

Contamination Management

Contamination of organics by non-targeted materials can be an issue for some kerbside collection schemes. When introducing a combined food and garden organics service it is important to maintain low levels of contamination, in order to:

- ✓ Decrease processing costs
- ✓ Ensure the products meet regulatory requirements
- ✓ Ensure the composted products can be marketed and used without causing harmful environmental impacts.

Contaminants in organics

Contaminants can be differentiated into:

- ✓ **Physical contaminants**, which comprise non-compostable impurities (e.g. plastic, glass, metal, rocks)
- ✓ **Chemical contaminants**, which include mainly heavy metals and herbicides
- ✓ **Biological contaminants**, which represent plant, animal and human pathogens and also viable plant parts or seeds.

High physical contamination levels usually result in increased contamination with heavy metals and other pollutants. Non-organic materials can contain numerous potential pollutants, some of which will end up in the finished compost. This can happen by way of (i) small particles that are generated during feedstock processing being retained in the compost, or by pollutants being solubilised during the composting process. Examples for this include the potential of car batteries in feedstock to result in elevated lead levels in compost, and generally increased contamination levels in compost from AWT.

There might be occasions where contamination in compost is caused by natural conditions, such as elevated heavy metal concentrations in soil being responsible for high heavy metal concentrations in compost. Heavy metals do not 'disappear' during composting, but are concentrated as the organic material breaks down.

Many, but not all, undesirable chemical compounds are broken down during the composting process. Most herbicides and pesticides are broken down and rendered ineffective during the composting process; however, some may persist. For example, the pyridine herbicides, *Clopyralid* and *Picloram*, are known to persist and accumulate in finished compost. As was seen in the USA and New Zealand, they can cause damage to plants if contained in minute concentrations in compost. These herbicides are used in the agricultural sector in Australia, but are not registered for domestic use. Hence, there is little risk that compost made from kerbside collected organics will contain these herbicide residues.

Biological contaminants, such as weed seeds, plant diseases, mould on spoiled food, or *E.coli* in pet excrements do not pose a problem as they are usually eliminated in well-run composting operations. Elevated temperatures (above 55°C) that are generated during the composting process and maintained for an extended period, inactivate plant propagules and pathogens. According to the *Australian Standard for Compost, Soil Conditioner and Mulches* (AS 4454-2012), composted material can be considered pasteurised if the whole of its mass is subjected to a minimum of three turns with the internal temperature reaching a minimum of 55°C for three consecutive days before each turn. Vermicomposting on its own is not able to generate pasteurised products, which is why these technologies need to incorporate a separate process that ensures elimination of biological contaminants, e.g. composting or heat treatment.

Physical contamination represents a major risk for organics collection schemes (compare Factsheet 6 – *Understanding the Possible Risks*). Potential physical contaminants can include plastic bags, biodegradable but not compostable bags, packaging, glass, cans, cutlery, rocks, garden implements, and misplaced garbage, which can contain anything.

Contamination of kerbside collected garden organics with impurities is relatively low (less than 1% to 3%, weight for weight) in most cases. However, concerns are often raised that co-collection of garden and food organics increases physical contamination of the collected material. Some trials and established schemes support this view, while others have demonstrated that garden and food organics can be collected with very little contamination.

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IMPLEMENTING YOUR SCHEME – FACTSHEET 12 – CONTAMINATION MANAGEMENT

The major contaminant in a food organics collection service is plastic bags. These are used by residents to line the kitchen caddies and transport the food organics to the kerbside organics bin. Occasionally plastic bin liners are also used to keep the organics bin clean. Residents may not be able to differentiate the look and feel of compostable bags from other types of bags or differentiate between the terms degradable, biodegradable and compostable. Householders are often confused by the plethora of environmental based messaging on the packaging of bin liners. In addition, compostable liners for kitchen caddies or bins are often not readily available in retail outlets.

