What’s in the mix?

The role that waste and recycling composition data play in the rollout of the RMA

Association of Oregon Recyclers Sustainable Oregon Conference

Jun. 18, 2024

Speakers

Arianne Sperry
RMA Implementation Lead
arianne.sperry@deq.oregon.gov

Peter Spendelow
Waste Composition Lead
peter.h.spendelow@deq.oregon.gov

Justin Gast
RMA Implementation Team
justin.gast@deq.oregon.gov

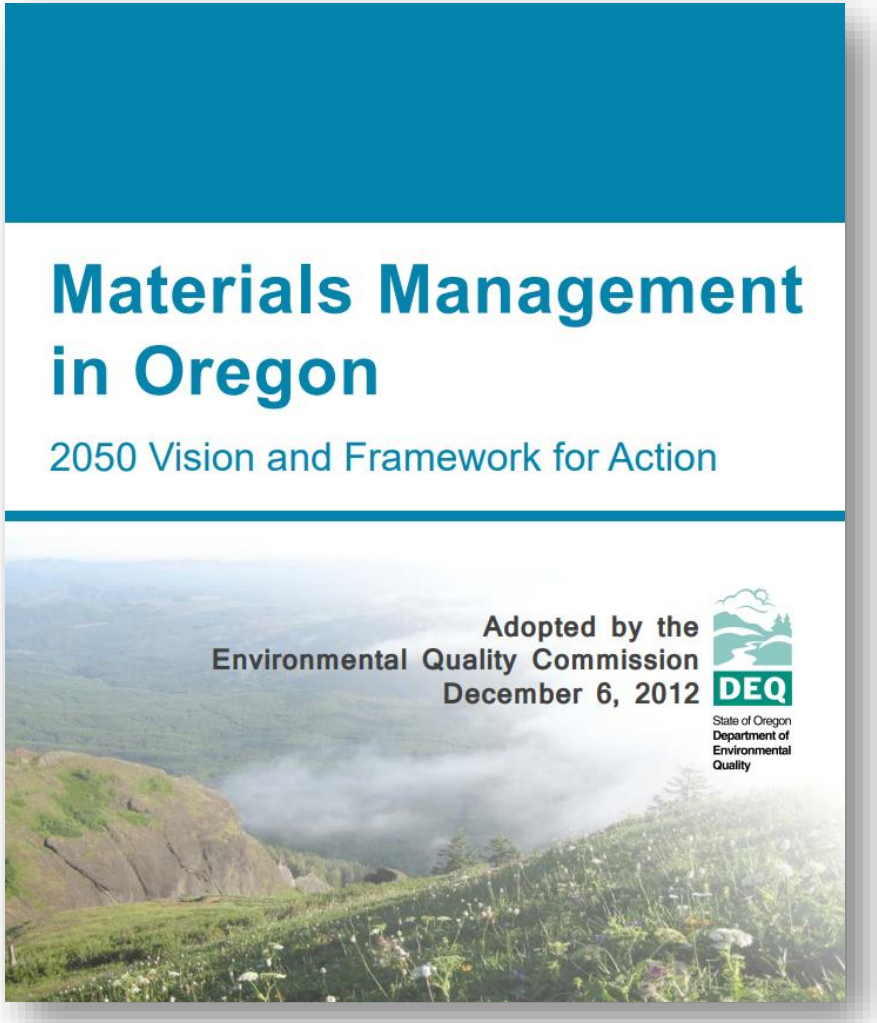
Agenda

• RMA overview •
• Waste composition study •
• Applying waste composition data to the RMA •

About Materials Management

The 2050 Vision describes how people in Oregon:

- Produce and use materials
- Conserve resources
- Protect the environment
- Live well



Product Stewardship

oregon E-CYCLES

Printed paper, packaging & food serviceware (July 1, 2025 start date)

