

**INFORMATION BULLETIN No. 105**

*Environmental Management and Pollution Control (Waste Management) Regulations 2000*

**CLASSIFICATION AND MANAGEMENT OF CONTAMINATED  
SOIL FOR DISPOSAL  
November 2010**

## 1. Introduction

This bulletin defines the criteria used by the Environment Protection Authority (EPA) for the classification of contaminated soil that requires treatment and/or off-site disposal, and outlines the management of each classification in accordance with the *Environmental Management and Pollution Control (Waste Management) Regulations 2000* (the 'Regulations'). Although criteria set out in this bulletin have been determined for soil, they may be applicable to the classification of other solid waste material on an 'as needs basis' (see section 2.2.3).

This bulletin is designed to be used by waste producers, consultants, local government, waste transporters and landfill operators for the purposes of determining whether potentially contaminated soil is suitable to be disposed of at a landfill, in assessing alternative options for contaminated soil management and outlining how to make an application for disposal to the EPA.

The EPA encourages effective waste management by promoting on-site remediation, treatment and/or re-use, where appropriate, as the preferred options for dealing with contaminated soil. In accordance with the hierarchy of waste management options, direct disposal of soil to landfills should be used only when no other approved method of dealing with the contaminated soil is available. For further details on these waste management principles, see Section 1.2 of the *Landfill Sustainability Guide 2004* (DPIWE, 2004).

Treatment, re-use options and disposal of soil will be assessed and approved on a case by case basis by the Director, EPA ('the Director') or the Director's delegate.

## 2. Classification

The EPA uses 4 categories to classify contaminated soil: (Level 1) *Fill Material*; (Level 2) *Low Level Contaminated Soil*; (Level 3) *Contaminated Soil*; and (Level 4) *Contaminated Soil for Remediation*, Table 1 below summarises each classification. Please note, for the purposes of this Bulletin soil also includes dredge spoil (refer Section 2.2.5).

Criteria in Table 2 below shows the maximum total concentration, and the leachable concentration values for specific pollutants that are used as a guide to classify soil for off-site disposal. For soils classified as potentially acid sulfate soils (PASS), the criteria in Table 2 do not apply. Determination of risk associated with these soils should be conducted in line with the *Tasmanian Acid Sulfate Soil Management Guidelines* published by Department of Primary Industries, Parks, Water and Environment (refer Section 2.2.5).

Potentially contaminated soils are classified by analysis of representative samples of the soil and comparison of the results to the chemical concentrations given in Table 2.

It is not necessary to sample for all contaminants listed in Table 2 for soil classification. However, all contaminants that are reasonably likely to be present in the soil above background levels should be included in the sample analysis.

Generally, where a leachable concentration is prescribed in Table 2 that value takes precedence over the total concentration and is used as the sole determinant of final classification for disposal (see section 2.2.4 for further information).

Please note that these values are **not** to be interpreted as clean up target levels for certain land uses.

**Table 1.** Summary of the classification process

	<b>Classification</b> (with reference to Table 2)	<b>Controlled Waste</b> <sup>1</sup>	<b>Comments</b>
<b>Fill Material</b> <sup>2</sup> <b>(Level 1)</b>	Soil that exhibits levels of contaminants below the limits defined under <i>Fill Material</i> in Table 2.	Unlikely	Soil classified as <i>Fill Material</i> can still be a 'pollutant' under the <i>Environmental Management and Pollution Control Act 1994</i> and needs to be responsibly managed.
<b>Low Level Contaminated Soil</b> <b>(Level 2)</b>	Soil that exhibits levels of contaminants above the limits defined under <i>Fill Material</i> but below the limits defined under <i>Low Level Contaminated Soil</i> in Table 2.	Likely	Where leachable concentrations have not been prescribed, maximum total concentrations will be used to classify the soil.
<b>Contaminated Soil</b> <b>(Level 3)</b>	Soil that exhibits levels of contaminants above the limits defined under <i>Low Level Contaminated Soil</i> but below the limits defined under <i>Contaminated Soil</i> in Table 2.	Yes	Where leachable concentrations have not been prescribed, maximum total concentrations will be used to classify the soil.
<b>Contaminated Soil for Remediation</b> <b>(Level 4)</b>	Soil that exhibits levels of contaminants above the limits defined under <i>Contaminated Soil</i> in Table 2 (regardless of the maximum total concentrations) is generally <b>not</b> considered acceptable for off-site disposal without prior treatment.	Yes	Soil that contains contaminants that do not have criteria for leachable concentrations (e.g. petroleum hydrocarbons), and the levels of contaminants exceed the maximum total concentrations listed in <i>Contaminated Soil</i> , are generally classified as <i>Contaminated Soil for Remediation</i> .

