



Additional Details on Recycling Material Acceptance Lists, Part One

Background

In advance of the Nov. 9, 2022 meeting of the Rulemaking Advisory Committee (RAC), DEQ published [“Rule Concept: Recycling Acceptance List, Part One.”](#) That document provided DEQ’s initial recommendations for materials to be included on the Local Government Recycling Acceptance List and the Producer Responsibility Organization (PRO) Recycling Acceptance List.

During and following the November meeting, RAC members requested additional information regarding DEQ’s justification for acceptance of certain materials, especially those that scored a “3” or lower (on a scale of “1” to “5”) against any statutory criteria in the matrix evaluation of materials. That matrix is detailed in Appendix 1 of that initial Rule Concept document.

In response to those requests, this document provides additional information regarding certain materials contained in the prior Rule Concept document and proposed for inclusion in recycling acceptance lists.

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Minimum criteria

In all cases of materials recommended for inclusion in the Uniform Statewide Collection List (suitable for commingling), DEQ understands that the material can be effectively collected and processed; there are multiple responsible end markets that are relatively stable, accessible, and viable; and there are environmental benefits of recycling the material.

Materials scoring a “3” or lower

In general, where a material recommended by DEQ for acceptance scores “3” or lower against any statutory criteria, DEQ justifies its recommendation for inclusion for one or more of the following reasons:

- The lower score can be mitigated by new policy and program elements contained in the Plastic Pollution and Recycling Modernization Act (e.g., generator-facing contamination reduction programming, material recovery facility (MRF) regulation, responsible end markets).
- There are other compelling reasons to recycle the material (such as environmental benefits), and lower scores represent challenges that can be overcome or are acceptable given other countervailing benefits.

- In some cases, the criterion in question is not relevant to DEQ’s recommended placement. For example, shredded paper scores poorly against the criteria “Practicalities of sorting”, but this criterion is not relevant to DEQ’s recommendation (PRO Recycling Acceptance List), which would have the material bypass commingled processing.

Contamination reduction

The Plastic Pollution and Recycling Modernization Act relies on both user behavior and Material Recovery Facility regulation to manage and mitigate contamination. Acceptance lists can influence the level of inbound contamination (user behavior) and the technical and financial requirements of processors to remove contamination and achieve high-quality outbound bales. As these mechanisms work together, the system can tolerate some degree of inbound contamination. While a simple list may maximize generator compliance and minimize inbound contamination, it does not necessarily optimize the entire recycling system when all factors, including environmental outcomes, are taken into consideration.

User behavior

Proper preparation and sorting will always be a challenge and will never be perfect. As a practical matter, DEQ expects that implementation of California’s truth-in-labeling law (which will impact most labeled products sold in Oregon), uniform acceptance lists, enhanced outreach, and well-funded generator-facing contamination reduction programming will reduce but not eliminate inbound contamination at processing facilities. While a simpler list may also reduce contamination, the evidence for this is not consistent; the City of Eugene, in its [response](#) to DEQ’s Request for Information, suggested that its efforts to simplify acceptance lists in response to China’s National Sword policy did not necessarily reduce contamination, and that many items currently considered contaminants would be recycled (thereby lowering the contamination rate) if acceptance lists were broader.

Material Recovery Facility regulation

The stronger mechanism in the Act for reducing the negative impacts of commingled system contamination on the downstream end markets and their communities is the regulation of processing facilities and new funding to comply with requirements. PROs must compensate facilities for contamination removal and achievement of permitting standards, and work with them where needed to ensure that materials flow to responsible end markets. Generator-facing elements in the Act will help to reduce contamination but do not guarantee an outcome; the only guaranteed mechanism for ensuring high outbound bale quality is MRF regulation. Not only are the mechanisms in the Act for MRF regulation stronger and more capable of achieving a guaranteed outcome, it is also easier and more realistic to control contamination via regulation of a small number of commingled recycling processing facilities than it is to change the behaviors of several million individuals.

Material-specific supplemental information

Paper-based items

Corrugated cardboard: uncoated or coated with recycle-compatible coating. Includes pizza boxes
Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

Among the materials evaluated by DEQ, the only contributor to this category was pizza boxes, which scored “4” and “5” on all criteria save one: contamination, where it was assigned a score of “3”.

Given historical experience in Oregon’s recycling programs, it may be surprising that kraft paper mills would accept pizza boxes. However, according to information provided to DEQ by the [American Forest & Paper Association](#) (AF&PA) in response to DEQ’s [Request for Information](#) related to material lists:

“In 2020, WestRock, an AF&PA member company, conducted a mill study of how cheese and grease associated with pizza boxes impacted their repulpability and recyclability. The study was a continuation on an initial survey on pizza box recyclability done by AF&PA in 2019.

The WestRock study found neither cheese or grease negatively impacted repulpability, performance on the paper machine or finished product quality at typical levels of presence expected to be received in the recovery stream at MFRs (sic) and when included in the recovered fiber at expected levels of concentration at furnish mills.”

AF&PA cited [the WestRock study](#) as justification for its recommendation that Oregon include pizza boxes on the uniform statewide collection list. In [other promotional materials](#), AF&PA notes that its members accepting pizza boxes collectively provides for 93.6 percent of recovery of old corrugated containers provided by AF&PA members. This illustrates that pizza boxes are not a niche item accepted at only a few mills.

Pizza boxes could, in theory, serve as a vector for unwanted food waste into the commingled system. DEQ finds that this potential can be mitigated with effective outreach and communication, and that the potential benefits of increasing recovery of this fiber outweigh the potential risks.