Drug Take-Back Program

PaintCare™
RECYCLING MADE EASY

Mattress Recycling Program

Why Recycling Modernization Act

Public confusion over what can be recycled

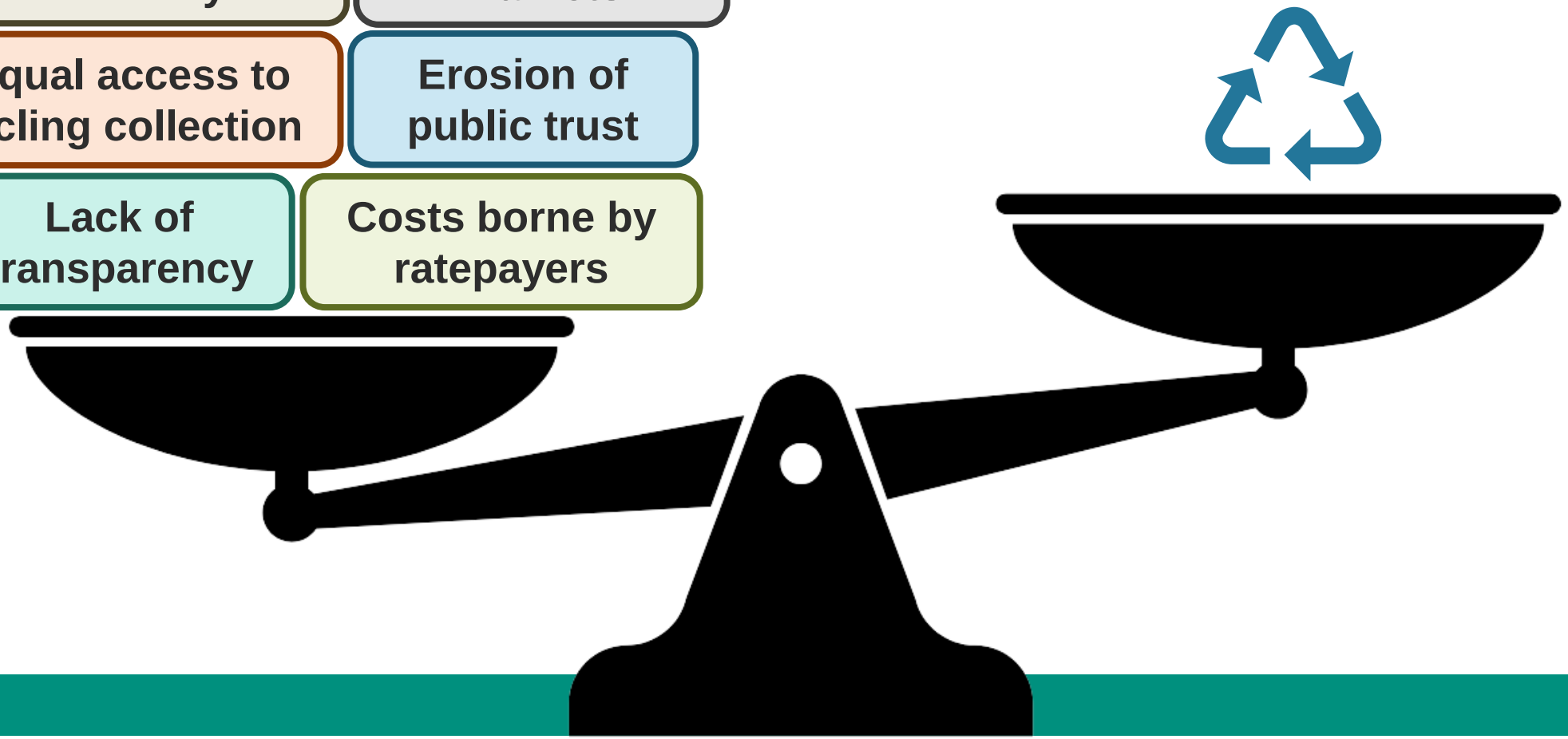
Unstable global markets

Unequal access to recycling collection

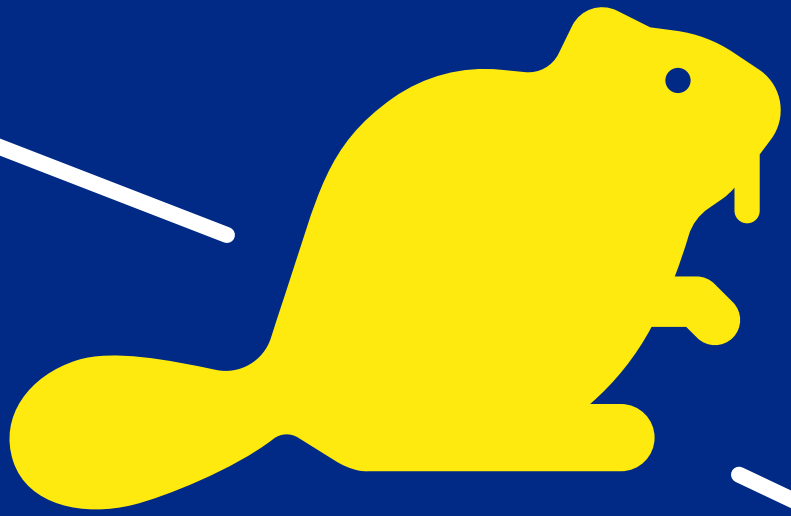
Erosion of public trust

Lack of transparency

Costs borne by ratepayers



Recycling the Oregon Way



Shared Responsibility
Producers, governments, service providers and community members all play an important role.

Statewide collection list
One recycling list for all of Oregon eliminates confusion.

Expanded recycling services
Funding for new services and programming, infrastructure, and transportation.

Assurance
that materials are recycled responsibly.

Education and outreach
to help customers understand what can be placed in their bins.

New partners, new roles

Producers

Producer responsibility organization

Local government

Service providers

Recycling facilities

Responsible end markets

Oversight and integration

Materials Management
DEQ
State of Oregon

Oregon Recycling System Advisory Council

Producers

Manufacturers of covered packaging, paper and food serviceware. These include your favorite brands.

Oversight and integration

Materials Management
DEQ
State of Oregon

Oregon Recycling System Advisory Council

PRO

A nonprofit organization that helps producers meet RMA requirements


Producers
Producer responsibility organization
Local government
Service providers
Recycling facilities
Responsible end markets
Local governments
Cities and counties
Oversight and integration
Materials Management
DEQ
State of Oregon
Oregon Recycling System Advisory Council

Service Providers

Garbage and recycling companies.

Recycling Facilities

The places where recycling goes to be sorted into marketable commodities.

Responsible End Markets

The places that buy recycling and start the process of turning it into new items.

Producers

Producer responsibility organization

Service providers

Recycling facilities

Oversight and integration

Materials Management

DEQ

State of Oregon

Oregon Recycling System Advisory Council

Shared responsibility

Oversight and integration

DEQ and the Recycling Council work in partnership to ensure the RMA is implemented in a way that is best for Oregon.

Producers

Producer responsibility organization

Local government

Service providers

Recycling facilities

Responsible end markets

Communities around the world

Photo: Megan Ponder

Oregon commits to recycling *better*

New statewide recycling lists

- Local Government Acceptance List
  - Uniform Statewide Collection List (materials that can be commingled)
  - A few other materials
- PRO Recycling Acceptance List
  - Materials PRO must collect
  - Harder to recycle materials

Local Government Acceptance List:

Uniform Statewide Collection List


Corrugated cardboard


Paperboard boxes


Kraft paper


Office and other paper


Paperback books, telephone directories


Molded pulp packaging


Tissue paper


Newspaper and magazines

Cartons


Plastic bottles


Plastic tubs


Nursery pots


Plastic buckets, and pails


Aluminum and steel cans


Scrap metal

Local Government Acceptance List:

Other Materials

Collected at Depots
not commingled

Motor oil

Scrap metal, including large appliances

Metro Region only

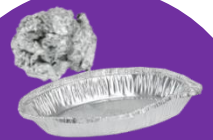
Yard debris

Glass bottles and jars

non-residential on-route only

PRO Acceptance List

Aerosol cans



Pressed aluminum and foil

Pressurized canisters

Shredded paper

Glass bottles and jars

Can carriers

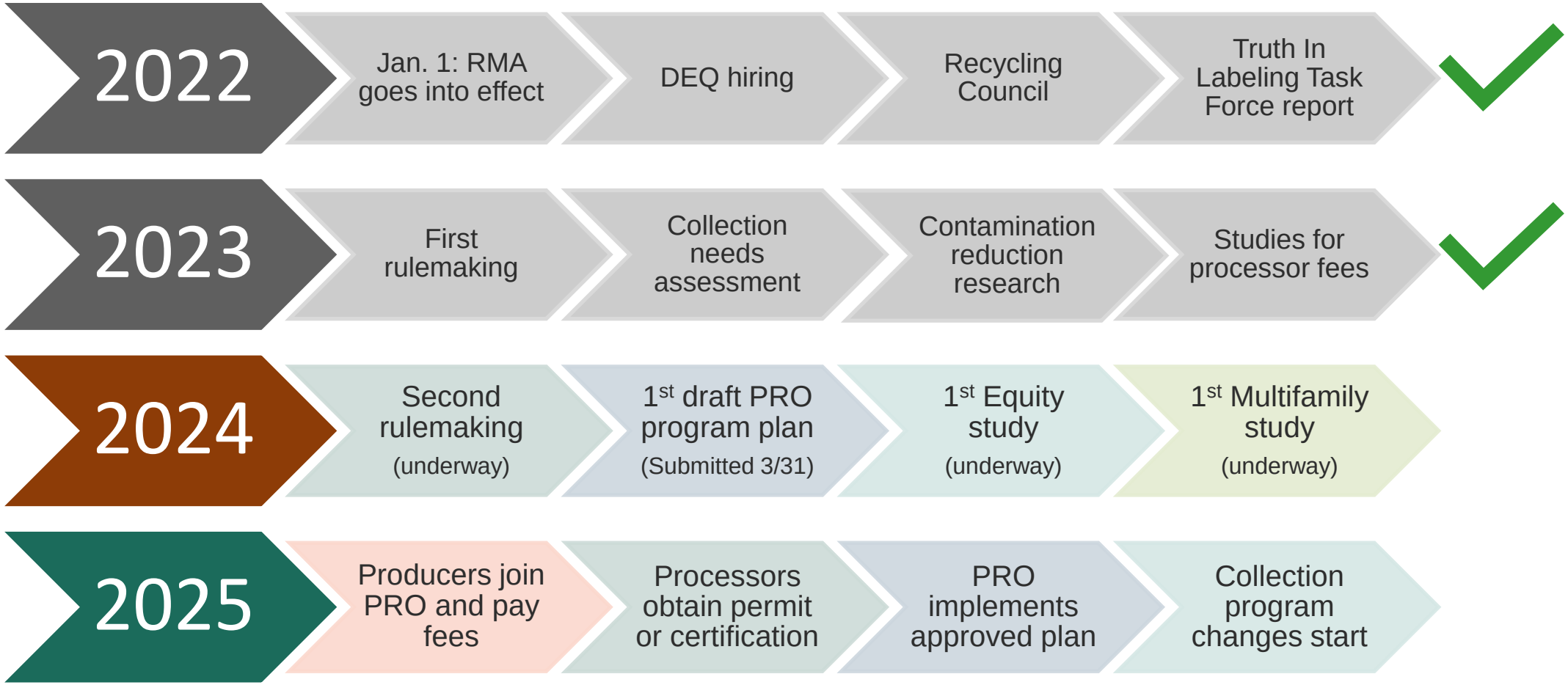
Polyethylene film

Lids

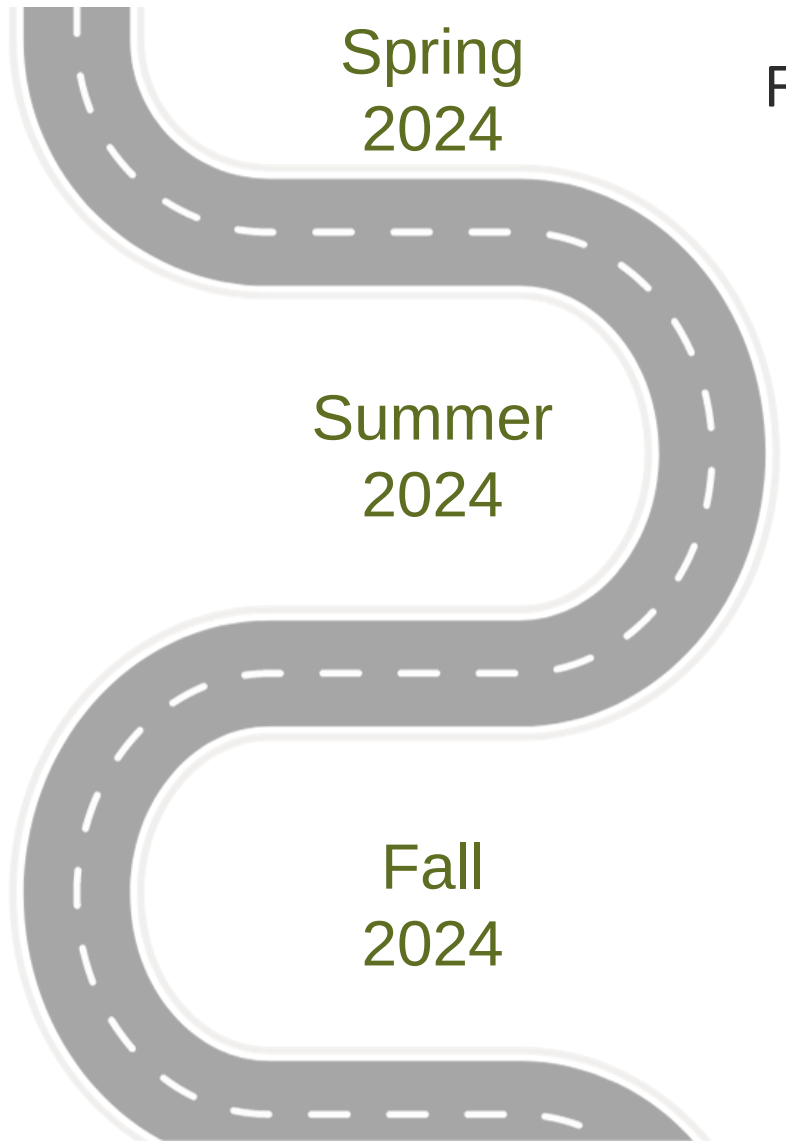
Block white expanded polystyrene

Bulky plastic containers

Implementation Progress



Road to RMA rollout



Spring 2024

First program plan draft review

PRO gathers information from local governments and service providers

Summer 2024

Comment period for second set of rules

Multifamily needs assessment
Equity study

Second program plan draft due

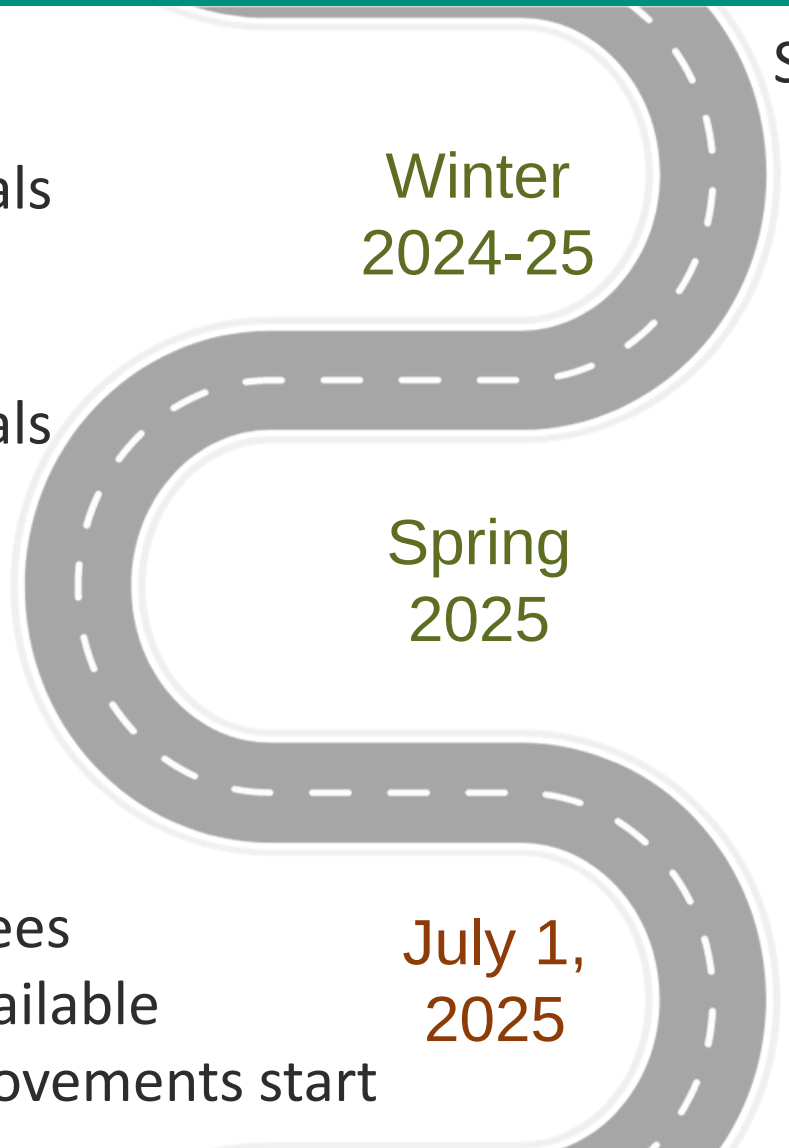
Draft funding authorization forms

Fall 2024

Draft USCL educational materials

Draft contamination reduction programming elements

Road to RMA rollout



Second set of RMA rules adopted

Winter 2024-25

USCL educational materials reviewed and approved

Funding authorization/ service provider designation forms sent out

USCL educational materials become ready for use

Spring 2025

Funding authorization/ service provider designation forms due

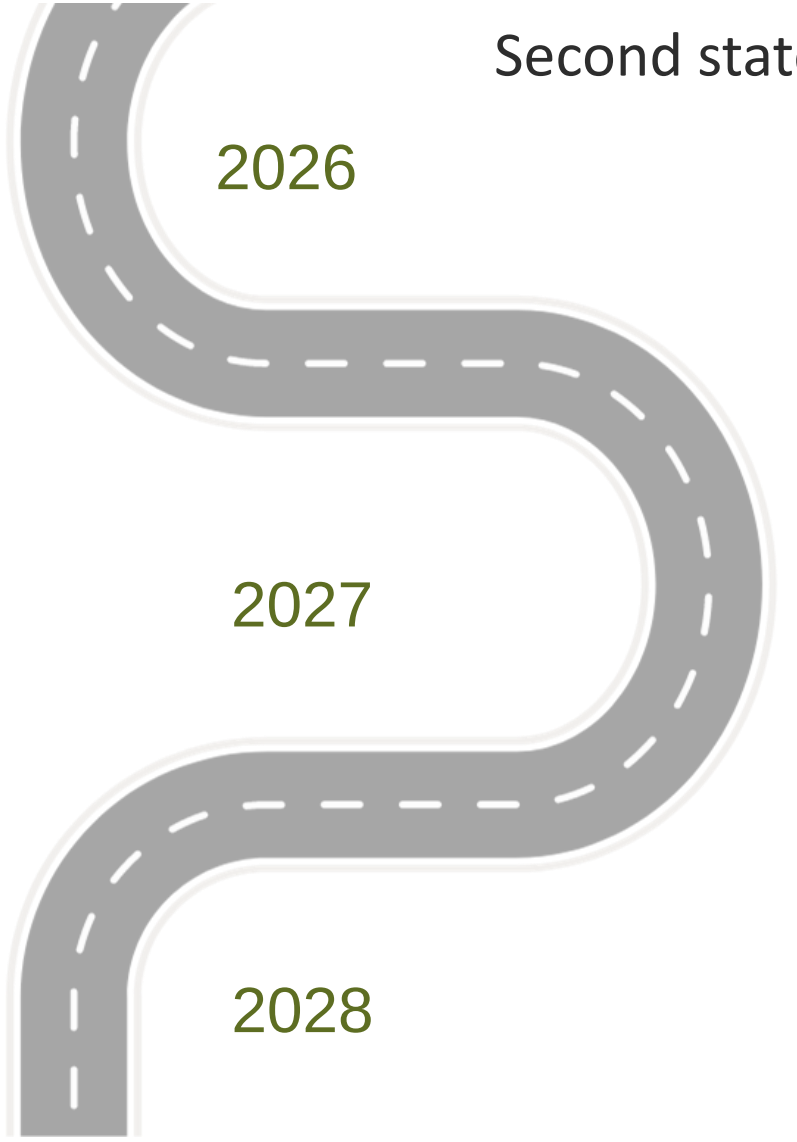
Funding agreements with PRO

Recycling facilities permitted

Producers begin paying fees
PRO funding becomes available
Recycling collection improvements start

July 1, 2025

Beyond the rollout



Second statewide needs assessment

Multi-tenant requirements

2026

Litter and marine debris needs assessment

MIRROR program (Material Impact Reduction and Reuse - Oregon)

Compostability study

