

**Interim Standards  
for Organics  
Applied to Land**  
*Draft for  
Public Comment*

# *Statement of Intent*

## **Our Vision**

*Towards Zero Waste in Western Australia*

## **Our Goal**

*That all Western Australians live in a  
Waste Free society*

## **Our Principles**

***Principle 1: Prevention** - to avoid the  
creation of waste*

***Principle 2: Recovery** - to efficiently  
re-cover, re-treat and re-use all wastes*

***Principle 3: Disposal** - to responsibly  
manage waste into the environment*

**INTERIM STANDARDS  
FOR ORGANICS  
APPLIED TO LAND**

*Draft for Public Comment*

Western Australian  
Waste Management Board

JUNE 2006



## CONTENTS

1.0 Introduction	1
2.0 Purpose	1
3.0 Scope	1
4.0 Appropriate application of organics to land	1
4.1 Sites suitable for organics	2
4.2 Regulatory requirements	2
5.0 Standards for organics applied to land	3
5.1 Contaminant thresholds for unrestricted use	3
5.2 Contaminant thresholds and application rates for restricted uses	5
Appendix 1 – Summary table of contaminant thresholds	7

## 1.0 INTRODUCTION

It has long been recognised that organic matter is essential for maintaining the health of productive land. Over time, soil organic matter (SOM) can become depleted, through plant take-up and the effects of erosion and leaching. Recycling organic materials from waste and applying it to productive land, be it home gardens or farmland, is a way of turning a potentially polluting waste into a benefit to both the environment and to people. The WA Government believes that organic material should be recycled wherever possible and used to replenish the organic soil in land.

The WA Government acknowledges that there are some community concerns about how organic wastes have been collected, processed and applied to land in the past. This interim Standard is a performance-based Standard that sets a framework for applying organic wastes to land that will ensure that the benefits of increasing SOM can be achieved without compromising the health of humans, livestock or the environment.

This interim Standard is based on the best available information. It is intended that this Standard will be reviewed and updated as better information becomes available.

## 2.0 PURPOSE

The purpose of this document is to set quality standards for organic materials being applied to land as a soil conditioner, fertiliser or mulch. The Standard is aimed at producers and users of recycled organic products. The Standard may also be useful to regulators by providing information to support licensing and enforcement activities. However, this Standard is voluntary and does not constitute a regulation.

## 3.0 SCOPE

This Standard applies to all biodegradable organic materials being applied to land that are not already covered by existing guidelines or Standards.

Types of materials to which this Standard applies include; compost, MBT organic outputs, manures, agricultural wastes, etc.

Materials to which this Standard does not apply include biosolids, human effluent, soil deemed to be contaminated soil. Guidelines exist for these materials<sup>1</sup>.

## 4.0 APPROPRIATE APPLICATION OF ORGANICS TO LAND

The benefits of soil organic matter in productive land are well studied and documented. In brief, extensive research and practical experience have shown that the appropriate application of organic material to land:

- *Saves water through better water retention;*
- *Saves fertilisers through decreased mobilisation and leaching of nutrients;*
- *Increases soil health through increasing microbial activity in the soil;*
- *Decreases erosion of topsoil;*
- *Decreases pollution of nearby ground and surface waters through decreased runoff of chemical fertilisers; and*
- *Improves plant yield and plant health.*

<sup>1</sup> Government of Western Australia (2002) *Western Australian Guidelines for Direct Land Application of Biosolids and Biosolids Products*, Dept Environmental Protection, Water and Rivers Commission and Dept Health  
Government of Western Australia (2003) *Assessment Levels for Soil, Sediment and Water: Version 3*, Department of Environment.

To maximise the benefits, organic material should be treated in a pasteurising process, such as composting or enclosed digestion, prior to application to land. Unprocessed organic wastes can be a source of weed seeds, plant diseases and pathogens. Prior to applying organics materials, landowners should reassure themselves about the source of the material and how it has been treated.

These Standards are specifically aimed at the application of organic material to “productive” land, or land that has already been disturbed by human activity. In general, exogenous organic material should not be applied to undisturbed bushland, as this would upset the natural balance of the ecosystem.

#### 4.1 SITES SUITABLE FOR ORGANICS

A range of site-specific factors will determine whether it is appropriate to apply organic material to a site. Factors to be considered include:

- a) Potential to adversely impact on surface water or groundwater;
- b) Potential to adversely impact on natural ecosystems; and
- c) Activities conducted on the site.

