Waste Authority

Waste Authority of Western Australia

Position Statement

Recycled Organics

October 2009

1 Background

The Waste Authority (the Authority) was established on 6 May 2008, superseding the Waste Management Board. The former Waste Management Board issued a *Position Statement on Recycled Organics* in February 2008 outlining its view that the diversion from landfill and beneficial use of organic waste was a priority.

Several regional councils operating alternative waste treatment (AWT) facilities and members of the waste and composting industries, requested that the Authority release the previous Waste Management Board's *Position Statement on Recycled Organics* for comment prior to the Authority releasing a similar policy document. The Authority released a draft *Position Statement on Recycled Organics* for stakeholder comment for three months (until 30 June 2009), with a view to adopting a revised edition as an Authority policy document.

2 Overview

A function of the Authority is to promote the wise use of resources that would otherwise be considered to be waste. Consequently, the Authority considers the diversion and beneficial use of organic waste from landfill to be a priority.

When applied to home gardens, public parks, road verges or farmland suitably processed recycled organic material (such as a high quality compost) can improve soil quality and help maintain plant available nutrients in soils. The use of recycled organics can provide significant benefit, as many Western Australian soils have low water holding capacity, are low in certain plant nutrients, lack sufficient levels of organic matter and suffer from other soil fertility issues. The Authority believes that appropriately selected and processed organic waste should be recycled wherever possible and used to replenish soil organic matter.

Organic matter due to be applied to residential gardens, and root and leaf crops intended for direct human consumption should undergo an appropriate pathogen and plant propagule destruction process. The pasteurisation of material through composting is a well known example of an appropriate process that achieves pathogen and plant propagule destruction. Such measures aim to maintain good public health, minimise biosecurity risks to growers and minimise impact to the environment. Raw manures and untreated liquid organic wastes are considered less suitable in such applications.

The Authority embraces the notion that separation at source is the preferred strategy for recovering organic waste. Source separation involves diverting some waste materials into separate collection services (such as through separate bin services for organic materials or verge side collections for 'green waste') or though direct delivery of specific wastes to drop-off facilities (such as at specific areas at waste transfer stations). . Composts derived from source-separated wastes and single-waste sources are more likely to meet quality requirements for unrestricted use. Nevertheless, the unrestricted use status of recycled organics can also be determined through characterization, quality processing systems and confirmation of high quality status through ongoing sampling and testing.

Beyond land application situations requiring recycled organics with an unrestricted use status, there is also a substantial need for different quality composts and other recycled organics products in a range of important applications.

The Authority recognises that further expansion of systems that support the use of recycled organics will be assisted by strategic planning and ongoing community education programs. Also, change in technology is likely to be an important factor supporting the expansion in production and use of recycled organics, as well as providing improvements in quality assurance and quality control systems associated with recycled organics processing.

3 Suitable Materials for Recycled Organic Products

Materials that can be used for recycled organics production include a large range of biodegradable organic materials such as 'green waste' from households, parks, gardens and orchards, residues from food production and consumption, residual wood and timber, paper and cardboard, manures and other biologically derived organic residues from agricultural and urban activities.

The appropriate use of organic materials that will achieve a significant diversion of waste from landfill is an Authority priority. Prime examples of these types of materials include garden and food organics and paper and cardboard rejected for recycling from municipal sources, along with some organic materials from industrial and agricultural sources, as these materials can become suitable co-ingredients in recycled organics production.

However, recycled organics produced from source-separated waste (and appropriate single waste sources) has a greater chance of meeting the requirements of relevant standards than products created from mixed waste such as unsorted municipal solid waste, and therefore the market for source-separated products tends to be broader. The Authority recognises that recycled organics produced from municipal solid waste has merit for use in important applications. The scope of use can expand where producers accept an onus of proof to confirm recycled organic product quality.

Other countries with similar climatic and soil conditions to Western Australia, have demonstrated government support for the manufacture of recycled organics and for the application of recycled organics to land. However, the focus in these other jurisdictions has often been on source-separation to maximise the quality of the end product.

Certain specific recycled organics products may draw from a narrower range of organic material sources for various reasons, and in these situations the Authority supports the use of accompanying information and/or labelling, where a producer seeks to differentiate a recycled organic product on the basis of product ingredient choices.

4 Recycled Organics and Soil Improvement

The generally poor quality of many WA soils, often with low water holding capacity and low cation exchange capacity, is a good reason to apply recycled organics to land. Cation exchange capacity relates to soil storage capacity for certain plant available macro-nutrients such as calcium, magnesium, potassium and a range of micro-nutrients, such as iron, sodium, copper and zinc and manganese. The cation exchange capacity of

soil is generally determined by the amount and type of clay and organic matter found within it. Furthermore, organic materials also release other plant nutrients (such as nitrogen, phosphorous and sulfur) during the slow biodegradation of the organic matter in soil.