Second program plan due

2027

Second program plan begins

2028

2023 Oregon Waste Composition Studies

3 separate studies, and why we did them

Traditional disposed waste composition

- What's in the garbage, and how much of each different material
- State Law ORS 459A.035 requires DEQ to do this study at least every 6 years

Inbound commingled recycling collection composition

- What's in the commingled recycling
- How much contamination is in the commingled recycling, and what those contaminants are
- Information on how much of the acceptable commingled material and how much of the contaminants are covered products under the RMA

Composition of outbound commodities and waste streams of commingled recycling processing facilities

- Provides baseline information regarding the capture rates of different materials
- Provides baseline data on the contamination levels of the various commodities sent to market

Our study partners

Big thanks to all who helped!

Partners

- Metro
- Lane County
- Marion County
- Deschutes County
- Participation by Washington County

Support and Assistance

- Disposal Sites
- Recycling Facilities
- Collection Service Providers
- ORRA

Disposed Waste Composition Study

Samples from **55** transfer stations and landfills, from Ontario to Lakeview to Tillamook.

1042 samples averaging more than 200 pounds each.

241,376 pounds of garbage sorted into **152** material categories.

180 samples of all rigid plastics taken back to a facility for detailed resin analysis.

Inbound Commingled Recycling Study

Samples from **36** recycling reload facilities or commingled recycling processing facilities.

379 samples averaging more than 200 pounds each.

89,835 pounds of commingled recycling sorted into **87** material categories.