The Australian Standard for Composts, Soil Conditioners and Mulches (AS 4454-2012) stipulates the following key contamination requirements for unrestricted use of recycled organic products:

Physical contaminants

Glass, metal, rigid plastic	≤ 0.5% (w/w)
Plastics – light, flexible or film	≤ 0.05% (w/w)
Stones and lumps of clay	≤ 5% (w/w)

Biological contaminants

Viable plant propagules	0 after 21 days
Salmonella spp	absent in 50 g
Faecal coliforms	<1000 MPN/g

Chemical contaminants

Arsenic	≤ 20 mg/kg
Cadmium	≤ 1 mg/kg
Chromium	≤ 100 mg/kg
Copper	≤ 150 mg/kg
Lead	≤ 150 mg/kg
Mercury	≤ 1 mg/kg
Nickel	≤ 60 mg/kg
Selenium	≤ 5 mg/kg
Zinc	≤ 300 mg/kg

The Australian Standard (AS 4454-2012) quality specifications represent minimum requirements aimed at minimising or avoiding adverse impact on environmental and public health. It does not necessarily mean that customers are happy with contamination levels, even if the product meets the above outlined specifications. Small amounts of plastic film can still make compost products unsightly, and shreds of glass will accumulate over time on the surface of mulch applied in large doses.

At this point in time, it is voluntary to have compost products independently audited against the Australian Standard quality specifications.

Planning for contamination management

A comprehensive contamination prevention and management plan should be developed prior to roll out of a combined food and garden organics service. Planning should be informed by the pilot trial results and local experience with contamination. It should include at least:

- ✓ Education material for householders, including visually appealing lists and stickers of what can and what can't go into the organics bin. Clear symbols (i.e. Ticks and crosses) should be used to ensure the material is easily understood.
- ✓ On-going public education and motivation.
- ✓ Communications material for the local media, councillors, senior staff etc.
- ✓ Arrangements with waste collection personnel regarding contaminated bins and use of contamination tags for individual households not complying, i.e. if the bin contains high levels of physical contamination.
- ✓ Arrangements with the processor regarding contaminated material for the initial roll out of the service and on-going maintenance of the service. This may include penalty payments if contamination levels exceed a certain threshold.
- ✓ Continuous monitoring and evaluation in problem areas through bin inspections, waste auditing and community consultation.

It is often very hard and costly to remedy a situation where collected organic material has unacceptably high contamination levels. Hence, adequate resources need to be made available to prevent this from occurring.

Particular issues related to combined food and garden organics collections include:

- ✓ Whether Councils should elect to promote compostable plastic liners, paper liners or no liners.
- ✓ If liners are promoted whether they will be supplied by council (how many for how long) or if residents have to provide their own.
- ✓ Whether plastic bags and other large impurities are going to be handpicked and removed at the processing facility or not. Hand sorting of incoming material increases processing costs and may also require colouring or marking compostable bin liners so they can be easily differentiated from other plastic bags.
- ✓ Whether a bag shredder will be deployed to rip open compostable bin liners to release food material. This may result in small pieces of non-compostable plastic within the end product if the incorrect types of bags are used by the householder.
- ✓ Whether kerbside collected garden and food organics be shredded, as this will result in small pieces of plastic that are hard to separate from the finished compost and mulch.
- ✓ Whether contaminated bins will be identified, remedial action taken with the individual household and the service ultimately removed if contamination continues. Community and council support for the service may influence acceptance of various options for dealing with households unable or unwilling to correctly use the service.

Case Studies

Finding the Drivers to Reduce Contamination – Canterbury Council

The Canterbury Council area is a culturally, socially and economically diverse community in Sydney's inner west. Almost half of its approximately 145,000 residents were born overseas and there is a significant concentration of high density and public housing.

In 2009, Canterbury Council won a Compost Australia Award for the management of contamination in its domestic garden organics collection service. Since the roll-out of the organics service in 2005, contamination in kerbside-collected garden material had been maintained at almost 0% for a number of years.