Sites where organic materials are generally applied with beneficial effects include:

- *Home gardens*
- *Horticulture*
- *Broad acre agriculture*
- *Mine site rehabilitation*
- *Landfill site rehabilitation (vegetation regrowth and LFG abatement)*
- *Landscaping*
- *Roadside verges*
- *Erosion-affected farmland*
- *Salt-affected farmland*
- *Playing fields and sports grounds.*

#### 4.2 REGULATORY REQUIREMENTS

In some instances, approval may be required from either the Department of Environment or the Department of Health for transport and application of certain wastes to land. Raw animal manures and other unprocessed organic waste are of primary concern. Any premises or site where over 1000 tonnes of waste is stored, processed or applied to land in any one year is required to have a licence from the Department of Environment<sup>2</sup>. Animal effluents and carcasses are a Controlled Waste, and a licence to transport and treat such wastes may be required for bulk quantities<sup>3</sup>. The Department of Health is currently working with the Department of Agriculture to develop guidelines for the application of raw poultry manure to land. Application of raw poultry manure is banned in some areas at certain times of the year to control stable fly infestations. Landowners should contact the Department of Health and their local Council prior to applying bulk raw poultry manure to land.

<sup>2</sup> Environment Protection Regulations 1987, *Schedule 1: Prescribed Premises*

<sup>3</sup> Environmental Protection (Controlled Waste) Regulations 2004, *Schedule 1: Controlled Waste*

## 5.0 STANDARDS FOR ORGANICS APPLIED TO LAND

This Standard is designed to be consistent with existing WA regulation and guidelines. Its role is to provide guidance for those materials not already covered by existing guidelines. This document does not supersede, but should be read in conjunction with, existing regulations or guidelines. The threshold values recommended below are consistent with the WA Biosolids Guidelines<sup>4</sup> and the Environmental Investigation Levels (EILs) listed in the WA guidelines for contaminated soil<sup>5</sup>. Where a threshold value is not given below, reference should be made to the Commonwealth Department of Environment and Heritage National Chemical Reference Guide (<http://www.deh.gov.au/chemicals-guide>).

### 5.1 CONTAMINANT THRESHOLDS FOR UNRESTRICTED USE

Examples of sites where the thresholds in Table 1 should be met include home gardens, public parks, sensitive commercial uses (child care centres, schools, public playing fields). Where there is a risk of exposure to the material by sensitive members of the public, i.e. children, elderly, people in poor health, then the organic material being applied should meet the Standards for unrestricted use.

The contaminant thresholds used in this interim Standard are based on the best available information. The numerical values are consistent with the unrestricted use thresholds listed in the WA Biosolids Guidelines. For additional contaminants not covered by the Biosolids Guidelines, values have been derived from the WA guidelines for contaminated soils and AS4454-2003<sup>6</sup>.

**Table 1: C1 thresholds - allowable limits for unrestricted uses**

Parameter		Maximum C1 concentration	Units
<b>Total Petroleum Hydrocarbons (TPH)</b>	C6-C9	100 <sup>5</sup>	mg/kg dry wt
	C10-C14	500 <sup>5</sup>	mg/kg dry wt
	C15-C28	1000 <sup>5</sup>	mg/kg dry wt
	C16-C35 (aromatics)	90 <sup>5</sup>	mg/kg dry wt
	C16-C35 (aliphatics)	5600 <sup>5</sup>	mg/kg dry wt
	>C35	56000 <sup>5</sup>	mg/kg dry wt
<b>Monocyclic Aromatic Hydrocarbons (MAHs)</b>	Benzene	1 <sup>5</sup>	mg/kg dry wt
	Toluene	3 <sup>5</sup>	mg/kg dry wt
	Ethylbenzene	5 <sup>5</sup>	mg/kg dry wt
	Xylenes	5 <sup>5</sup>	mg/kg dry wt

(continued over page...)

<sup>4</sup> Government of Western Australia (2002) *Western Australian Guidelines for Direct Land Application of Biosolids and Biosolids Products*, Dept Environmental Protection, Water and Rivers Commission and Dept Health

<sup>5</sup> Government of Western Australia (2003) *Assessment Levels for Soil, Sediment and Water: Version 3*, Department of Environment.

<sup>6</sup> Standards Australia (2003) *Australian Standard: Composts, soil conditioners and mulches, AS4454-2003*

Table 1. (cont.)