Outbound Commingled Recycling and Wastes Stream

Work done at 8 commingled recycling processing facilities

4-5 days of on-site sorting 50-60 samples at most facilities

Work broken into 2 periods, 6 months apart at each facility

How the work was done

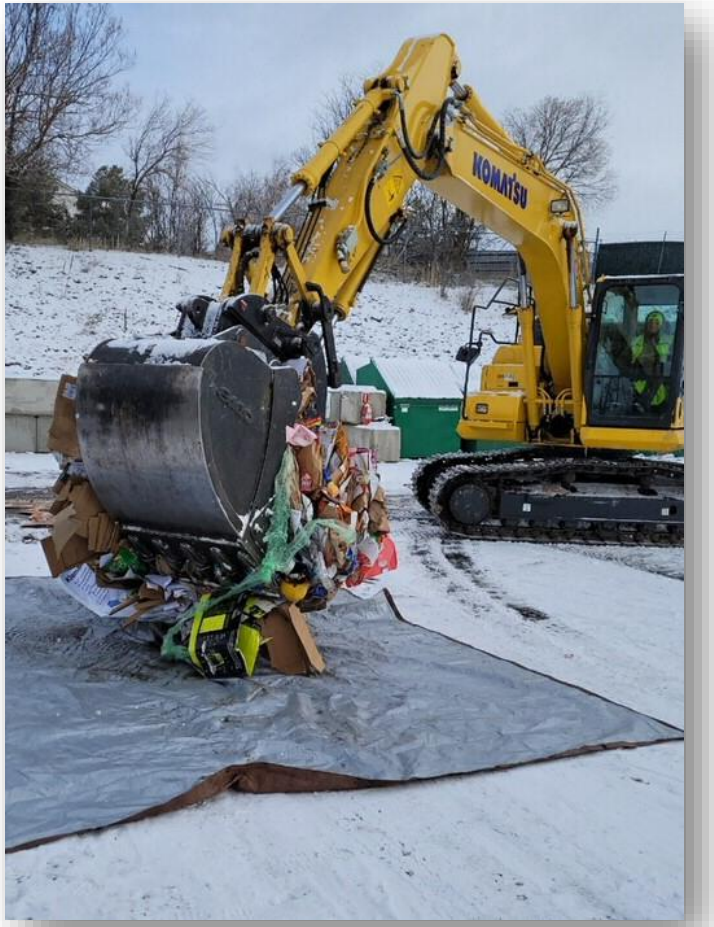
Crew sorting in the bitter wind/cold/snow at the Klamath Landfill.

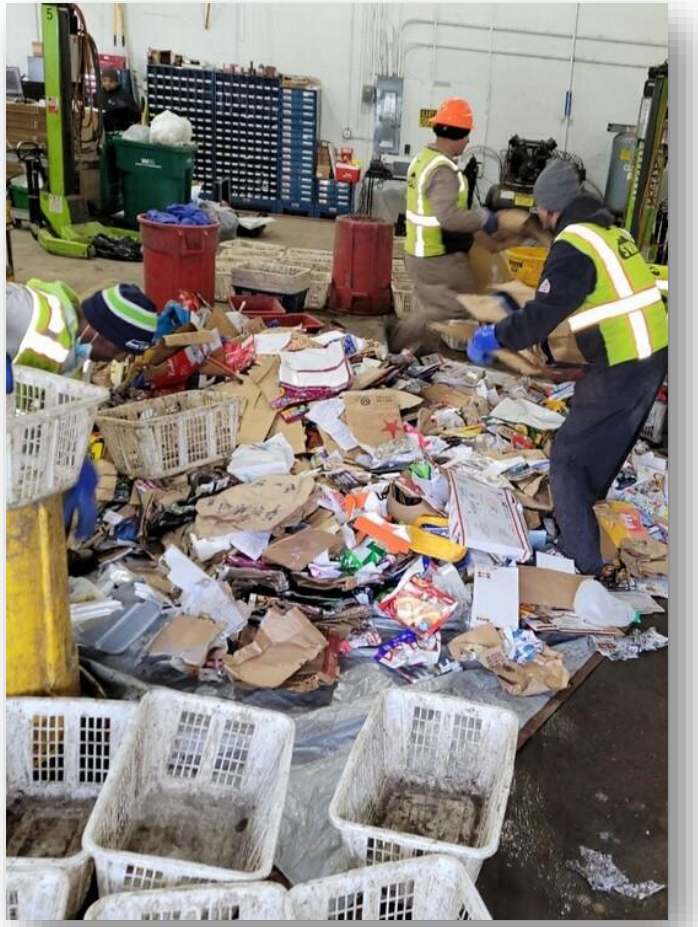
Selecting loads to be sorted

- Pre-selected route trucks based on past disposal data.
- Drop boxes and self-haul loads selected randomly by the contractor.
- Interviewed driver to get basic information on each load.
- Same methodology as used since the 1998 study.

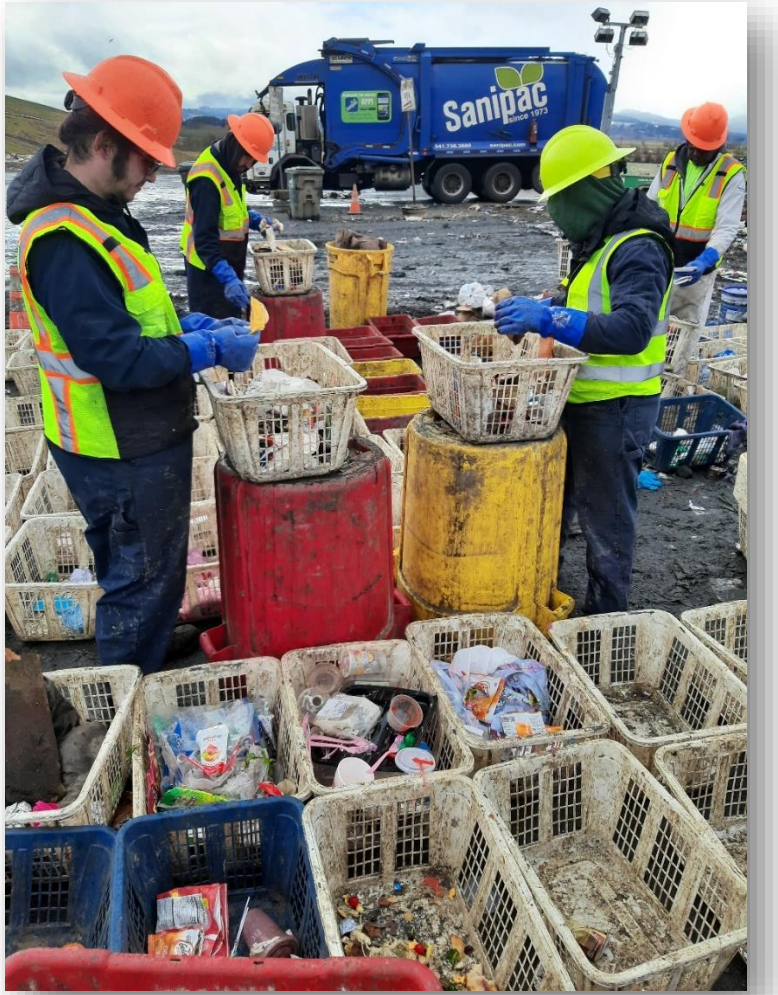
Inbound recycling loads

- Huge amount of help from facility operators
- WM using their equipment to pull samples from recycling load in Klamath Falls.
- WM allowed us to use their shop for sorting commingled recycling





Sorting garbage at Short Mountain Landfill



Rigid Plastics

Detailed Analysis and Resin Analysis

- Randomly selected 180 of the 1,042 samples for detailed analysis and resin identification
- Paul led the Sky Valley crew in 2023 for both the disposal and inbound recycling composition work
- Stina and Sky Valley identified each piece of plastic by resin

Commingled Recycling Sample #15

Residential sample from the Metro area

- 20.0% Cardboard
- 2.7% Newspaper
- 53.3% other acceptable paper
- 7.4% acceptable plastic
- 4.7% acceptable metal
- 12.1% contamination

Inbound Study: Acceptable Material List

Used Metro acceptable material list for the definition of “contaminants” for all samples statewide – not the local acceptable material list.