All kraft paper (such as paper bags, mailers)

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

Kraft paper, paper bags, and mailers (e.g., Amazon all-paper mailers) can typically be marketed in either a grade 15 (Used Brown kraft), grade 54 (Mixed Paper) or grade 56 (Sorted Residential Papers & News) bale and there are currently markets for all three types of bales. The material may also end up in a standard cardboard bale.

The only “3” score kraft paper, bags, and mailers received was associated with “Ability for waste generators to easily identify and properly prepare for recycling.” Realistically, that score could’ve easily been a score of “4” or “5” for most kraft paper, but a portion of the public believes the padding within the Amazon paper mailer is foam, so the mailer is landfilled. In fact, the soft foam-like material is made from the components commonly found in the glue used to make corrugated boxes. According to [Amazon](#), “recycling testing confirmed the cushioning is filtered out during the recycling process and does not affect recycled paper quality” and “the cushioning material was specifically designed to easily separate from the paper in the same way that print inks and other paper coatings are removed during the paper recycling process.”

In response to DEQ’s Request for Information, the [American Forest & Paper Association](#) and [Ameripen](#) both recommended that DEQ include the material on the Local Government Recycling Acceptance List.

Uncoated paperboard packaging (e.g., cereal, cracker, and medicine boxes)

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

This high-volume material typically ends up in a grade 54 (Mixed Paper) bale and there are stable end-markets for this commodity inside and outside of the Pacific Northwest.

The “3” score for “Environmental health and safety considerations.” was because current data shows that Oregon MRFs are still sending a considerable percentage of fiber to overseas markets. The impacts of those exports are not well understood at present, and they may serve as a vector for plastics disposal in countries that lack adequate disposal infrastructure. Both of those factors should change in the future as the MRF permitting, disposition reporting, and responsible end market requirements of the Recycling Modernization Act go into effect. In addition, domestic paper mills handling this material will have efficient systems in place to properly handle the material as well as any contamination that may show up in the bale.

Molded pulp packaging

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

The only evaluation criteria where DEQ scored these materials with a “3” (or lower) was for “Environmental health and safety considerations” and related to fiber to being sent to overseas markets. Please see the discussion under “uncoated paperboard packaging” (above) as the potential concerns for that material are identical.

Polycoated cartons (e.g., milk cartons) and aseptic cartons

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

Aseptic and polycoated gable-top containers are commonly used to package milk and a variety of shelf-stable foods and beverages. Both consist of layers of paperboard and polyethylene. Aseptic cartons also contain an aluminum layer as an oxygen barrier. While the plastic and aluminum fractions are typically not recycled, multiple mills are willing to accept this material because the fiber quality is generally very high.

These packaging formats scored “2” and “3” in the following categories:

- Stability and maturity of end markets (3)
- Accessibility of end markets [3 in a mixed paper bale; 2 in a grade 52 (Cartons) bale]
- Viability of end markets (3)
- Compatibility with existing commingled collection and processing infrastructure [3, if the cartons are sorted into a grade 52 (Cartons) bale]
- Amount of material available (3)
- Practicalities of sorting [2, when included in a grade 52 (Cartons) bale]
- Practicalities of storing [3, when included in a grade 52 (Cartons) bale]
- Environmental health and safety considerations (2)

One of the region’s largest consumers of mixed waste paper, Norpac (Washington), currently accepts cartons within a grade 54 (Mixed Paper) bale. Other locations outside the region are also willing to accept cartons either in a grade 54 (Mixed Paper) bale or as a separate grade 52 (Cartons) bale. The appetite for cartons comes from Sustana (Wisconsin and Quebec), Green Bay Packaging (Wisconsin), Great Lakes Tissue (Michigan) and Kimberly Clark (Mexico), among others. The Carton Council, in its [response](#) to DEQ’s Request for Information, identified more than two dozen domestic paper mills accepting (and recycling) this material, as well as several export options.

The scoring of “Compatibility with existing recycling infrastructure: commingled collection and processing” and “Practicalities of sorting” depends on whether the MRF is choosing to market the low-

volume material as either grade 54 or grade 52 material. The use of robotic technology would be necessary to sort the material effectively and efficiently for purposes of creating grade 52 (Carton) bales.

One complicating factor is that cartons can end up on both the fiber and container sorting lines at a MRF. On the fiber line, separation isn't necessary so long as the MRF sends mixed paper to an end market (such as Norpac) that can recover adequate yield from the cartons. On the container line, separation is required but may not be necessary at every single facility. Given the addition of other materials proposed for the Uniform Statewide Collection List, DEQ expects that some MRFs will choose to "cherry pick" only higher-value or -volume items from the container line and send the remainder to another facility for secondary processing. Several Oregon MRFs (as well as several other locations in the region) will likely have the advanced technology necessary to separate these materials.

The scoring associated with "Practicalities of storing" is because cartons make up a very small percentage of the average inbound ton at any given MRF, and storing for long periods of time (i.e., time needed to generate a truckload's worth of bales) leads to deterioration of baled material. To ensure material does not sit onsite for long periods of time and to achieve proposed standards for adequate yield, the PRO may need to establish a less-than-truckload route amongst those MRFs separating this material into grade 52 (Cartons) bales. Again, this problem is partially mitigated if cartons are only separated at a handful of advanced facilities, which receive and consolidate materials from other MRFs. The larger volumes at advanced MRFs and statewide collection will make it easier to generate truckload quantities. Currently, about half of the state is served by on-route collection of this material.