Canterbury Council consulted its community thoroughly and engaged a research and consultancy group to assist in the design process for education material used in its garden organics service roll-out. The communication strategy was implemented at a modest cost of about \$4 per household. The education package included printed brochures, stickers, a calendar and a DVD which were produced in six of the most common languages spoken in the LGA.

Council's standard compliance program for dealing with contaminated recycling and garden organics bins consisted of the following process:

- 1 Driver reports all contamination incidents to Council (whether collected or rejected)
- 2 Sticker with reason placed on bin if major incident necessitates rejection for collection
- 3 Council sends a warning letter to the property by mail
- 4 If bin is reported on multiple occasions, council field officers visit property in person and provide multi-lingual education material.



Contamination tag for kerbside bin

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IMPLEMENTING YOUR SCHEME – FACTSHEET 12 – CONTAMINATION MANAGEMENT

Council conducted an audit of every truckload of garden material collected over a two week period. Contamination was found to be consistently below 0.5%. Meanwhile, the co-mingled recycling service which was introduced prior to the organic service, had struggled to control contamination levels, which at times reached 15%.

The council believes that the key to its success in keeping contamination out of garden organics was in fact a set of committed garden organics collection truck drivers who were extremely vigilant in reporting contamination incidents and rejecting excessively contaminated bins. Over several years, council received reports for 2 or 3 garden organics bins on average per day, for which the council then implemented its compliance program. Meanwhile, the drivers of the recycling collection truck rarely reported contamination and so most residents who used the recycling system did not receive feedback on their actions.

Lesson Learnt: Council maintained an excellent relationship with management and drivers of its collection contractor, communicating at least on a daily basis. Their garden organics truck drivers took pride in their work and understood the importance of their role in improving product quality.

The 'Recycle Right!' Contamination Reduction Strategy – Bankstown City Council

Bankstown City Council, 20km south-west of the Sydney CBD, is known for its cultural diversity and provides 60,000 domestic waste services, spread between 50,434 single dwellings and 1,356 unit complexes.

Bankstown City Council has provided a recycling service to residents for about 20 years and waste education has been used as a strategy with some success to promote and inform residents about recycling. In 2009–2010, Bankstown residents diverted 48% of their total household waste from landfill through the three-bin system; however contamination rates in some areas of the LGA were as high as 30%.

To address this issue, the council's Resource Recovery Team developed a campaign based on behavioural psychology to investigate the drivers behind the required behaviour change and to develop an understanding of the individual and situational factors that motivate or constrain residents' recycling behaviours.

The 'Recycle Right' Contamination Reduction Strategy commenced in 2010 and involved thorough research, community consultation, several stages of monitoring and evaluation, and ultimately reviewing and refining of strategies. Nine different 'education strategies' were tested during the campaign to reduce contamination in recycling bins which were:

- 1 **Personal Feedback:** Officers place a 'Well Done' or 'Oh No' themed feedback postcard in the letterbox after bin inspection
- 2 **Flag & Tag:** Officers hang a 'Well Done' or 'Oh No' themed feedback tag on the bin handle after bin inspection
- 3 **Door Hanger:** Officers hang a 'Well Done' or 'Oh No' themed feedback door hanger on resident's individual front door
- 4 **Feedback by Poster:** Officers hang a 'Well Done' or 'Oh No' themed poster in the bin bay area
- 5 **Changing Recycling Bin Lids:** Officers remove existing recycling bins and replace with bins that have a small square hole in the lid (hence discouraging disposal of bagged recyclables in the bin)
- 6 **'I Pledge':** Officers door knock to enlist residents' support in taking a 'Pledge' to Recycle Right
- 7 **Recycling Tub:** Officers door knock and deliver a yellow recycling collection tub
- 8 **Bulk Recycling Bin:** Officers replace existing 240L recycling bins with 660L recycling bins
- 9 **Door knocking:** Officers door knock residents to answer any recycling questions and confirm they understand how to use the bins correctly.

The most successful strategy overall was the 'Personal Feedback' strategy which reduced contamination levels by 31%. This result is consistent with other research that the council reviewed as part of the project, indicating that people want positive feedback and like to feel that they are doing what everyone else is doing – 'the right thing'.