<sup>1</sup> Controlled Waste as defined in the *Environmental Management and Pollution Control Act 1994*.

<sup>2</sup> Criteria for *Fill Material* above are the limits set by the Director for the purposes of R.10(2)(a)(ii) in the *Regulations*.

**Table 2.** Maximum total concentration and leachable concentration values permitted for waste classification

CONTAMINANT	FILL MATERIAL	LOW LEVEL CONTAMINATED SOIL		CONTAMINATED SOIL	
	Level 1	Level 2		Level 3	
	Maximum total concentration mg/kg dry weight	Maximum total concentration mg/kg dry weight	Maximum (TCLP) leachable concentration (pH 5.0 extract) mg/L	Maximum total concentration mg/kg dry weight	Maximum (TCLP) leachable concentration (pH 5.0 extract) mg/L
Arsenic	20	200	0.5	750	5
Barium	300	3,000	35	30,000	350
Beryllium	2	40	1	400	4
Cadmium	3	40	0.1	400	0.5
Chromium (total)	50	500	0.5	5,000	5
Chromium (VI)	1	200	NA	2,000	NA
Copper	100	2,000	10	7,500	100
Cobalt	100	200	NA	1,000	NA
Lead	300	1,200	0.5	3,000	5
Manganese	500	5,000	25	25,000	250
Mercury (total)	1	30	0.01	110	0.1
Molybdenum	10	1,000	2.5	4,000	20
Nickel	60	600	1	3,000	8
Selenium	10	50	0.1	200	1
Silver	10	180	0.5	720	5
Tin (total)	50	500	NA	900	NA
Zinc	200	14,000	25	50,000	250
Tributyltin (reported as Sn)	0.005	0.07	0.05	0.7	0.5
Aldrin + Dieldrin	2	20	0.003	50	0.03
DDT + DDD + DDE	2	200	0.2	1,000	2
Benzo(a)pyrene	0.08	2	0.0005	20	0.005
Phenols	25	500	14	2,000	50
C <sub>6</sub> -C <sub>9</sub> petroleum hydrocarbons	65	650	NA	1,000	NA
C <sub>10</sub> -C <sub>36</sub> petroleum hydrocarbons	1,000	5,000	NA	10,000	NA
Polycyclic aromatic hydrocarbons (total)	20	40	NA	200	NA
Polychlorinated biphenyls (PCBs)	2	20	0.001	50	0.002
Benzene	1	5	0.05	50	0.5
Toluene	1	100	1.4	1,000	14
Ethylbenzene	3	100	3	1,080	30
Xylene (total)	14	180	5	1,800	50
Cyanide (total)	32	1,000	1	2,500	10
Fluoride	300	3,000	15	10,000	150

## 2.1 Controlled waste

Contaminated soil may or may not be a controlled waste as defined in the *National Environment Protection Measure for the Movement of Controlled Waste between States and Territories* (NEPC, 1998) and the *Environmental Management and Pollution Control Act 1994* (EMPCA) and as further prescribed in the Regulations.

Soil and other material reasonably suspected to be a controlled waste must be sampled and analysed to determine whether it is a controlled waste before that waste can be removed from the site (R.6(3) of the Regulations). This generally includes, but is not limited to soil that is from a site that is used, or has been used, for an activity listed in Table 3 and is likely to be contaminated.

Special provisions apply to the management of controlled waste, as detailed in section 3 of this bulletin. As a general rule all *Low Level Contaminated Soil*, *Contaminated Soil* and *Contaminated Soil for Remediation* that is intended for treatment, re-use or disposal should be managed as controlled waste unless sampling proves otherwise.

