NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS (NCTCOG)

Resource Paper: Contamination Mitigation

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FOR NCTCOG

AUGUST 2025

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Introduction

As communities turn to organics recycling for food scraps and yard waste, a significant challenge that must be addressed is contamination, or the improper disposal of unwanted materials in the organics waste stream. Contaminants such as plastic bags, diapers, or produce stickers can hinder the organics recycling process, reduce the quality of end products (such as compost), and result in additional disposal costs or penalties for municipalities or residents. This resource paper explores the causes, concerns, and strategies to address contamination for curbside organics collection programs.

Background

The Composting Consortium released a 2024 report on the challenges of contamination titled "Don't Spoil the Soil." The report finds that conventional plastic, such as rigid containers, films and wrappings, and plastic-lined paper, is the most prevalent contaminant at composting sites, accounting for an average of 85% of the contamination by volume. Despite ongoing efforts by processors and communities to reduce contamination, conventional plastic often remains in the final compost; 4 out of 10 composters had trace amounts of flexible plastic in their finished product.

Contamination is a significant concern because it reduces the quality and marketability of the finished product. The intended environmental benefits of compost, including improved soil structure, enhanced moisture retention, and reduced erosion, are compromised by potential public health issues through contamination of soil and crops. As a result, poor product quality limits the scope of its application and reduces commercial opportunities for market distribution.

Additional considerations underscoring the importance of addressing contamination include:

HARMS THE ENVIRONMENT.

Contaminants may result in the presence of PFAS (polyfluoroalkyl substances) and microplastics. If the finished compost is utilized in residential or municipal projects, these fragments can create runoff and pollution concerns that harm the environment.

DISRUPTS OPERATIONS.

Contaminants can damage facility equipment and downgrade end products, causing added maintenance and downtime and prompting haulers or facilities to reject and landfill loads that are over-contaminated. This undermines the efforts of residents and staff to divert waste from landfills.

INCREASES LABOR TIME AND COSTS.

The process of removing contaminants through additional staffing and equipment drives up expenses for organic waste processors. These additional costs may ultimately be passed on to consumers through higher service fees or fines.

REDUCES TRUST.

When the outcomes of sorting organics do not align with expectations, trust in the system and willingness to participate are weakened. This damages the relationships between residents and the program, as well as between haulers and the municipality, and ultimately the success of the program.

The challenges and potential consequences of contamination should not deter municipalities from implementing organics recycling programs. When properly managed, composting provides significant environmental benefits to communities, and many municipalities have successfully adopted strategies to limit contamination. Outlined under Key Strategies, employing a combination of targeted approaches can effectively reduce contamination while also fostering public understanding of its impacts and encouraging greater community ownership and participation in organics recycling efforts.

Sources for Contamination

There are several common contaminants identified nationally. According to the Composting Consortium's "Don't Spoil the Soil" report, the most prevalent contaminants in decreasing order of magnitude include rigid plastics, plastic film (e.g., garbage bags, wraps, films, and pouches), paper products with plastic linings, glass, and metal. To best address contamination, education and outreach should focus on these common offenders.

The scale and type of contaminants may also vary by region or facility, influenced by local knowledge of organics recycling and the specific items accepted by the haulers and processors. For example, compostable packaging and serviceware (products made from plant-based materials with the intention of breaking down in certain environments) are not accepted at all facilities and are dependent on the processing capabilities and infrastructure of the processing facility. It is critical to engage in discussions with the hauler and processor to clearly identify and agree upon which items will and will not be accepted. If the facility does accept compostable packaging, it is important to educate the public and emphasize the importance of only accepting items with the Biodegradable Products Institute (BPI) or Compost Manufacturing Alliance (CMA) certification marks, as shown in the images below.

Sources for contamination vary, but stem from knowledge gaps, miseducation, or lack of convenience. Common factors to be aware of and to form strategies to address include:

LACK OF AWARENESS

Accepted items in compostable streams vary by region, which may lead to confusion for residents new to the area or program. Develop a standardized list of accepted items, along with clear identification of common contaminants. These resources should be provided to new customers, translated into common languages in the region, made readily accessible on website platforms, and included in education campaigns.

CONFUSING LABELING

Misleading packaging labels and unsupported compostability claims contribute to public confusion and result in widespread misunderstanding among residents. In response, states such as California, Washington, and Colorado have enacted legislation mandating clear, standardized labeling for compostable packaging to reduce contamination. Municipalities that accept compostable packaging should emphasize the importance of accepting only items with certification marks from recognized third parties, such as BPI or CMA. These certified items should be clearly referenced on a standardized list of accepted and prohibited materials.

WISH-CYCLING

Participants may try to compost items they believe are compostable even though they are not, such as produce stickers, paper towel with cleaning chemicals, or painted wood, a behavior known as wish-cycling. Encourage residents to reference a dedicated online resource to verify the acceptability of uncertain items and to follow the slogan, “when in doubt, find out.”

PARTICIPANT RESISTANCE

Certain residents may lack interest or responsibility in composting, especially if they are required to participate. Targeting these audiences through education that incorporates behavior change techniques is critical. To support these efforts, it is also important to ensure composting is as convenient and accessible as trash disposal.

