Visual Inspection
- Inbound Audits

MRF

- Visual Inspections
- Inbound Audits
- Bale / Bunker Audits
- Time-and-Motion Studies
- MRF Mass Balance and Efficiency Audit

Importance of Collecting Data

- Key message, “Don’t Reinvent the Wheel!”.
- Use existing audit methodologies but update material categories to reflect your specific program issues.
- Brokers have **stressed** the need for visual inspections of bales; once its baled **AND** when its being loaded.
- Most end markets will conduct an initial audit.
- Market supply and demand, volumes and relationships are also big factors for tolerance

Visibility of Contamination

- Visibility is critical in removing contamination
- Visible Contamination:
 - Large contamination (e.g. propane tanks, hoses, etc.)*
 - Unacceptable materials*
 - Incorrectly placed recyclables (cross-contamination in dual-stream program)
 - Medical waste.
 - Outthrows / Prohibitives in Commodities
- Limited Visibility Contamination:
 - Material buried in collection containers
 - Sharps, medical waste, etc.
 - Greasy pizza boxes
 - Partially filled containers
- Municipalities play a vital role in mitigating both types of contamination
- Service providers play a big role in managing visible contamination

Financial Impact of Contamination

- Prohibited and Contaminated Materials incurs:
 - Collection Costs;
 - Processing Costs; and,
 - Disposal / Handling Costs.
- Also can result in equipment damage, line shutdowns and revenue declines.
- Improperly Sorted Materials (Outthrows and Prohibitive Materials) in commodities incurs:
 - Processing Costs; and
 - Loss in Revenue.

Why is this relevant and what's next?

- Study will provide an updated material category list for conducting audits
- Financial Impact model will help municipalities make informed decisions and continue to improve programs
- Pre-Transition Benefit
 - Enables customization of Promotion & Education.
 - Identifies opportunities for Enforcement
 - Helps determine accountability between municipalities & service providers
- Post-Transition Benefit
 - Help municipalities decide on whether to be a service provider for PROs.
 - Inbound contamination threshold for collectors; and,
 - Commodity quality or revenue requirements for processing.



Questions