## 2.2 Sampling and analysis

The waste producer is responsible for organising the sampling and analysis of potentially contaminated soil. It is recommended that a suitably qualified person perform all sampling. Additionally, all soil sampling should be conducted in accordance with the relevant Australian Standards, which include:

- AS 4482.1-2005 Guide to the investigation and sampling of potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds
- AS 4482.2-1999 Guide to the sampling and investigation of potentially contaminated soil. Part 2: Volatile substances
- In the case of potentially Acid Sulfate Soils, the *Tasmanian Acid Sulfate Soil Management Guidelines* published by Department of Primary Industries, Parks, Water and Environment should be consulted.

*In-situ* sampling is generally not recommended for classification of soils that are to be excavated later for disposal. However, if this method of classification is unavoidable, then the Australian Standards listed above should be adhered to in order to obtain a representative number of samples.

All sample analyses must be conducted by a laboratory accredited by the National Association of Testing Authorities for the testing procedures undertaken ('NATA accredited'), or by a laboratory approved by the Director for the test.

### 2.2.1 Sampling density

The number of samples required for adequate classification of soil is dependent on the volume of material, the estimated standard deviation of contamination concentrations, and the estimated average concentration. However, as a general rule for homogeneous stockpiled soil one sample should be taken every 25 m<sup>3</sup>.

### 2.2.2 Composite sampling

Generally, composite samples are not recommended for classification of soil for disposal. However, composite sampling may assist an environmental program by reducing sampling costs that could be spent elsewhere in the program. Composite sampling is only acceptable for stockpiled soil containing non-volatile contaminants and is **not** an acceptable method for sampling of volatiles such as some hydrocarbon-contaminated soil.

All composite sampling should be undertaken by a suitably qualified person and in accordance with the Australian Standards AS 4482.1-2005 and the National Environmental Health Forum Monograph, Soil Series No. 3 – *Composite Sampling*, 1996.

### 2.2.3 Sampling materials other than soil

For materials such as contaminated construction materials there are no guidelines available for determining the representative number of samples for testing. Surface scrapings or bored samples may be required to classify the material. The person undertaking the sampling, preferably an environmental consultant should develop a sampling strategy and density that adequately classifies the material.

### 2.2.4 Leachable fraction

In order to classify soil for disposal, the leachable concentrations of metals and relevant/appropriate organics should be undertaken. Where a leachable concentration is prescribed in Table 2, generally that value will take precedence over the total concentration value and will be used as the sole determinant of final classification for disposal.

The most appropriate procedure for determining the leachable fraction should be determined in consultation with an environmental consultant, the EPA and the analytical laboratory performing the procedures and with consideration of the waste management goals that are to be achieved. Accepted methods for determining leachable fractions are detailed below:

The Toxicity Characteristic Leaching Procedure (TCLP), in accordance with USEPA Method 1311 – SW 846, is used to simulate the leaching of contaminants into groundwater under conditions found in solid waste landfills.

The Multiple Extraction Procedure (MEP), in accordance with USEPA MEP Method 1320 – SW 846, is used to simulate leaching from repetitive acid washings and is a more rigorous test of the buffering capacity of the soil than the TCLP. In some circumstances (e.g. for remediation technologies that involve solidification with lime based agents), the MEP would be a more suitable test to determine the long-term stability of soil.

There is also an Australian Standard for the preparation of leachates: AS 4439-1997 (parts 1 to 3), *Wastes, Sediments and Contaminated Soils: Preparation of Leachates*.

### 2.2.5 Acid sulfate soils

Potentially Acid Sulfate Soils (PASS) underlie parts of Tasmania's coastline and may also underlie inland areas such as peat bogs, salt lakes and wetlands. They are natural soils that contain sulfides (mostly iron sulfides). In an undisturbed and waterlogged state these soils are harmless, but when disturbed, (such as dredging estuaries etc) a process of oxidation can produce sulfuric acid in large quantities. As the acid moves through the soil profile it may 'mobilise' or cause the release of metals and other toxins from the soil, which eventually flow into surrounding waterways. Acid Sulfate Soil (ASS) runoff therefore has significant environmental, economic and social impacts. The *Tasmanian Acid Sulfate Soil Management Guidelines* provide guidance on the level of management required to minimize the risk associated with ASS. The *Guidelines* also provide criteria to characterise acid sulfate soils. The criteria in Table 2 of this Bulletin do not apply to any soils classified as PASS. Such soils should be managed as potentially acid sulfate soils. Acid Sulfate Soil predictive mapping is available for Tasmania at [www.thelist.tas.gov.au](http://www.thelist.tas.gov.au). For further information regarding ASS, instructions on how to utilise the predictive mapping, or obtain a copy of the *Guidelines*, refer to:

<http://www.dpiw.tas.gov.au/inter/nsf/WebPages/SWEN-83NVBG?open>

### 3. Re-use or disposal - waste management plan

A Waste Management Plan should be developed following the classification of soil to determine whether the soil can be remediated or re-used instead of, or prior to, disposal (see Figure 1, which summaries this process, and section 5 which details the information required).