Parameter		Maximum C1 concentration	Units
<b>Metals / metalloids</b>	Antimony	20 <sup>5</sup>	mg/kg dry wt
	Arsenic	20 <sup>4</sup>	mg/kg dry wt
	Barium	400 <sup>5</sup>	mg/kg dry wt
	Boron	100 <sup>6</sup>	mg/kg dry wt
	Cadmium	3 <sup>4</sup>	mg/kg dry wt
	Chromium – total	100 <sup>4</sup>	mg/kg dry wt
	Cobalt	50 <sup>5</sup>	mg/kg dry wt
	Copper	100 <sup>4</sup>	mg/kg dry wt
	Lead	150 <sup>4</sup>	mg/kg dry wt
	Manganese	500 <sup>5</sup>	mg/kg dry wt
	Mercury	1 <sup>4</sup>	mg/kg dry wt
	Molybdenum	40 <sup>5</sup>	mg/kg dry wt
	Nickel	60 <sup>4</sup>	mg/kg dry wt
	Selenium	3 <sup>4</sup>	mg/kg dry wt
	Tin	50 <sup>5</sup>	mg/kg dry wt
	Zinc	200 <sup>4</sup>	mg/kg dry wt
<b>Phenols</b>	Total Phenol	1 <sup>5</sup>	mg/kg dry wt
<b>Pesticides</b>	DDT & degradates (total)	0.5 <sup>4</sup>	mg/kg dry wt
	Individual Organochlorine pesticides	0.02 <sup>4</sup>	mg/kg dry wt
	Dieldrin	0.02 <sup>4</sup>	mg/kg dry wt
	Heptachlor	0.02 <sup>4</sup>	mg/kg dry wt
	Chlordane	0.02 <sup>4</sup>	mg/kg dry wt
<b>PCBs</b>	Total PCBs	0.3 <sup>4</sup>	mg/kg dry wt
<b>Polycyclic Aromatic Hydrocarbons (PAH)</b>	Total PAH	20 <sup>5</sup>	mg/kg dry wt
	Anthracene	10 <sup>5</sup>	mg/kg dry wt
	Benzo(a)pyrene	1 <sup>5</sup>	mg/kg dry wt
	Fluoranthene	10 <sup>5</sup>	mg/kg dry wt
	Naphthalene	5 <sup>5</sup>	mg/kg dry wt
	Phenanthrene	10 <sup>5</sup>	mg/kg dry wt
	Pyrene	10 <sup>5</sup>	mg/kg dry wt
<b>Pathogens</b>	E. Coli	< 100 <sup>4</sup>	counts per 1g of dry product
	Salmonella	<1 <sup>4</sup>	counts per 50g of dry product
<b>Other</b>	Cyanides (complexed)	50 <sup>5</sup>	mg/kg dry wt
	Cyanides (free)	50 <sup>5</sup>	mg/kg dry wt
	Sulphate	2000 <sup>6</sup>	mg/kg dry wt
	Physical contaminants	0.2	wt% dry wt
	pH	5.0-7.5 <sup>6</sup>	
<b>Adsorbable Halogenated Organics (AOX)</b>	Total AOX	500 <sup>7</sup>	mg/kg dry wt
<b>Linear alkylbenzene sulphonates (LAS)</b>	Total LAS	2600 <sup>7</sup>	mg/kg dry wt
<b>Di(2-ethylhexyl) phthalate (DEHP)</b>	Total DEHP	100 <sup>7</sup>	mg/kg dry wt
<b>Polychlorinated dibenzo-dioxins and -furans (PCDD/Fs)</b>	Total PCDD/F	100 <sup>7</sup>	ng/kg TEQ

<sup>7</sup> ICON / IC Consultants Ltd (2001) *Pollutants in Urban Waste Water and Sewage Sludge*, European Commission Directorate-General Environment.

## 5.2 CONTAMINANT THRESHOLDS AND APPLICATION RATES FOR RESTRICTED USES

Both the contaminated sites guidelines and biosolids guidelines contain higher threshold values for most contaminants where the chance of exposure to the material by sensitive members of the public is small. Higher contaminant levels are permitted for “commercial” end uses, such as horticulture / agriculture, site remediation, etc. The table below is produced using information from the Biosolids guidelines, the WA contaminated sites guidelines and AS4454-2003.