The lower score of "Environmental health and safety considerations" reflects two outstanding concerns. The first involves the possibility that both grade 54 and grade 52 bales may be exported to countries that might not meet new (proposed) standards for "responsible end markets". For example, countries with mills accepting grade 52 bales include both South Korea and India and standards for land disposal differ between those two countries. Regardless of whether cartons are pulped at a mill in the U.S. or elsewhere, there are also potential concerns involving production of microplastics during the pulping process, and discharges of these into wastewater. DEQ was unable to find any definitive research quantifying the scope of this potential problem.

Despite these challenges, DEQ recommends their inclusion in the Uniform Statewide Collection List for the following reasons:

- The number of end markets now accepting these materials is significant and continues to grow, including one of the largest consumers of mixed waste paper in the region.
- Materials can be marketed either in a mixed paper bale or a separate (Cartons) bale.
- Not all Oregon MRFs will necessarily need to separate cartons on their container line; some can send an unsorted fraction of containers (including cartons and certain plastics) to a MRF with advanced processing capacity.
- A screening-level life cycle assessment (see slides 94 – 133 of [this document](#)) performed by DEQ found moderate environmental benefits associated with marketing these materials in either a grade 52 or a grade 54 bale, even after accounting for expected yield losses and transport of materials to locations as far away as Michigan or Mexico.
- Potential concerns involving exports and disposition of the non-recyclable fraction can be addressed through the responsible end market standards proposed for this rulemaking and for MRFs.
- Cascadia Consulting Group, as part of its evaluation of material flows and transactional costs of various potential future scenarios, estimates that the marginal cost of adding polycoated and aseptic cartons (and polycoated paper cups, which are present in smaller volumes) to the state's Uniform Statewide Collection List is approximately \$391,000/year (net). This includes additional

recovery of approximately 1,400 tons/year and recovery costs (collection, transport, and processing) of approximately \$775,000/year offset by waste collection and disposal savings of approximately \$384,000/year. Resulting environmental benefits (an estimate of the monetized value of reductions in pollution) have an estimated societal benefit of approximately \$2.6 million/year.

Polycoated paper cups

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

This material can end up in either a grade 37 (Sorted Office Paper), grade 52 (Cartons), grade 54 (Mixed Paper) or grade 56 (Sorted Residential Paper & News) bale and the end market demand for this material is growing. In fact, many of the nation's largest paper mills announced in June 2022 their commitment to increasing paper cup recycling nationwide by supporting a [national declaration of acceptance](#). According to information provided to DEQ by the [Foodservice Packaging Institute](#), as of March 2022 there were several dozen paper mills in the U.S. and Canada accepting paper cups in bales of mixed paper, and three accepting paper cups in grade 52 (Cartons) bales. All of these end markets are in the midwest or eastern regions, although acceptance may spread to mills in the western U.S. Given the relatively low volume of paper cups, DEQ expects that cups would primarily be sorted by MRFs with advanced processing capacity into a grade 52 (Cartons) bale, and sent out with polycoated cartons for recycling.

The material scored a “3” with respect to “Compatibility with existing recycling infrastructure: commingled collection and processing” and a “2” for “Practicalities of sorting” for reasons like those described (above) for polycoated and aseptic cartons. As with cartons, use of artificial intelligence robotic technology would be necessary to effectively and efficiently sort the material for purposes of creating grade 52 (Cartons) bales.

This material also scored a “3” for “Contamination,” due to the possibility of lids and stirrers being included with the cups and the fact that acceptance of polycoated cups could introduce an undetermined amount of excess liquid into the stream.

Like cartons, polycoated cups are considered a low-volume material in the inbound stream. Cartons being combined with polycoated cups into a grade 52 (Cartons) bale could allow bales of grade 52 material to be generated and moved to market in a quicker manner.

Also, as with cartons, polycoated cups received a score of “2” for “Environmental health and safety considerations” because current data shows that Oregon MRFs are still sending a considerable percentage of fiber to overseas markets. If grade 52 bales are produced, the material could be marketed to a domestic mill or exported to end markets like Kimberly Clark in Mexico or Paper Core in South Korea. Alternatively, there are an increasing number of domestic paper mills that accept paper cups in bales of mixed paper. Domestic paper mills handling this material will have efficient systems in place to effectively and properly handle the fiber material and any contamination that may show up in the bale. Unfortunately, DEQ was unable to determine if the same can be said for overseas mills accepting similar bales from Oregon MRFs.

Tissue paper (packaging, not sanitary)

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

Non-glittery, non-metallic tissue packaging paper is rarely promoted for recycling, but the material is accepted by mills in a grade 54 (mixed paper) bale. The demand for such bales is stable, both inside and outside the Pacific Northwest.

The only evaluation criteria where DEQ scored these materials with a “3” (or lower) was for “Environmental health and safety considerations”. Please see the discussion under “uncoated paperboard packaging” (above) as the potential concerns for that material are identical.

Non-metalized gift wrap

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

Like tissue packaging paper, non-metalized gift wrap is recyclable as well, but jurisdictional education and communication regarding the acceptance of this material typically only occurs around the winter holiday season. This material will typically end up in a grade 54 (Mixed Paper) bale and demand for such bales is stable, both inside and outside the Pacific Northwest.