LACK OF CONVENIENCE

Accessibility to composting services plays a large role in participation. If organics waste collection is not as easy and convenient as recycling or landfilling, residents who are discouraged may place compostables in trash containers or vice versa. Curbside organics recycling that follows standard operating procedures for trash and recycling collection is one way to make the practice convenient.

ILLEGAL DUMPING

Pedestrians may improperly dispose of items, such as soda cans, water bottles, or dog waste, into any publicly accessible carts, including those designated for organics waste. To mitigate this, municipalities may require waste collection carts to be curbside only within 24 hours of scheduled collection, therefore reducing unauthorized access during other times. Some areas may also implement locking mechanisms on organics carts.

SHARED CONTAINERS

Accounts in which residents share a container, such as in apartment complexes, face greater challenges with contamination. This stems from varying levels of understanding and commitment among users, the difficulty of achieving coordinated participation, and the absence of individual accountability. Targeted education and consistent communication with all users are key. Municipalities should provide clear information on program goals, proper usage, and the benefits of participation to foster collective engagement.

Key Strategies

Contamination control is a standard practice for all composting and recycling programs. To effectively address contamination, education and outreach need to be prioritized. Continuous, repeated messaging that explains the reasons for minimizing contamination and identifies common contaminants is essential. Behavior change strategies, as outlined in the Guidance Document, can be integrated into outreach methods, utilizing best-practice tools such as social media campaigns, informational flyers, workshops, and event tabling to raise awareness.

Contamination monitoring programs should be explicitly defined and included in agreements with waste haulers. Typically, haulers (or facilities) set a contamination threshold of 5% of total volume, rejecting materials or sending them to landfill if this threshold is exceeded. These expectations, including local contamination goals or stipulations, should be clearly discussed and outlined in final contracts. If the contamination metric is not met, haulers should be required to increase monitoring and corrective actions. Sample contract language may include: “If more than 2% of inbound materials are found to be contaminants, the Contractor shall develop a plan to identify which customers are contributing contaminants to the organics stream and implement a public education program to address the issue.”

Contamination reduction programs and strategies, ranked in increasing order of complexity for implementation, include:

DO'S AND DON'TS

Provide a readily accessible list of accepted and prohibited materials. This resource can be supplied by the organics recycler and hauler or developed by the municipality. Utilizing clear, straightforward terminology alongside photos will enhance community understanding. Ensure this resource is easily and broadly accessible by distributing it both online and in print.

CART STAMPS

Ensure containers for trash, recycling, and organics are distinct from one another (with standardized colors, generally green for organics, brown/black for trash, and blue for recycling) and have stamps or stickers on top of each to indicate acceptable materials. Include a website link or QR code for residents to access additional information.

EDUCATION CAMPAIGNS

Invest in regular outreach and education campaigns to increase awareness of the importance of keeping organics waste streams clean. This could include direct mailers, flyers, web content, social media circulation, composting block leaders, field staff education, workshops, and tabling at events. Materials and outreach efforts should be offered in the primary languages spoken within the municipality and be reflective of the community's diversity to effectively engage and resonate with all residents. Additional recommendations and strategies for impactful outreach and education can be found in the Procurement Process Guidance Document.

LID FLIPS

Collection staff should be trained to visually check curbside compost carts for contamination before servicing them. If contamination is found, photos can be taken for documentation, and the resident should be notified so they're aware of the issue and can make corrections.

BIN TAGS

After conducting a lid flip inspection, staff should place bin tags or "oops" notices on containers found with contamination to inform residents of the issue and remind them not to repeat the offense. Record all tagging internally, with repeated violations potentially resulting in fines or suspension of service. To encourage proper sorting, positive reinforcement such as stickers with messages like "No plastics in my food scraps!" or "I recycle right by keeping plastic out of my organics cart" can be placed on compliant organics carts, serving as visible reminders and motivation for the community.

TARGETED EDUCATION

Provide educational outreach, such as through printed mailers, emails, or online media, to specific groups that are known to have greater contamination rates, such as properties with shared containers or individuals with consistent records of contamination.

PROMOTE COMPOST USE

Host compost giveaway events, incorporate compost into municipal projects, and educate residents on the general benefits of compost to help participants close the loop and understand how their efforts lead to higher quality compost.

KITCHEN PAILS

Certain programs may offer free pails to residents for collecting common food scraps in their kitchens. When paired with compostable bags, this helps keep organic waste separated within the home before being transferred to the organics collection container. Getting signed commitments from residents to follow allowable material guidelines in exchange for the free pail can be effective in improving the quality of material received.

LOAD INSPECTIONS

As part of their collection and processing services, facility operators at processing facilities may inspect materials and notify collection routes if there are issues with contamination. Depending on the agreement made, this may prompt targeted outreach strategies to households on the route.

WEBSITE DEVELOPMENT ("WASTE WIZARD")

Online tools can be implemented to help residents quickly and efficiently understand what can be composted. A "waste wizard" serves as a one-stop-shop where residents can search for items and be directed on how to properly dispose of them.