*Table 2. C2 thresholds - allowable limits for restricted uses*

Parameter		Maximum C2 concentration	Units
<b>Total Petroleum Hydrocarbons (TPH)</b>	C6-C9	100 <sup>5</sup>	mg/kg dry wt
	C10-C14	500 <sup>5</sup>	mg/kg dry wt
	C15-C28	1000 <sup>5</sup>	mg/kg dry wt
	C16-C35 (aromatics)	90 <sup>5</sup>	mg/kg dry wt
	C16-C35 (aliphatics)	5600 <sup>5</sup>	mg/kg dry wt
	>C35	56000 <sup>5</sup>	mg/kg dry wt
<b>Monocyclic Aromatic Hydrocarbons (MAHs)</b>	Benzene	1 <sup>5</sup>	mg/kg dry wt
	Toluene	3 <sup>5</sup>	mg/kg dry wt
	Ethylbenzene	5 <sup>5</sup>	mg/kg dry wt
	Xylenes	5 <sup>5</sup>	mg/kg dry wt
<b>Metals / metalloids</b>	Antimony	20 <sup>5</sup>	mg/kg dry wt
	Arsenic	60 <sup>4</sup>	mg/kg dry wt
	Barium	400 <sup>5</sup>	mg/kg dry wt
	Boron	200 <sup>6</sup>	mg/kg dry wt
	Cadmium	20 <sup>4</sup>	mg/kg dry wt
	Chromium – total	500 <sup>4</sup>	mg/kg dry wt
	Cobalt	50 <sup>5</sup>	mg/kg dry wt
	Copper	2500 <sup>4</sup>	mg/kg dry wt
	Lead	420 <sup>4</sup>	mg/kg dry wt
	Manganese	500 <sup>5</sup>	mg/kg dry wt
	Mercury	15 <sup>4</sup>	mg/kg dry wt
	Molybdenum	40 <sup>5</sup>	mg/kg dry wt
	Nickel	270 <sup>4</sup>	mg/kg dry wt
	Selenium	50 <sup>4</sup>	mg/kg dry wt
	Tin	50 <sup>5</sup>	mg/kg dry wt
	Zinc	2500 <sup>4</sup>	mg/kg dry wt
<b>Phenols</b>	Total Phenol	1 <sup>4</sup>	mg/kg dry wt
<b>Pesticides</b>	DDT & Derivatives (total)	1 <sup>4</sup>	mg/kg dry wt
	Organochlorine pesticides	0.5 <sup>4</sup>	mg/kg dry wt
	Dieldrin	0.5 <sup>4</sup>	mg/kg dry wt
	Heptachlor	0.5 <sup>4</sup>	mg/kg dry wt
	Chlordane	0.5 <sup>4</sup>	mg/kg dry wt
<b>PCBs</b>	PCBs	0.5 <sup>4</sup>	mg/kg dry wt

Table 2. C2 thresholds - allowable limits for restricted uses

Parameter		Maximum C2 concentration	Units
<b>Polycyclic Aromatic Hydrocarbons (PAH)</b>	Total PAH	20 <sup>5</sup>	mg/kg dry wt
	Anthracene	10 <sup>5</sup>	mg/kg dry wt
	Benzo(a)pyrene	1 <sup>5</sup>	mg/kg dry wt
	Fluoranthene	10 <sup>5</sup>	mg/kg dry wt
	Naphthalene	5 <sup>5</sup>	mg/kg dry wt
	Phenanthrene	10 <sup>5</sup>	mg/kg dry wt
	Pyrene	10 <sup>5</sup>	mg/kg dry wt
<b>Pathogens</b>	Thermo-tolerant coliforms	< 1000 <sup>4</sup>	counts per 1g of dry product
	Salmonella	<10 <sup>4</sup>	counts per 50 g of dry product
<b>Other</b>	Cyanides (complexed)	50 <sup>5</sup>	mg/kg dry wt
	Cyanides (free)	50 <sup>5</sup>	mg/kg dry wt
	Sulphate	2000 <sup>6</sup>	mg/kg dry wt
	Physical contaminants	0.5 <sup>6</sup>	wt% dry wt
	pH	5.0-7.5 <sup>6</sup>	

Where an organic material being applied to land as a soil ameliorant does not meeting the Standard for unrestricted use, the amount of material applied should be limited to ensure that the final contaminant level in the soil does not exceed the Environmental Investigation Limits for contaminated soils, i.e. to ensure that the land does not (technically) become a contaminated site as a result of applying too much of the organic material.

Box 1 presents a methodology for estimating appropriate application rates for material that meets C2 thresholds and is applied to land for "commercial" purposes. It should be noted that testing of both the soil and the organic material will be required to calculate the appropriate application rate.