Non-metalized gift wrap received a score of 2 for “Ability of waste generators to easily identify and properly prepare material” and “Contamination” because some households might struggle to distinguish between metalized and non-metalized gift wrap, or to remove other components such as ribbons or bows. That said, this material is generated in relatively small volumes, and some amount of metalized gift wrap is not likely to be detrimental to MRFs or domestic end markets.

The “3” score for “Environmental health and safety considerations” was because current data shows that Oregon MRFs are still sending a considerable percentage of fiber to overseas markets. Please see the discussion under “uncoated paperboard packaging” (above) as the potential concerns for that material are identical.

Magazines, catalogs and similar glossy paper

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

The only evaluation criteria where DEQ scored these materials with a “3” (or lower) was for “Environmental health and safety considerations” and this was related to fiber to being sent to overseas markets. Please see the discussion under “uncoated paperboard packaging” (above) as the potential concerns for that material are identical.

Telephone directories

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

The only evaluation criteria where DEQ scored these materials with a “3” (or lower) was for “Environmental health and safety considerations” and this was related to fiber to being sent to overseas markets. Please see the discussion under “uncoated paperboard packaging” (above) as the potential concerns for that material are identical.

Other printing and writing paper (e.g., envelopes, “junk mail”, cards)

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

The only evaluation criteria where DEQ scored these materials with a “3” (or lower) was for “Environmental health and safety considerations” and this was related to fiber to being sent to overseas markets. Please see the discussion under “uncoated paperboard packaging” (above) as the potential concerns for that material are identical.

Shredded paper

Proposed for PRO Recycling Acceptance List

Shredded paper would be best suited in a grade 36 (Unsorted Office Paper), grade 37 (Sorted Office Paper) or grade 40 (Sorted White Ledger) bale, though the material shows up in grade 54 and grade 56 bales as well. Demand for such bales is stable, both inside and outside the Pacific Northwest. According to AF&PA, the shredding process does relatively little to reduce fiber quality or yield.

The material received a score of “2” for “Compatibility with existing recycling infrastructure: commingled collection and processing” and “Practicalities of sorting” due to the fact that shredded paper is difficult to recover at MRFs, and the material creates a lot of dust for the internal environment. These are just some of the reasons for proposing this material for the *PRO Recycling Acceptance List*.

The relatively low score of “2” for “Amount of material” reflects that shredded paper from large generators is already recovered by private recyclers and is not typically available to the services provided under the Opportunity to Recycle Act.

The score of “3” for “Contamination” was mainly associated with the fact that, for the jurisdictional programs that do allow shredded paper to be included in the commingled stream, those programs ask residents to bag shredded paper in clear plastic bags. This approach introduces plastic film to the inbound stream and plastic film is a detrimental contaminant for the average MRF. It also may normalize the unwanted behavior of placing other recyclables into plastic bags.

The “3” score for “Environmental health and safety considerations.” was because current data shows that Oregon MRFs are still sending a considerable percentage of fiber to overseas markets. Please see the discussion under “uncoated paperboard packaging” (above) as the potential concerns for that material are identical.

Paperback books

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

Paperback books could end up in a grade 43 (Coated Book Stock) or grade 44 (Coated Groundwood Sections) bale, but given low volumes, most of this material is more than likely ending up in a grade 54 (Mixed Paper) or grade 56 (Sorted Residential Papers & News) bale. Demand for such bales is stable, both inside and outside the Pacific Northwest.

The only evaluation criteria where DEQ scored this materials with a “3” (or lower) was for “Environmental health and safety considerations”. Please see the discussion under “uncoated paperboard packaging” (above) as the potential concerns for that material are identical.

Plastic items

Plastic bottles and jugs, 6 ounces and larger: PET (#1) (clear only); natural and colored HDPE (#2) and LDPE (#4); clear and colored PP (#5)

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

Plastic bottles made of PET, HDPE and PP are some of the more easily recycled materials. While LDPE bottles are noted in the rule concept, in reality LDPE is only very rarely used for rigid packaging. LDPE could be removed from the rule concept with very little impact on recovery tonnages, and doing so might help to reduce public confusion, especially since the primary applications of LDPE (film plastic and lids) are not proposed for inclusion.

Among bottles of different resins, and excluding LDPE, the only scores of “3” or lower were as follows:

Colored HDPE bottles received a score of “3” in the category of “Environmental health and safety”. There are domestic end markets for colored HDPE. Indeed a major end market here in Oregon ([PakTech](#)) is forced to source HDPE from Canada because of insufficient volumes currently being collected from Oregon. [Denton Plastics](#), also in Oregon, is also increasingly seeking HDPE. However, a non-trivial amount of this material continues to be exported. While reclamation in other countries can be done responsibly, at present, DEQ lacks confirmation that it always is. This concern can be mitigated through the responsible end market standards in the Recycling Modernization Act.

PP bottles were given a score of “1” for their relatively low volume. Combined with other bottles as well as other rigid plastic packaging (where PP is more common), this is not a meaningful detriment.

Plastic tubs (e.g., cottage cheese), 6 ounces and larger: PET (#1); HDPE (#2); LDPE (#4); and PP (#5)

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

Most tubs are made of either HDPE, PP, or PET. The PET may or may not be thermoformed, and there is no practical way for the public to distinguish between thermoformed and non-thermoformed PET. As with bottles, LDPE is rarely used for rigid packaging, and could be removed from the rule concept with very little impact on recovery tonnages. Doing so might help to reduce public confusion, especially since the primary applications of LDPE (film plastic and lids) are not proposed for inclusion. If LDPE shows up at the MRF (whether accepted or not), it can be co-marketed in small quantities with either HDPE or PP.