Apart from improving soil nutrient levels, a range of other positive soil fertility effects can result from the application of recycled organics (such as compost) to soils. The range of beneficial effects from the application of recycled organics to soils include:

- Increase in soil nutrients and accumulation of soil carbon and organic nitrogen;
- Increased soil microbial activity;
- Increased soil cation exchange capacity;
- Increase in the soil's ability to hold water;
- Improved soil aeration;
- Improved soil chemical conditions that aid plant health (by moderating pH); and
- Improved soil erosion control.

The soil improvement qualities of recycled organics, can support reduced rates of water and fertiliser application. Hence, growers can maximise benefits by adjusting fertiliser programs to account for the additional nutrients supplied by recycled organics.

Also, as a result of climate change, a reduction in rainfall for much of the southern part of Western Australia is anticipated. However, as well as supporting improved soil quality and reduce environmental impacts from land use, the application of recycled organics can also increase the resilience of plant production systems to climate change.

5 Recycled Organics and Land Constraints

There are three characteristics that should be considered when deciding what form of recycled organics should be used for which type of land use:

1. If land is used to produce food which requires high quality organic inputs to ensure low risks of pathogens being associated with and/or contaminants entering produce, then organic materials that meet applicable recycled organics standards, such as Australian Standard for composts, soil conditioners and mulches (AS4454:2003), are likely to be more suited;
2. Where land use may be sensitive to contamination from materials that exist in municipal solid waste, then organics that have been separated at source are preferred; and
3. Organics should not be applied if the likely contamination in the organics could cause the land to be contaminated.

Not all recycled organics are suitable for all applications. There is, however, a widespread need for different quality composts and soil conditioners for various applications that still meet use-specific minimum criteria. Some examples include landscaping and soil stabilisation associated with large-scale construction projects and road verges, rehabilitation of land disturbed by mining and other activities, rehabilitation of degraded or contaminated land, and as a component of the final cover for landfills, mineral tailings and long-term mine overburden stockpiles.

To assist consumers with determining the suitability of recycled organics for application

to soils, the Authority supports the regular review of recycled organics standards (such as AS4454:2003) and for product labelling and other industry-driven quality assurance initiatives that are intended to give consumers confidence that the products supplied are 'fit for purpose'.

It is the Authority's expectation that manufacturers of recycled organics products will provide sufficient information and guidance to consumers about the appropriateness of their product for the proposed application, including advice on application methods and application rates.

6 Recycled Organics Where There is a Need for High level Contamination Control

For recycled organics to be of most benefit for soil improvement, they should first be appropriately processed to reduce the risk of contamination and to stabilize the material. For example, a well-managed composting process will reduce or eliminate harmful and problematic organisms and result in an organic product suitable for use where pathogen and plant propagule control is important. During the composting process organic materials undergo controlled aerobic (high in oxygen) and thermophilic (high temperature) biological transformations to achieve pasteurisation. This is usually followed by a period of product storage to allow for compost stabilisation and subsequent compost maturation, with storage period duration often being dependent on the intended use.

When organics materials have undergone pathogen destruction processes such as pasteurisation and have met applicable standards (such as AS4454:2003), those materials should have a reduced pathogen risk, and consequently the use of biosolids and animal manures as a feedstock to processes like composting can be acceptable in appropriate circumstances.

The Authority considers recycled organics being applied to residential gardens, root crops and leaf crops intended for direct human consumption should, as a minimum undergo an appropriate level of processing and quality assurance and quality control, which should include an accepted pathogen and plant propagule destruction step such as pasteurisation.

The application of raw organic waste materials such as manures and untreated liquid organic wastes should be avoided to minimise health and environmental risk.

7 Avoiding Contamination in Recycled Organics

An important source of organics for recycling is municipal solid waste from households. Municipal solid waste carries some possibility of contamination from various problematic materials that may be disposed of with that waste. The Authority recognises that recycled organic matter destined for higher uses such as food production must be managed with possible health and environmental issues in mind.

In recognising the responsibility of producers of recycled organics to minimise risks, the Authority considers:

- The sources of a recycled organic product should be well characterised or be known to be low risk;
- The materials are likely to have low levels of contamination (often due to prior management such as source separation);
- The materials are likely to have little capacity for variance in contamination level; and
- The materials are processed in such a way as to significantly minimise pathogen and plant propagule spread (such as through the use of pasteurisation).

However, where a recycled organic product is sourced from a mixed waste (such as unsorted municipal solid waste) or from sources that are not well characterised, then the Authority considers the best approach involves:

- Determination of the properties of the material through rigorous characterisation (to determine that materials and subsequent products will meet appropriate standards such as AS4454:2003);
- Establishment of quality assurance and quality control processes to help manage the quality of organic material inputs and subsequent products; and
- Conducting ongoing sampling and testing to confirm the suitability of recycled organics inputs to establish low contamination risks.