#### Box 1: Estimating final contaminant concentration or maximum application rates

##### Information required:

$\rho_{soil}$  = Soil density kg/m<sup>3</sup>

$\rho_{RO}$  = Recycled organic product density kg/m<sup>3</sup>

$C_{soil}$  = Contaminant concentration in soil (pre-application) mg/kg

$C_{RO}$  = Contaminant concentration in recycled organic product (pre-application) mg/kg

$C_{final}$  = Final contaminant concentration in soil after application and integration mg/kg

$D$  = Depth of integration of product into the soil (typical value = 10 cm = 0.1m)

$Vol$  = Proposed volume application rate (m<sup>3</sup> product per m<sup>2</sup> land area)

Estimating **final concentration of a contaminant** for a given application rate:

$$C_{final} = \frac{D * \rho_{soil} * C_{soil} + Vol * \rho_{RO} * C_{RO}}{D * \rho_{soil} + Vol * \rho_{RO}}$$

Estimating the **maximum application rate**:

$$Vol = \frac{D * \rho_{soil} (C_{soil} - C_{final})}{C_{final} * \rho_{RO} (C_{final} - C_{RO})}$$

## APPENDIX 1 – SUMMARY TABLE OF CONTAMINANT THRESHOLDS

Parameter		Maximum C1 concentration	Maximum C2 concentration	Units
<b>Total Petroleum Hydrocarbons (TPH)</b>	C6-C9	100	100	mg/kg dry wt
	C10-C14	500	500	mg/kg dry wt
	C15-C28	1000	1000	mg/kg dry wt
	C16-C35 (aromatics)	90	90	mg/kg dry wt
	C16-C35 (aliphatics)	5600	5600	mg/kg dry wt
	>C35	56000	56000	mg/kg dry wt
<b>Monocyclic Aromatic Hydrocarbons (MAHs)</b>	Benzene	1	1	mg/kg dry wt
	Toluene	3	3	mg/kg dry wt
	Ethylbenzene	5	5	mg/kg dry wt
	Xylenes	5	5	mg/kg dry wt
<b>Metals / metalloids</b>	Antimony	20	20	mg/kg dry wt
	Arsenic	20	60	mg/kg dry wt
	Barium	400	400	mg/kg dry wt
	Boron	100	200	mg/kg dry wt
	Cadmium	3	20	mg/kg dry wt
	Chromium – total	100	500	mg/kg dry wt
	Cobalt	50	50	mg/kg dry wt
	Copper	100	2500	mg/kg dry wt
	Lead	150	420	mg/kg dry wt
	Manganese	500	500	mg/kg dry wt
	Mercury	1	15	mg/kg dry wt
	Molybdenum	40	40	mg/kg dry wt
	Nickel	60	270	mg/kg dry wt
	Selenium	3	50	mg/kg dry wt
	Tin	50	50	mg/kg dry wt
	Zinc	200	2500	mg/kg dry wt
<b>Phenols</b>	Total Phenol	1	1	mg/kg dry wt
<b>Pesticides</b>	DDT & Derivatives (total)	0.5	1	mg/kg dry wt
	Organochlorine pesticides	0.02	0.5	mg/kg dry wt
	Dieldrin	0.02	0.5	mg/kg dry wt
	Heptachlor	0.02	0.5	mg/kg dry wt
	Chlordane	0.02	0.5	mg/kg dry wt
<b>PCBs</b>	PCBs	0.3	0.5	mg/kg dry wt
<b>Polycyclic Aromatic Hydrocarbons (PAH)</b>	Total PAH	20	20	mg/kg dry wt
	Anthracene	10	10	mg/kg dry wt
	Benzo(a)pyrene	1	1	mg/kg dry wt
	Fluoranthene	10	10	mg/kg dry wt
	Naphthalene	5	5	mg/kg dry wt
	Phenanthrene	10	10	mg/kg dry wt
	Pyrene	10	10	mg/kg dry wt

## APPENDIX 1 (CONT.)

Parameter		Maximum C1 concentration	Maximum C2 concentration	Units
Pathogens	E. Coli	< 100	< 1000	counts per 1g of dry product
	Salmonella	<1	<10	counts per 50g of dry product
Other	Cyanides (complexed)	50	50	mg/kg dry wt
	Cyanides (free)	50	50	mg/kg dry wt
	Sulphate	2000	2000	mg/kg dry wt
	Physical contaminants	0.2	0.5	wt% dry wt
	pH	5.0-7.5	5.0-7.5	-
<b>Adsorbable Halogenated Organics (AOX)</b>	Total AOX	500	-	mg/kg dry wt
<b>Linear alkylbenzene sulphonates (LAS)</b>	Total LAS	2600	-	mg/kg dry wt
<b>Di(2-ethylhexyl) phthalate (DEHP)</b>	Total DEHP	100	-	mg/kg dry wt
<b>Polychlorinated dibenzo-dioxins and -furans (PCDD/Fs)</b>	Total PCDD/F	100	-	ng/kg TEQ