As with other types of containers, DEQ expects that some Oregon MRFs will operate advanced recovery systems that will separate containers by type and resin. Others will likely focus primarily on fiber recovery and send un-sorted (or lightly sorted) mixed of containers on to those advanced MRFs or other secondary processing facilities.

HDPE tubs and containers have stable, mature markets up and down the West Coast, as well as in Canada. HDPE tubs may or may not be sold in a mixed bale with HDPE bottles, as bottles are blow-molded and tubs are injection-molded. Most reclaimers of HDPE bottles do not want tubs, although some reclaimers will accept them, sort them out, and market them with other injection-molded HDPE. Other recycling pathways reported by the Association of Plastics Recyclers for HDPE tubs include marketing them with mixed bulky rigids, tubs and lids, or even PP. Some HDPE ends up in bales of mixed plastics

that are bought by brokers and shipped to overseas markets, which is why the material received a score of “3” for “Environmental health and safety considerations.”

LDPE rigid containers, which again are present in only very small quantities, were assigned a score of “3” for “Environmental health and safety considerations” for the same reason. Scores of “2” in the categories of “Compatibility with existing recycling infrastructure: commingled collection and processing” and “Practicalities of sorting” reflect the less rigid nature of this packaging format, resulting in more of it flattening during compaction and ending up on the paper line at MRFs or being lost to the “unders” stream.

PP tubs and other containers received a score of “3” for “Environmental health and safety considerations.” Unlike HDPE, where bottles and tubs are often desired by different end markets, PP bottles and tubs can be reclaimed together and are commonly marketed together. While multiple end markets exist on the West Coast (and more are expected), some PP is still exported to countries that may not meet proposed standards for “responsible end markets”. This can be mitigated through new requirements in the Recycling Modernization Act.

PET tubs and containers are included in the evaluation matrix as “Clear PET other packaging, not thermoforms (e.g., jars) \geq 6 ounces” as well as a portion of “Clear PET thermoform packaging, not food serviceware (e.g., produce cartons, egg boxes)”. However, DEQ’s proposal for placement on the Local Government Recycling Acceptance List is limited to tubs (e.g., clear salsa or licorice containers) and excludes produce cartons, egg boxes, and food serviceware.

Both types of PET tubs (thermoformed and not) received scores of “3” for “Contamination,” based on the potential for food leftover inside a container. This would be more of an issue for the MRF (weight of leftover food could impact proper sortation of containers) than it would be for the end market as reclaimers first wash materials (reclaimer puts material through a washing process). Both also received scores of “3” for “Environmental health and safety considerations” given the current practice of exporting some PET and mixed plastics bales to countries that may not meet Oregon standards for responsible end markets.

Thermoformed PET also had scores of “3” in several criteria involving end markets, compatibility with existing recycling processing, and practicalities of sorting. Thermoformed PET can be recovered effectively at MRFs, although not all Oregon MRFs are currently processing tubs (and as noted earlier, not all will need to). Demand for the material is also growing, as documented in [responses](#) to DEQ’s Request for Information from NAPCOR, Denton Plastics, EFS Plastics, and others. Domestic PET bottle reclaimers can accept some thermoforms in PET bottle bales, but bales with higher content of thermoforms are, at present, typically exported to either Mexico or Canada for processing.

Plastic buckets, pails, storage containers and other packaging that fits loosely in the generator’s provided on-route collection container: HDPE (#2) and PP (#5)

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL). Also proposed for PRO Recycling Acceptance List.

HDPE and PP pails and buckets can end up in multiple different types of bales (including a Bulky Rigid Plastics bale, a 1-7 All Rigid Plastics bale, or others). Stable, mature markets for HDPE and PP can be found up and down the West Coast, as well as in Canada.

“Compatibility with existing recycling infrastructure: commingled collection and processing” and “Practicalities of sorting” each received a score of “3” based on the fact that this large-format material must be removed at the pre-sort stage of processing or the material becomes an issue as it makes its way

into the system (e.g., buckets can end up in cardboard stream and material is too big to flow under an optical sortation unit).

HDPE and PP pails and buckets received a score of “3” for “Contamination” due to the possibility of food or oil remaining inside any food-grade bulky buckets, especially if those buckets have come from the commercial sector. Reclaimers can handle a certain amount of food contamination, but they don’t want a considerable amount of it.

These materials received a score of “3” for “Environmental health and safety considerations” due to the fact that Oregon currently exports some bales of plastics for processing or reclamation to facilities that may not meet proposed standards for responsible end markets. DEQ expects that will be mitigated by new standards and requirements when the Recycling Modernization Act goes into effect.

Materials in categories referred to as “**Other bulky HDPE products**” and “**Other bulky PP products**” are only included in acceptance lists because the original matrix evaluation prepared for DEQ’s Technical Workgroup included storage containers in one of those categories, and storage containers are included in DEQ’s proposed acceptance lists alongside buckets and other large packaging. DEQ is not proposing to require acceptance of bulky products such as laundry baskets, coolers, children’s furniture or toys, some of which could be more difficult to identify and/or recycle. Generally speaking, large HDPE or PP storage containers have many of the same characteristics as pails and buckets and were scored fairly consistently.