- Much of commingled recycling is sorted by Metro-area processors who sort out the same materials regardless of source.
- Difficult to teach the sorters separate lists for each jurisdiction.
- Metro list expected to be close to the eventual Uniform Statewide Collection List for commingled materials.

Only small differences are expected between the USCL list and the Metro list

- Colored PET is not on the USCL list (yet).
- There is a small difference in acceptable size for large plastic tubs/pails.

High-level themes for inbound

The commingled recycling stream has changed substantially. Newspaper, magazines, and printing and writing paper have decreased significantly. Cardboard has increased.

Overall contamination has increased significantly since 2014.

Contamination is lower in rural parts of the state when compared to urban areas.

Results of inbound recycling study*

All Samples – All Jurisdictions

Material group	Average	95% confidence interval
Cardboard	**50.61%**	48.99-52.27%
Other cart-acceptable paper	**25.75%**	24.54-27.00%
Cart-acceptable plastic	**4.58%**	4.31-4.87%
Cart-acceptable metal	**3.51%**	3.28-3.74%
All contaminants	**15.54%**	14.57-16.57%

Note – DEQ discovered that bagged garbage was inadvertently omitted from data entry for a few samples. Staff have not re-analyzed the data yet, but the net result will be a slight increase in contamination in this and subsequent slides.

Change in Residential Composition 2005–2023*

Material	2005 Statewide Recyclable	2023 Metro Recyclable
Cardboard	**16.8%**	**52.0%**
Newspaper	**46.7%**	**4.0%**
Magazines	**11.9%**	**5.8%**
Hi Grade Paper	1.2%	2.1%
Low-grade Paper	16.1%	24.1%
Beverage cartons	0.3%	0.9%
Plastic bottles	3.8%	4.9%
Plastic tubs	0.3%	0.9%
Aluminum	0.4%	1.0%
Tin + Aerosol cans	2.3%	2.9%
Other scrap metal	0.3%	1.4%

*2023 Results are preliminary

Which materials increased from 2005 to 2023*

Material	2005 Statewide Recyclable	2023 Metro Recyclable	2005 if paper were low
Cardboard	16.8%	52.0%	36.6%
Newspaper	46.7%	4.0%	(4.0%)
Magazines	11.9%	5.8%	(5.8%)
Hi Grade Paper	1.2%	2.1%	2.6%
Low-grade Paper	16.1%	24.1%	35.0%
Beverage cartons	0.3%	0.9%	0.7%
Plastic bottles	3.8%	4.9%	8.3%
Plastic tubs	0.3%	0.9%	0.6%
Aluminum	0.4%	1.0%	0.8%
Tin + Aerosol cans	2.3%	2.9%	4.9%
Other scrap metal	0.3%	1.4%	0.8%

*2023 Results are preliminary

2023 Metro Residential vs. Commercial, Multifamily*

Material	Metro Single Family Residential	95% confidence interval	Metro Commercial, Multifamily	95% confidence interval
Cardboard	**42.77%**	41.07- 44.41%	**58.50%**	53.03 - 63.70%
Other paper	**30.28%**	28.83 - 31.74%	**19.89%**	16.06 - 24.21%
Plastic bottles	**4.02%**	3.78 - 4.27%	**2.65%**	2.17 - 3.16%
Plastic tubs, pails	**0.78%**	0.64 - 0.94%	**1.02%**	0.38 - 1.85%
Cart-acceptable metal	**4.38%**	4.03 - 4.74%	**2.29%**	1.75 - 2.90%
All contaminants	**17.77%**	16.43 -19.20%	**15.66%**	12.76 - 18.89%

*2023 Results are preliminary

Changes in Contamination 2005 – 2023*

Year	Container Type	Generator	Contamination	90% Confidence Interval
2004/2005	15-gallon bins	Statewide Residential	**2.52%**	2.07 - 2.98%
2004/2005	Rollcarts	Statewide Residential	**9.94%**	7.86 - 12.02%
2009/2010	Rollcarts	Statewide All	**9.40%**	8.44 - 10.36%
2014	Rollcarts	Metro Residential	**8.86%**	8.42 - 9.30%
2023	Rollcarts	Statewide All	**15.54%**	14.70 - 16.37%
2023	Rollcarts	Metro Residential	**17.77%**	16.54 - 18.91%

* 2023 Results are preliminary

Contamination Composition*

Material	Percent	95% Confidence Interval	% Samples where present
Paper not cart-acceptable	**3.28%**	2.95 - 3.66%	98.42%
Rigid plastic not cart-acceptable	**3.06%**	2.87 - 3.24%	99.47%
Film plastic	**1.18%**	1.05 - 1.35%	98.94%
Other scrap metal not cart-acceptable	**0.61%**	0.43 - 0.81%	45.65%
All glass	**2.06%**	1.75 - 2.39%	87.60%
Food, yard debris, and wood	**1.35%**	1.11 - 1.62%	92.88%
Disposable diapers	**0.11%**	0.06 - 0.18%	22.16%
Cloth textiles	**0.69%**	0.56 - 0.82%	81.79%
Other non-hazardous nonrecyclables	**0.80%**	0.63 - 0.99%	80.47%
Medical waste	**0.0039%**	0.00 - 0.01%	2.64%
Sharps	**0.0004%**	0.00 - 0.00%	1.58%
All batteries	**0.0177%**	0.01 - 0.03%	17.68%
All other hazardous materials	**0.0342%**	0.01 - 0.07%	3.69%
Bagged garbage	**2.35%**	1.89 - 2.90%	48.02%