EDUCATION FOLLOWED BY PENALTIES

Fines and enforcement require additional planning and legal considerations but may be a more impactful approach to minimizing contamination.

CART REMOVAL & SERVICE STOPS

If continued targeted outreach does not correct contamination concerns, service stops serve as an immediate consequence that reinforces the need to follow guidelines. In some communities, combining cart removal with an in-person or online training requirement to resume service provision can be effective at solving contamination issues.

ADVANCED TECHNOLOGY

Artificial intelligence (AI) is now embedded in multiple processes, including contamination monitoring. Many large collection haulers have begun equipping their trucks with AI cameras to identify contaminants and send real-time notifications directly to the account holder. Municipalities should speak to their hauler about the accessibility of this software.

Case Studies

MINNEAPOLIS, MINNESOTA

The Minneapolis Solid Waste & Recycling Division operates a voluntary opt-in food scraps curbside collection program and attributes a contamination rate of less than 1% to ongoing education, cart monitoring, and waste audits. Collection staff review all cart contents before collection and leave bin tags with information about misplaced items if contaminated. In 2024, 1,760 carts were tagged, including 955 for contamination, and back-of-truck hand sorts consistently found 1% or less contamination. By comparison, without bin tagging and collection staff intervention, the contamination rate in 2022 for the city was 9.8%. Organic waste sorts conducted by the city in 2021 and 2024 reaffirm these statistics and helped the city identify common contaminants, including recyclables and poly-lined paper.

For cases of multiple infractions, collection staff remove carts, require an additional fee, and completion of an online training course to receive the container back. However, an emphasis on education and community outreach help reduce the need for this measure. Starter kits include a welcome letter, magnet, home setup tips, and biodegradable bags to get residents started. Consistent engagement through tabling and door-to-door outreach is conducted in multiple languages to reach a large scale of residents and encourage greater opt-in participation rates.

Additional information on the City's contamination mitigation strategies is available at the City of Minneapolis' Organics Recycling webpage.

SEATTLE, WASHINGTON

The City of Seattle began curbside food waste collection in 2005 and required all residential properties to participate in the program or compost at home by 2009. Through a commitment to extensive education, the city's organics contamination rate is 2.1% as of 2022.

The city's "Compost Right" campaign include multiple initiatives, including a "Food In, Plastic Out" marketing campaign, a waste-wizard tool to address and reduce wishcycling, and a "Friends of Compost" monitoring program in which volunteers educate multifamily building residents on proper composting. The city also collaborates with processing facilities such as LENZ Enterprises and Cedar Grove Composting to ensure standardized materials and minimal confusion on program goals by residents. In partnership with Waste Management and Cedar Grove, a "bingo" card game with produce stickers was created to address the common contaminant. Customers who complete the game are rewarded with a free bag of compost.

Additional information on the City's contamination mitigation strategies is available at the City of Seattle's Compost Right webpage.

SAN ANTONIO, TEXAS

San Antonio's organics recycling program, initially launched as a pilot in 2011 and since expanded to all residents, has faced significant contamination challenges in the past. However, through a dedicated education and outreach strategy and creative partnerships, the city's contamination rate was able to decrease from 43% to 22% between 2017 and 2018.

The city's Solid Waste and Management Division oversees the SA Recycles program, which includes a dedicated website for all trash collection information. Among the resources provided are free counter-top kitchen pails for new customers, recycling videos, free presentations, and educational training materials for residents and teachers. In addition to providing clear guidelines and communication on composting correctly, the program stresses the compost process and community benefits through the use of compost at the city's Botanical Gardens and many park. Cross-departmental collaboration within the city has also led to the development of ReWorksSA, a grant-funded resource to provide consulting and material resources to businesses on composting correctly. Among the toolkit resources are a custom recycling sign maker, a Yes/No recycling flyer, and multilingual flyers to accommodate the diverse population.

Enforcement plays a critical role in the city's strategy. Collection drivers conduct lid flips and administer "oops" tags to inform residents of violations, and repeated offenses result in violation fees of $25 or more, with diapers exclusively fined at $50 per violation.

To address contamination at the processing stage, San Antonio's composting partner, Atlas Organics, installed an AI-equipped robot in 2022. This technology helps remove contaminants from the organics stream before composting, significantly reducing contamination rates. The AI robot has been successful in reducing contamination to less than 1%, effectively mitigating previous issues with load rejections.

Additional information on the City's contamination mitigation strategies is available at the City of San Antonio's Curbside Organics Collection webpage.

Conclusion

Developing contamination mitigation strategies is an important component of any successful organics recycling program. It requires an understanding of why the contamination is taking place, discovering the barriers which are keeping people from doing the right thing, and understanding which messages, tools, and education pieces and practices will result in reduced contamination in particular communities. These practices are not 'one and done,' rather they need to be built into service provision and programming for consistent and regular messaging to provide sufficient repetition and visual reminders to most effectively reach residents. A well-developed and executed contamination mitigation program and resulting reduction in contamination has measurable benefits to program operations as well as in the improved quality of the resulting compost.

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