8 Glossary

- **Aerobic** - In the presence of, or requiring, oxygen.
- **Alternative waste treatment (AWT)** – waste treatment method that involves biological and/or mechanical treatments to separate, process and/or stabilise waste materials
- **AS4454:2003** - is a document outlining the voluntary Australian Standard for Composts, Soil Conditioners, and Mulches (Please Note: Australian Standard 4454:2003 relies on state and national government to set minimum criteria for pathogens, potentially toxic elements and compounds and other problematic substances).
- **Biodegradable** - capable of being decomposed by the action of biological processes;
- **Biosolids** - organic solids or semi-solids produced by municipal sewage treatment processes. Solids become biosolids when they come out of an anaerobic digester or other treatment process and can be beneficially used. Until such solids are suitable for beneficial use they are defined as waste-water solids. The solids content in biosolids should be equal to or greater than 0.5% weight by volume (w/v). Biosolids are commonly co-composted with garden organics and/or residual wood and timber to produce a range of recycled organics products.
- **Cation exchange capacity** - A measure of the nutrient holding power of a soil or soil amendment, such as compost. Indicates a soil's ability to attract and retain plant nutrients which exist as charged molecules or ions. Cation exchange

capacity concerns positively charged ions. Cation exchange is usually stressed because most soils have a negative charge and, therefore, attract the positively charged cations typically supplied by fertilisers

- **Compost** - An organic product that has undergone controlled aerobic and thermophilic biological transformation to achieve pasteurisation and a specified level of maturity. Compost is suitable for the use as soil conditioner or mulch and can improve soil structure, water retention, aeration, erosion control, and other soil properties.
- **Compost maturation** - Final stage of composting where temperatures remain steady below 45ºC, and the compost becomes safe to use with plants due to the absence of toxins.
- **Compost stabilisation** – an intermediate stage of the composting process, where after the thermophilic stage (where pasteurisation occurs), composting materials under go further biological and chemical processes where reactivity and chemical release are significantly reduced
- **Different quality composts** – is a term used in the recycled organics industry to identify a product that does not meet unrestricted used characteristics, yet can find use in other applications.
- **Fit for purpose** – is a term that indicates that a product has been characterised and meets key criteria for specific product applications.
- **Heavy metals** - A group of metallic elements that include lead, cadmium, zinc, copper, mercury, and nickel. (See also potentially toxic elements).
- **Land application (or application to land**) - The spraying or spreading of solid, semi-solid or liquid organic products onto or into land surfaces, or their injection below the land surface.
- **Municipal solid waste (MSW)** - The solid component of the waste stream arising from all waste sources associated with human populations and relating to specific locations within a designated geographic region.
- **Pasteurisation** – Is a process where heat is used to significantly reduce living biological material such as viable plant cells, plant and animal pathogens and other organisms, which are not able to tolerate thermophilic conditions.
- **Pathogen** – A biological entity (be it microbial, viral or some other form), which can cause harm to a host organism, be it humans, animals or plants.
- **pH** - A measure of the concentration of hydrogen ions in a solution. pH is expressed as a negative exponent. Material that has a pH of 8 has ten times fewer hydrogen ions than a material with a pH of 7. The lower the pH, the more hydrogen ions are present, and the more acidic the material is. The higher the pH, the fewer hydrogen ions present, and the more basic it is. A pH of 7 is considered neutral.
- **Plant propagule** – a discrete piece of plant material that can establish a viable plant when placed under favourable conditions (these include seeds, tubers or bulbs, and other sections of plant material that can vegetatively reproduce)
- **Potentially toxic elements** - A group of elements that include all the heavy metals (such as lead, cadmium, zinc, copper, mercury, and nickel), along with all other elements that may become toxic, and include metaloids (such as Arsenic) and non-metals (such as Boron). High concentrations of potentially toxic

elements in the soil can lead to toxic effects in plants and in animals ingesting the plants and soil particles

- **Quality assurance** – Part of quality management focused on providing confidence that quality requirements will be fulfilled.
- **Recycled Organics** – The term Recycled Organics has been adopted by some government agencies within certain Australian jurisdictions as a generic term for a range of products manufactured from compostable organic materials (garden organics, food organics, residual wood and timber, biosolids and agricultural organics). Specific recycled organic (RO) products are defined in the following Australian Standards:

  1. AS 4454 (2001-draft) Composts, mulches and soil conditioners
  2. AS 3743 (1996) Potting mixes
  3. AS 4419 (1998) Soils for landscaping and garden use
  4. AS/NZS 4422 (1998) Playground surfacing: specifications, requirements and test methods

  Whilst quality standards exist, there are also many raw recycled organics products which are not defined in any standard and are completely unregulated, certain risks are associated with their use.
- **Source-separation** – Physical sorting of the waste stream into its components at the point of generation.
- **Thermophilic** – Is a process that proceeds at elevated temperatures; likely above 45ºC. Used to describe a stage of composting in which high temperatures are sustained resulting in high rates of decomposition and pasteurisation of the organic material.
- **Water hold capacity** - The amount of water held in a soil after any excess has drained away following saturation, expressed as a percentage of the oven-dry weight of the soil.

Please Note: Most of the Glossary definitions have been sourced from the 3rd edition of the Recycled Organics Dictionary and Thesaurus (Standard terminology for the recycled organics sector). Recycled Organics Unit, University of New South Wales
(URL http://www.recycledorganics.com/dictionary/downloads/dictionary_edn3.pdf)