Polyethylene film

Proposed for PRO Recycling Acceptance List

Polyethylene film material (e.g. grocery bags, produce bags, product overwrap, pallet wrap, bubble wrap, bubble mailers, etc.) can end up in a PE Retail Mix Film bale, though film products under this category may also end up in a LDPE Furniture Mix bale, a PE Clear Film bale or a LDPE Colored Film bale. Markets for PE Retail Mix film bales include Trex (the largest buyer of PE film nationwide), Avangard Innovative, PreZero and Prime Plastics Products (California) and Merlin Plastics and EFS Plastics (Canada). Most of those buyers would also accept PE clear/colored film and MRF curbside film.

Another emerging market relates to Waste Management’s recent acquisition of a controlling interest in Avangard Innovative’s US business ([will operate as Natura PCR](#)). That company is expected, within five years, to scale and grow recycling capacity to produce an estimated 400 million pounds per year of post-consumer resin (PCR).

Polyethylene film received a “1” score for “Compatibility with existing recycling infrastructure: commingled collection and processing” and “Practicalities of sorting” due to the material being a detrimental contaminant to Oregon’s MRF operations. That is why the material is being proposed for the PRO Recycling Acceptance List.

The material received a score of “3” for “Practicalities of storing” due to the fact that if material sits onsite outside for an extended period of time, the outdoor elements will more than likely lead to some form of material deterioration. Water is a contaminant to film bales.

“Contamination” was given a score of “3” due to the potential for leftover food/food remnants that can be found inside produce and grocery and take-out bags. Tape and labels found on mailers and water damage (i.e. rinsed, wet bags placed inside a recycling container) are other potential forms of contamination.

“Ability for waste generators to easily identify and properly prepare material” received a score of “3”, despite being relatively easy to identify. Proper preparation (ensuring cleanliness, removing paper labels) may be a difficult task for some generators.

“Environmental health and safety considerations” received a score of “3” because, though a lot of this material is recycled domestically, a considerable amount of this material is still being exported to overseas markets, some of which might not meet Oregon’s proposed standards for “responsible end markets”. Fortunately, such exports have fallen significantly in recent years. According to the Association of Plastic Recyclers’ [2019 U.S. Post-Consumer Plastic Recycling Data Dashboard](#), only 46.7 percent of film plastic recovered for recycling from inside the U.S. was acquired by U.S. or Canadian plastics recyclers in 2016, but by 2019 that rate had risen to 71.5 percent. While remaining exports remain a potential (although not guaranteed) concern, such concerns can be mitigated through implementation of the responsible end market standards contained in the Recycling Modernization Act.

Mono-material PE film was also the subject of several additional responses to DEQ’s Request for Information, including from the Flexible Packaging Association and the American Recyclable Plastic Bag Alliance.

Clear plastic cups: PET (#1) and PP (#5)

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

As described in the [Foodservice Packaging Institute’s response](#) to DEQ’s Request for Information, a bale audit of mixed plastics bales from nine North American material recovery facilities in 2020-2021 found that plastic cups (all resins and colors) comprised about 6 percent of the average weight of bales excluding bulky plastics. Of these cups, over 60 percent were made of PP, with the remainder split between PS and PET. Put differently, the volume of PP plastic cups is roughly three times the volume of PET.

Clear PP cups can be marketed in several different types of bales, including a 1-7 or 3-7 bottles and Small Rigid Plastics bale or one of several PP bales. Stable, mature markets for PP can already be found up and down the West Coast, as well as in Canada (see for example [response from EFS Plastics](#)), and new markets are expected to surface thanks to efforts like [The Recycling Partnership’s Polypropylene Recycling Coalition](#) and [Purecycle’s](#). Here in Oregon, [Denton Plastics](#) recently announced plans to expand purchases of PP bales, including drink cups. The material was scored well for compatibility with commingled processing infrastructure, due in part to the ability of optical sortation units to identify and separate PP.

“Contamination” was given a score of “3” because PP cups were evaluated alongside other PP thermoformed material and clear PP cups could bring food or liquids into the commingled stream.

“Ability for waste generators to easily identify and properly prepare material” was also given a score of “3.” While the material is easily identifiable and relatively easy to prepare for recycling, the success of preparation for recycling may depend on whether or not the material is being generated in a residential or commercial setting (e.g., liquids/ice are properly disposed of by patron before being recycled).

Clear PP cups received a score of “3” for “Environmental health and safety considerations,” due to the fact this material is sometimes included in bales that are bought by brokers and shipped to overseas markets. As with other materials, concerns involving potential downstream impacts are mitigated by the responsible end market standards of the Recycling Modernization Act.

Clear PET cups are present in smaller quantities than clear PP cups and generally scored slightly lower than PP counterparts. There is growing demand for PET thermoformed material, especially for post-consumer recycled content in PET thermoform containers by fruit and vegetable producers. The largest buyers of thermoform-rich bales are currently located in Mexico in Mexico. However, PET bottle reclaimers (of which there are many in the U.S.) are willing to accept a small percentage of thermoformed material mixed with PET bottles, and willingness to accept higher levels appears to be growing.

Some Oregon MRFs have optical sortation for certain plastics, including PET, while other don't. Like other plastics, DEQ expects that some MRFs might choose to skim off higher volume or higher value materials, and send PET cups on to an advanced MRF or secondary sortation facility for additional separation. These factors along with some loss of material is why DEQ scored this material a "3" for both "Compatibility with existing recycling infrastructure: commingled collection and processing" and "Practicalities of sorting."

Clear PET cups were also given scores of "3" for the criteria of "Contamination", "Ability for waste generators to easily identify and properly prepare material", and "Environmental health and safety considerations" for the same reasons described above for clear PP cups.