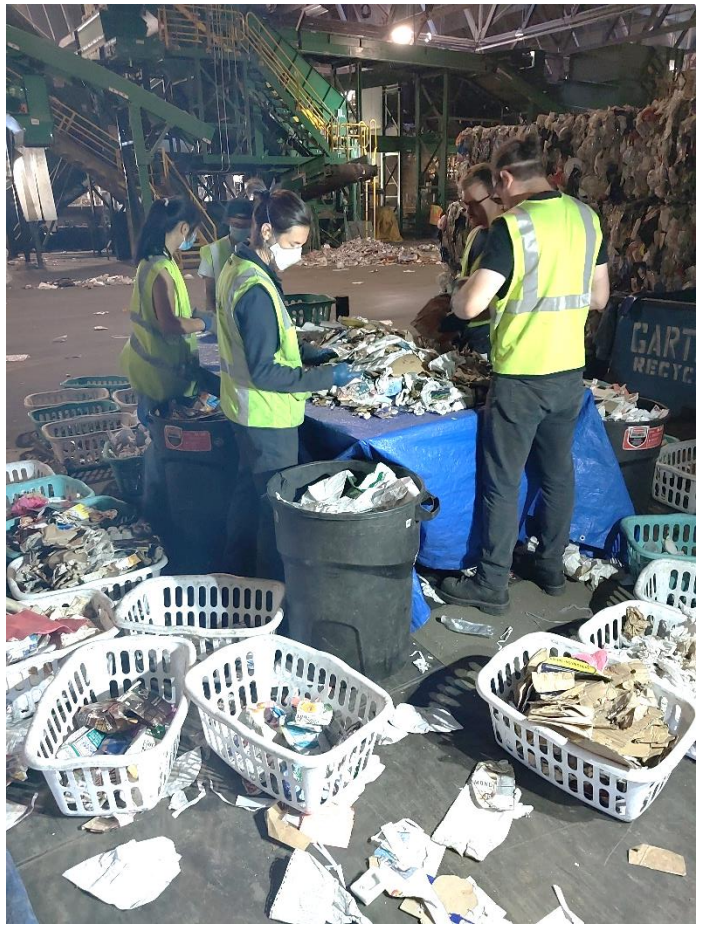
*2023 Results are preliminary

Inbound Contamination by Parts of State*

Jurisdiction	Average contamination	95% confidence interval	# Samples
Metro	17.03%	15.68-18.49%	179
Marion County	14.69%	12.41-17.26%	49
Lane County	12.39%	9.73-15.42%	50
Willamette Valley counties	15.64%	12.84-18.57%	31
Deschutes County	12.12%	9.67-14.45%	20
Coastal counties	13.43%	8.60-18.85%	20
Southwest Oregon counties	8.91%	6.78-11.46%	19
Eastern Oregon counties	6.91%	3.71-10.12%	11
Statewide average	**15.54%**	**14.57-16.57%**	**379**

*2023 Results are preliminary

Outbound Recycling Study



Cascadia sorting at Garten Services

- Field Work by Cascadia Consulting Group as subcontractor to Sky Valley Associates
- Participating Facilities:
  - Far West Recycling: Hillsboro and Portland
  - Pioneer Recycling
  - WestRock Recycling
  - Garten Services
  - Environmental Fibers International
  - International Paper
  - EcoSort

High-level themes for outbound

Significant help from the facilities in doing the study.

Some materials, particularly mixed scrap paper, are not currently meeting the 5% contamination standard in our new rules, so improved sorting will be required.

Facilities are not currently meeting the capture rate standards for plastic and metal containers in our new rules.

Contamination of outbound commodities has significantly increased, and capture rates have decreased for most materials.

Outbound Recycling: contamination in outbound commodities
Standard: contamination must not exceed 5%*

Commodity	Samples	Acceptable	Marginal	Not Acceptable
Cardboard, brown paper	60	96.04%	0.80%	3.16%
Mixed Scrap Paper	118	85.74%	1.55%	12.71%
Rigid Plastic + Containers	48	79.30%	15.69%	5.01%
Aluminum	10	90.81%	0.00%	9.19%
Tinned Cans	11	92.96%	3.31%	3.73%
Scrap Metal	15	96.56%	0.00%	3.44%
Glass	5	99.62%	0.00%	0.38%
Garbage	89	60.52%	3.61%	35.87%
Commingled: to processor	17	82.89%	12.36%	4.75%

*2023 Results are preliminary

Composition of Mixed Scrap Paper Bales*

Paper acceptable in mixed paper	**85.74%**
Corrugated cardboard/brown paper	28.73%
Hi-grade printing paper	5.69%
Aseptics & gable top beverage cartons	0.84%
Other acceptable paper	50.48%
Marginal in mixed paper	**1.55%**
Polycoats, freezer boxes, cups, plates	1.55%
Not acceptable in mixed paper	**12.71%**
Commingled acceptable materials not acceptable in mixed paper	4.50%
Materials not accepted in commingled recycling	8.21%

*2023 Results are preliminary

Commingled-acceptable materials not acceptable in mixed scrap paper bales*

Material	Percent
Curb-acceptable plastic bottles, tubs	2.37%
Curb-acceptable aluminum	0.64%
Curb-acceptable tinned cans	1.14%
Other scrap metal	0.35%
Total	**4.50%**

*2023 Results are preliminary

Contaminants in mixed scrap paper bales not acceptable in commingled bins*

Material	Percent
Nonrecyclable paper	2.36%
Other rigid plastic	2.09%
Film plastic	0.96%
Glass	0.79%
Yard debris, wood, food	0.79%
Diapers	0.24%
Textiles	0.25%
Batteries	0.01%
Other hazardous materials	0.01%
Other nonrecyclables	0.72%
Total	**8.21%**

*2023 Results are preliminary

Contamination Rates of Paper Bales in 2009 vs 2023
2009: Old Newsprint + Other, 2023 Mixed Scrap Paper*

Material	2009 ONP and other paper	2023 Mixed Scrap Paper
Commingled acceptable paper	96.49%	85.74%
Nonrecyclable paper	0.95%	2.36%
Plastic bottles, tubs, pails	0.86%	2.37%
Aluminum cans, foil	0.20%	0.64%
Steel "tinned" cans	0.35%	1.14%
Other scrap metal	0.10%	0.35%
Not-acceptable rigid plastic	0.54%	2.09%
Film plastic	0.23%	0.96%
Glass	0.04%	0.79%
Other nonrecyclables	0.24%	2.01%

*2023 Results are preliminary

Capture Rates: Where did materials end up?

Material	Capture rate	Wrong commodity	Disposed as residue
All accepted commingled material	91.6%	2.8%	5.6%
All recyclable paper	94.7%	0.2%	5.1%
All recyclable rigid plastic	64.3%	27.0%	8.6%
All recyclable metal	62.5%	24.6%	12.8%

*2023 Results are preliminary

Capture Rates: more material details 2023*

Material	Capture rate	Wrong commodity	Disposed as residue
Cardboard + brown paper	97.5%	0.1%	2.4%
Aseptic + gable top drink boxes	81.9%	5.4%	12.8%
Other acceptable paper	90.5%	0.3%	9.3%
Deposit plastic bottles	59.5%	27.9%	12.7%
Other plastic bottles	66.6%	25.5%	7.8%
Plastic tubs, pails	50.3%	39.2%	10.5%
Aluminum beverage cans	47.2%	37.8%	15.1%
Aluminum foil + pet food cans	17.6%	49.5%	32.9%
Other aluminum (scrap metal)	49.5%	40.8%	9.7%
Tinned cans	66.4%	26.3%	7.4%
Other scrap metal	69.0%	13.3%	17.7%

*2023 Results are preliminary

Capture Rate Changes 2009 – 2023*

Material	2009 Capture rate**	2023 Capture rate
Cardboard and brown paper	99.2%	97.5%
Aseptic and gable top drink boxes	93.7%	81.9%
Other acceptable paper	98.4%	90.5%
Plastic bottles and tubs	84.2%	64.3%
Aluminum cans	67.0%	47.2%
Aluminum foil/pet cans	34.0%	17.6%
Tinned cans	85.9%	66.4%

*2023 Results are preliminary **2009 rates for paper adjusted for mixed scrap paper as the market, not newsprint

Applying Waste Comp Data to the RMA

Plastic recycling rate ORS 459A.926

Data used to determine rate:

- Opportunity to Recycle reports
- Material Recovery Survey
- Info submitted by the PRO, as needed
- **Waste Comp Study data (with solid waste disposal from OTR reports)**
- Other information to estimate changes in plastic waste generation in years between waste composition studies

Inbound Commingled Recycling Study

How data was used:

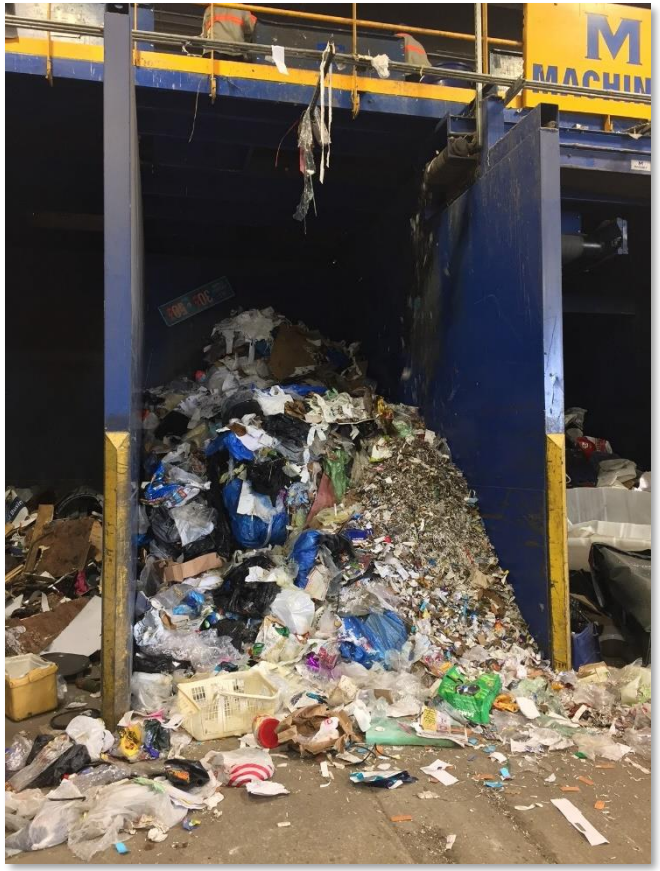
- Helped CAA determine its market share
- Established contamination baseline
- Determined proportion of recyclable material shipment that is not covered products
  - Transportation cost reimbursement:
    Starting in 2027, and at least once every five years thereafter, the PRO(s) will fund study to determine proportion of covered material in commingled recyclable material, recyclable material that is collected separately and recyclable material that is not fully commingled.

Inbound Commingled Recycling Study - CMF

Contamination Management Fee

- Per-ton fee paid by the PRO to processing facilities to compensate for costs of removing and disposing of covered products that are contaminants:
  - 2025 and 2026 program plan years: $341/ton
  - 2027 program plan year: $432/ton
  - 2028 program plan year: $418/ton

- Relevant to overall CMF invoicing:
  - Percentage of covered product contamination in inbound commingled recycling stream (46.7%)
  - Invoicing of covered product contamination for glass, plastic film and mixed plastics.



Inbound Commingled Recycling Study - PCRF

Processor Commodity Risk Fee

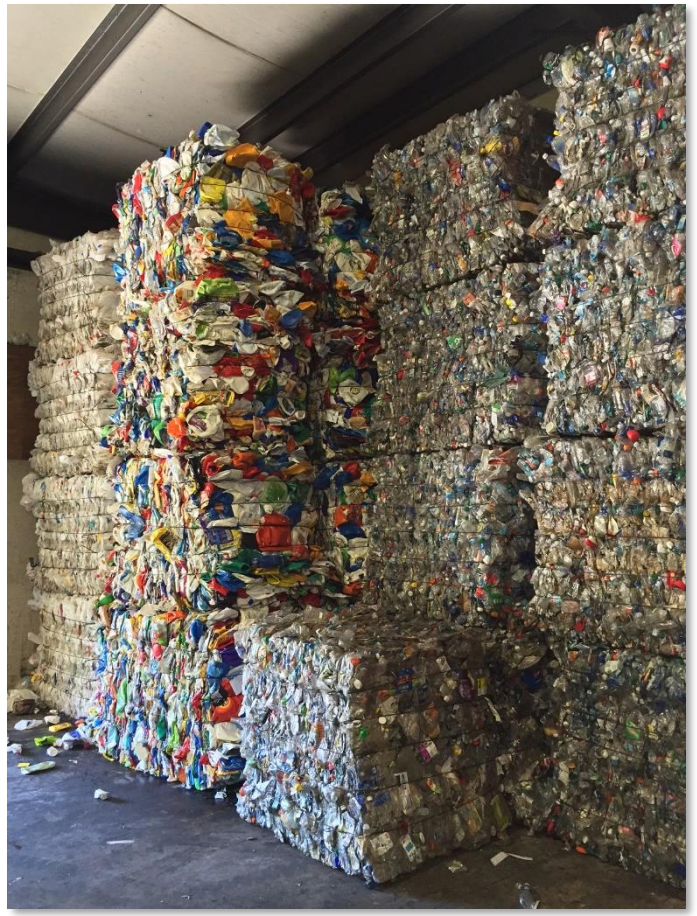
- Per-ton fee paid by the PRO to ensure producers share in the costs of fully processing commingled recyclables and to allow local governments to reduce the financial impacts on ratepayers.

- Facilities will be paid the difference between the statewide per-ton average eligible processing cost and the average commodity value of recyclable materials processed:
  - 2025 and 2026 program plan years: $200/ton
  - 2027 program plan year: $286/ton
  - 2028 program plan year: $245/ton

Inbound Commingled Recycling Study - PCRF

Processor Commodity Risk Fee

- Weighting factors used in average commodity value calculation:
  - Cardboard – 50%
  - Mixed paper – 33%
  - PET – 2.1%
  - HDPE natural – 1.5%
  - HDPE color – 2%
  - Mixed plastic – 1.3%
  - Tin/steel cans – 1.4%
  - Aluminum – 0.8%
  - Residual and other materials (e.g., scrap metal) – 7.9%
- Factors to be updated on a quarterly basis using material disposition data.



Outbound Commingled Recycling Study

How data was used:

- Help determine proposed capture rates under new permit/certification programs for commingled recycling processing facilities.
- Help determine outbound contamination rate.
- Sorting approach used for the Waste Composition Study is the desired approach to be used with conventional evaluation method assessments undertaken to determine a processing facility's compliance with the capture rate/outbound contamination rate performance standards.

Stay up to date

Arianne Sperry
arianne.sperry@deq.oregon.gov

Justin Gast
justin.gast@deq.oregon.gov

Peter Spendelow
peter.h.spendelow@deq.oregon.gov

Questions?

Microplastics in solid waste management study

The goal of this voluntary, DEQ/OSU run project is to better understand which plastic materials are prevalent at the invisible scale (<5mm) in different solid waste management routes to gain insight into potential interventions and design solutions.

What are we asking for?

- Assistance from Oregon's solid waste industry in providing samples of wastewater and effluent. In most cases this would be a one-time activity of collecting appropriate samples.
- OSU-DEQ team is available to assist, and even come to the facility and perform the collection given the permission to do so.

Thank you!

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800-452-4011 | TTY: 711 | deqinfo@deq.oregon.gov