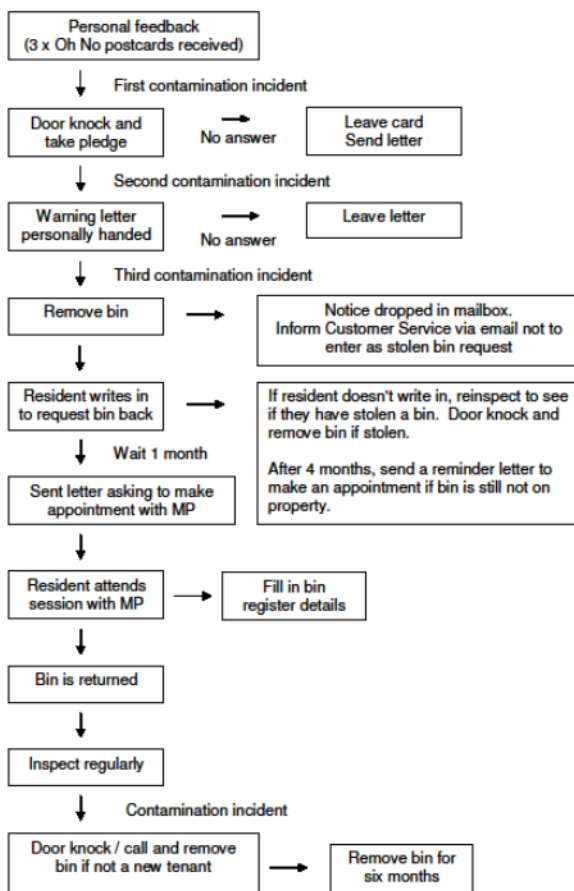
For residents in multi-unit dwellings, 'Changing Lids' and 'Feedback by Poster' were the most effective in achieving contamination levels below 10%.

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IMPLEMENTING YOUR SCHEME – FACTSHEET 12 – CONTAMINATION MANAGEMENT**

The 'Bulk Recycling Bin' strategy was the least successful approach and actually led to higher rates of contamination in the area tested.

The council analysed the results of the trial, community consultation, surveys and demographic data to determine the most effective community engagement strategy for contamination management, developing new standard procedures which are now being implemented across the LGA for three types of properties: SUDs, small MUDs (<25 units) and large MUDs (>25 units). The figure below shows the procedure followed for SUDs.

Contamination Management Process



Bankstown City Council's new Contamination Management Strategy for SUDs, revised and finalised after the 'Recycle Right' trial.

A financial analysis found that the campaign costs on average \$2.38 per household to implement, which includes providing households with an information pack, bin sticker and 6 collections of feedback costs. However personal feedback, door knocking (verbal) and door hangers are the cheapest strategies to run while strategies such as bulk bins and recycling tubs cost significantly more due to the infrastructure required.

The council has also used key findings from the community consultation sessions to redesign the education campaign resources to feature a range of local children with the red, yellow and green bins. These images are being incorporated into resources such as:

- 1 Individual feedback postcards
- 2 A media campaign
- 3 Truck panel decals
- 4 Brochures, flyers and Council website.

Factsheet 8 provides more detail on the design and results of the education campaign and trial.



Artwork for the 'Recycle Right Program' (Bankstown City Council)

Lessons Learnt: The trialling and subsequent implementation of the final strategy has provided a reliable evidence base for the Council's new approach to recycling education and contamination management procedures for both single and multi-unit dwellings and the process of ongoing monitoring and review will ensure that it can be revised and refined to maintain its effectiveness.

Further information:

www.bankstown.nsw.gov.au

NB: Information in this factsheet is taken from the *Food and Garden Organics Best Practice Collection Manual* (2012) published by the Department of Sustainability, Environment, Water, Population and Communities. The full document is available on the department's website www.environment.gov.au/wastepolicy/publications/organics-collection-manual