Metal-based items

Aluminum foil and pressed foil products

Proposed for PRO Recycling Acceptance List

Markets are stable for scrap aluminum, especially used aluminum beverage cans, although the Pacific Northwest is no longer home to any aluminum smelters (though there are discussions underway to revive Alcoa's currently shuttered Intalco Works smelter in Ferndale, WA).

However, foil and pressed foil products (such as pie plates and roasting pans) pose several challenges. First, the material can be difficult to prepare properly and if not cleaned, can introduce contamination into the recycling system in the form of food and food residue. This explains the scores of "3" for "Contamination" and "2" for "Ability for waste generators to easily identify and properly prepare materials" respectively.

If collected commingled, foil can also create some challenges to recover. Flattened two-dimensional aluminum products run the risk of ending up in the fiber stream, especially if the flattened product is buried under cardboard or other paper. Even if prepared into a ball, the material is often so small that it falls through screens and ends up in the MRF's "unders" stream, which typically is destined for landfill.

If aluminum foil makes it as far as the eddy current separator, it can be effectively separated with all other aluminum. But such bales of mixed cans and foil introduce yet another challenge. According to the Aluminum Association, the furnaces at most aluminum smelters are not designed to effectively recover significant yield from foil or foil products. There are a handful of furnaces in the U.S. (including one in Idaho) that specialize in recovering aluminum from foil, but that requires separating foil from cans and marketing them as separate bales. That in turn requires either additional hand sortation or the use of robotics.

These challenges justify scores of "3" for the criteria "Compatibility with existing recycling infrastructure: commingled collection and processing" and "Practicalities of sorting". If the aluminum foil is not separated, most of the material is simply lost in paper mills or the smelter furnace.

The challenges involving processing and end markets can be mitigated through the use of additional MRF investments, including a mandatory “unders recovery system”, advanced sorting of fibers, and separation of foil from cans following eddy current separation. Depot collection avoids the need for such investments although may result in lower recovery. Depot collection offers one other advantage: if households are accumulating foil prior to taking it to a depot location, they are more likely to prepare the material by removing food contamination. For these reasons, DEQ has proposed including the material in the PRO Recycling Acceptance List, although commingled collection could be an option given sufficient investments at processing facilities.

Steel and aluminum aerosol packaging

Proposed for PRO Recycling Acceptance List

Markets are plentiful for recovered steel and aluminum products, including steel and aluminum aerosol packaging. But such containers are treated differently by scrap metal recyclers depending on the contents (e.g., spray cheese vs. pesticide). Even if the contents are not hazardous, propellants can be flammable and pose risks to workers and facilities involved in the recycling process – both processors and end markets (steel furnaces).

During DEQ’s Materials Lists Technical Workgroup process, several MRFs and service providers voiced their concerns around the handling of aerosols. The containers can be handled effectively at the MRF, but facility operators worry of the contents inside such containers, not knowing whether or not all of the containers are actually empty or still pressurized, whether any remaining propellants are flammable, and whether the product content itself is hazardous. Releasing hazardous substances is a health and safety issue for sort-line workers. Plus, compaction of a container containing a flammable substance could trigger an explosion or cause a fire. Evidence of such incidents is primarily anecdotal, and involves low frequency but potentially significant impact. The feedback DEQ received played into the score of “3” that was provided to “Compatibility with existing recycling infrastructure: Commingled collection and processing.”

Excess content left inside an aerosol container is the major form of contamination here, especially if the content is hazardous. That is why “Contamination” received a score of “2.”

“Environmental health and safety considerations” received a score of “2” due to the health and safety concerns associated with MRFs and downstream processors (e.g., scrap metal yards, steel mills) handling aerosol containers containing hazardous substances. The potential that some materials could be exported to countries with less-stringent standards for worker and environmental protection raised additional concerns.

DEQ’s recent thinking around aerosol packaging can be found in proposed [Rule Concept: Recycling Material Acceptance Lists, Part One](#), Appendix 3 (page 27), with refined performance standards involving handling of aerosol containers included in the new Rule Concept: [Convenience Standards, Collection Targets and Performance Standards for PRO Recycling Services](#).

Steel and bi-metal cans, including empty and dry metal paint cans

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

Current U.S. markets for recovered steel include packaging, appliances, utility poles and construction materials, as well as recovered steel being used in the manufacture of new vehicles. A lot of recovered steel stays in-state, with local scrap recyclers supplying processed steel to Cascade Steel in McMinnville, where the material becomes PCR feedstock in the making of rebar and rolled steel bar.

“Contamination” received a score of “3” only because of the proposed inclusion of empty steel paint cans (non-aerosol) which sometimes still have residual paint in them. Paint cans with paint can be recovered through the state’s paint product stewardship program (operated by PaintCare), but that program does not accept empty paint cans (or aerosol paint canisters).

Scrap metal less than 10 pounds in weight and 18” in length – no sharp items (e.g., knives) or “tangles”

Proposed for Local Government Recycling Acceptance List, including both on-route and depot collection; suitable for commingled collection (USCL)

Much of the scrap metal coming from Oregon MRFs ends up at a local scrap metal recycler, and markets for scrap ferrous and non-ferrous metal are plentiful and stable, including ferrous end markets right here in the Pacific Northwest. While some scrap metal is recovered domestically, some is exported overseas. At present, countries with strong demand for scrap ferrous metal include Bangladesh, Egypt, Greece, Pakistan, Turkey and Vietnam.