It should be noted that a controlled waste will not be suitable for re-use in sensitive environments such as wetlands, agricultural areas or residential sites.

### 4. Disposal of contaminated material

Classification of soil (as defined in Table 2) will determine what category of landfill the soil can be disposed of in accordance with the landfill operator's permit conditions.

If disposal is the only viable management option, all possible efforts should be made to reduce the volume of material requiring disposal by minimising excavated volumes and segregating and sorting of wastes prior to disposal.

Waste Type	Category A landfill - Solid Inert Landfill	Category B landfill - Putrescible Landfill	Category C landfill - Secure landfill
Level 1 – <i>Fill Material</i>	✓	✓	✓
Level 2 – <i>Low Level Contaminated Soil</i>	✗	✓	✓
Level 3 - <i>Contaminated Soil</i>	✗	✗	✓
Level 4 - <i>Contaminated Soil for Remediation</i>	✗	✗	✗

See the *Landfill Sustainability Guide 2004* (DPIWE, 2004) for further details.

#### 4.1 Disposal of fill material (Level 1)

4.1.1 The off-site disposal of *Fill Material* is not restricted and may be used as cover in landfills.

4.1.2 The definition of *Fill Material* includes inert construction material, soils and rocks, which have not been contaminated with any substance, and stable asphalt or bituminous pavement material, all of which are generally considered inert for use as 'fill'. However, soil and other material classified as *Fill Material* can still be a 'pollutant' under EMPCA and must be responsibly managed.

#### Re-use of fill material

4.1.3 The re-use of *Fill Material* must not result in environmental harm. *Fill Material* might contain contaminants above background levels and therefore may not be suitable for all uses, e.g. for sensitive uses such as child play areas, residential uses, or in protected nature reserves

4.1.4 In some cases, unwanted 'waste' soils or rock imported from another site to be used as fill may naturally contain contaminants at levels that are higher than *Fill Material* criteria due to regional geological characteristics. This material would be regarded as unsuitable for re-use if it posed a risk to human health or the environment in its new locality.

The risk posed by importation of materials with naturally elevated levels of certain contaminants should be assessed by an environmental consultant and the evaluation and supporting information submitted to the Director for approval to import the material.

#### **4.2 Disposal of low level contaminated soil (Level 2)**

**4.2.1** *Low Level Contaminated Soil* may, in some cases, be suitable for disposal as intermediate landfill cover at nominated municipal landfills and in accordance with the landfill permit conditions. Please note that the landfill operators should refuse soil that has not been classified and approved if there is likelihood that acceptance of the material may result in a breach of the landfill operator's permit conditions.

**4.2.2** Approval for the disposal of *Low Level Contaminated Soil* must be sought from the landfill operator and the Director. The information detailed in section 5 of this bulletin must be supplied to the Director when making an application for approval to dispose of a waste.

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#### **Landfills that may accept *Low Level Contaminated Soil* (Level 2):**

Council / Authority	Landfill
Burnie City Council	Mooreville Road Waste Depot
Circular Head Council	Port Latta Waste Depot
Dulverton Regional Waste Management Authority (DRWMA)	Dulverton Regional Waste Depot
Launceston City Council	Remount Rd Waste Depot
Copping Refuse Disposal Site Joint Authority	Copping Waste Depot

#### **Re-use of low level contaminated soil**

**4.2.3** *Low Level Contaminated Soil* might be suitable for re-use as fill or levelling material on an industrial or commercial site, but will be judged on a case by case basis. In determining whether *Low Level Contaminated Soil* may be used as fill, an assessment of the environmental and human health hazards associated with the disposal option must be conducted by a suitably qualified environmental consultant. If the soil is classified as a controlled waste, approval must be sought from the Director as detailed in section 5.