Recovered aluminum can go overseas as well, but there is also growing domestic demand for the non-ferrous material. For example, Ball Corp. is currently constructing a new [\\$290 million aluminum beverage packaging plant](#) in North Las Vegas, NV, and the company is partnering with Manna Capital Partners to [construct a state-of-the-art aluminum can sheet rolling mill](#) in Los Lunas, New Mexico, a facility that is slated to come online in 2026.

Scrap metal is not a covered product, and acceptance of scrap metal varies widely between Oregon communities and MRFs. Communities that accept it (including the Metro-region local governments) have typically adopted a standard of “30 inches and 30 pounds or less”. However, many communities don’t accept scrap metal in their on-route collection programs, directing people to depots and private scrap buyers instead. MRFs are similarly divided on the topic of scrap metal. Several have told DEQ that they oppose acceptance of any scrap metal in commingled programs, one supports the Metro-region standard (less than 30 inches and 30 pounds), and several prefer something between those two extremes.

Regardless, ferrous and non-ferrous metals offer some of the largest environmental benefits per ton of commonly accepted materials, and DEQ has a strong interest in supporting high capture and recycling rates for metals, including scrap metal.

During DEQ’s Materials Lists Technical Workgroup process, several MRF operators told DEQ that scrap metal can be a challenge for processors to handle. Small pieces such as screws and nails easily become lodged in and can damage sortation equipment. Heavier items can damage balers and other equipment, potentially shutting a facility down for several weeks or longer. Heavier items can also create safety and ergonomic hazards to facility workers, especially if workers need to pull heavy items from a moving conveyor line. Wires, chains, and cables can easily become entangled in equipment, forcing shutdowns for maintenance.

In evaluating this material, DEQ initially aligned with the Metro region service standard and distinguished between items smaller than 30 inches and less than 30 pounds vs. items that are larger or heavier. The feedback DEQ received on scrap metal from MRFs contributed to scores of “2” for the criteria “Compatibility with existing recycling infrastructure: commingled collection and processing”, “Practicalities of sorting” and “Environmental health and safety considerations”. For this last criteria, MRFs pointed out that some residents try to recycle small metal items that bring inherent hazards with them, such as small propane canisters, guns or ammunition. Additionally, the potential that some scrap

metal may be exported to locations with less-stringent worker safety or environmental protection standards also pulls down the score for “Environmental health and safety”.

DEQ’s proposed rule concept, limiting on-route acceptance to items less than 10 pounds in weight or 18 inches in length, was designed to strike a compromise between the different MRFs and to reduce acceptance of heavier/larger items that are more likely to cause significant equipment damage as well as worker injury.

Regardless, “Contamination” was given a score of “3” primarily because some scrap metal items bring with them non-metal components. The diversity of scrap metal products, challenges with removing non-metal components, and concerns voiced by MRFs regarding the ability of generators to follow weight and size standards contributed to the score of “2” for “Ability for waste generators to easily identify and properly prepare material.”

Other scrap metal

Proposed for Local Government Recycling Acceptance List, depot collection only

This material is essentially all scrap metal items larger than 18 inches in length and weighing more than 10 pounds. The larger sizes and weights pose greater challenges in commingled processing, which is why DEQ is only proposing to require acceptance of this material at depots under the Local Government Recycling Acceptance List. All other criteria are scored the same as smaller scrap metal.

Other items

Motor oil

Proposed for Local Government Recycling Acceptance List, depot collection only

There are several different end-uses for recovered motor oil, including converting the oil into fuel used in industrial processes, re-refining it (the auto industry and oil manufacturers have promoted the benefits of using recycled oil for years now), or converting it into an alternative fuel. Oregon has several entities that collect and process used motor oil.

Motor oil received scores of “1” for “Compatibility with existing recycling infrastructure: commingled collection and processing” and “Practicalities of sorting,” as commingled processors are not equipped to handle containers containing motor oil or commingled material damaged by motor oil. However, DEQ is not proposing acceptance of motor oil in a commingled collection program. Many collection service providers across Oregon accept motor oil curbside for recycling (placed curbside in a see-through container), but collected motor oil is kept separate from any collected commingled material. However, most motor oil is collected at recycling depots, service stations, or by auto parts retailers.

“Practicalities of storing” was scored a “2,” given the need for storage that both protects against potential ignition as well as leaks.

Contamination for the end-user could come in the form of any non-oil substance mixed with the used oil before being placed curbside for collection or dropped off. Used oil also often contains some gasoline (dissolved in the oil from sources in the engine) and water derived from combustion byproducts, leading to yield loss in either the re-refining process or the processing into used oil fuel. Used motor oil can also contain heavy metals as well as hazardous contents that are intentionally added by some generators. This reasoning played into DEQ providing “Contamination” with a score of “2.”

“Environmental health and safety considerations” was provided a score of “2” based on the handling of the hazardous material, as there are special hazard/safety/containment issues related to storage of used motor oil. This material also scored a “2” against the criteria “Policy in ORS 459A.015(2)(c)” as most used motor oil is used to produce a combustion product, a lower priority in Oregon’s statutory waste management hierarchy

Despite these limitations, continued collection of motor oil (at least at local government depots) is recommended. While used motor oil can be difficult to manage properly, the consequences of improper management, such as contamination of ground and surface waters, are even more severe. Oregonians need access to a responsible infrastructure for managing used motor oil, and the local solid waste infrastructure is an important element of that infrastructure.

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