#### **4.3 Disposal of contaminated soil (Level 3)**

**4.3.1** *Contaminated Soil* can only be disposed of at landfills that have the appropriate permit conditions and within a separate lined and contained cell.

**4.3.2** Approval for the disposal of *Contaminated Soil* must be sought from the landfill operator and the Director. The information detailed in section 5 of this bulletin must be supplied to the Director in making an application for approval.

**4.3.3** Only permitted landfills are allowed to accept Level 3 waste. Furthermore, it is at the landfill operator's discretion as to whether or not they will accept the waste. At the date of publication, no Tasmanian landfill is receiving level 3 waste for disposal.

#### **4.4 Contaminated soil for remediation (Level 4)**

**4.4.1** *Contaminated Soil for Remediation* requires remediation or treatment prior to disposal to reduce total concentrations and/or leachable concentrations to levels acceptable for landfill disposal or re-use.

- 4.4.2** The producer (defined in the Regulations) of the *Contaminated Soil for Remediation* is responsible for identification of the treatment options, which will depend on the waste and pollutant type, waste volumes and the availability of suitable facilities in which to manage the remediation. Typical forms of treatment currently being used for remediation of contaminated soil include bioremediation, thermal treatment/desorption, soil washing, soil vapour extraction, red mud, chemical treatments and stabilisation. Specific treatment of hydrocarbon contaminated soil by bioremediation is encouraged under appropriate circumstances, as detailed in the EPA's *Information Bulletin 108: Landfarming of Petroleum Contaminated Soils*.
- 4.4.3** The suitable technologies for waste treatment may not be available in Tasmania and thus treatment may require transport to an interstate facility. Advice on interstate treatment options should be sought from the Controlled Waste Management Officer.
- 4.4.4** If the soil is to be disposed of after treatment, the EPA encourages treatment methods that minimise soil volumes prior to disposal to conserve landfill space.
- 4.4.5** If the remediation method has the potential to cause environmental harm, as defined in EMPCA, advice from the Director should be sought.
- 4.4.6** *Regulation 6 - General Responsibilities* of the Regulations requires that a person must not remove, receive, store, reuse, recycle, reprocess, salvage, incinerate, treat or use for energy recovery a controlled waste as defined within the Regulations unless approved to do so.

## **5. Approvals**

### **5.1 Approval process**

The waste producer, or consultant/contractor acting on behalf of the waste producer, is responsible for applying for approval for soil disposal, re-use options or remediation.

Applications are to be sent to the Director, EPA. Please allow up to ten working days for the Director to respond to an application. Please note that where it is intended to dispose of material to a landfill, an 'in principle' agreement from the landfill operator should be gained by the applicant prior to disposal.

Upon approval of the application, the Director, or a person delegated by the Director will provide written notification to the applicant of the approved classification of the waste where appropriate. The landfill operator will also be forwarded a copy of the approval, along with a copy of the analytical results and any other relevant information so that they can monitor waste entering the landfill.

### **5.2 Information required**

An application for approval to dispose of, re-use, treat, remediate, *etc*, soil must contain the following information:

#### **Introduction:**

- Details of the site(s) from which the soil is to be removed, including a brief site history and why the soil is thought to be contaminated, or likely to cause environmental harm;
- Description of the soil;
- Estimate of the volume of soil to be managed.

#### **Sampling details:**

- Sampling density and analytical suite to classify the soil;



- Sampling protocols followed;
- Scaled sampling plan showing, for example, soil stockpiles and sample locations and contamination sources;
- NATA endorsed laboratory reports.

**Waste management plan:**

- Proposal for the management of the soil that is in accordance with relevant guidelines and standards;
- If the soil is to be disposed of, provide justification for why re-use, on-site treatment, *etc* is not proposed;
- Details of the proposed management method, for example the name of the landfill facility that you wish to dispose of the soil at, or details of the treatment or re-use *etc*;
- The name of the waste transporter that you will be utilising (see Section 6 for further details); and
- If the soil is to be re-used, recycled, treated, *etc*, and is a controlled waste, the waste producer must apply for an environmental approval from the Director (R.12 of the Regulations). Relevant information required by the Director to consider an application for an environmental approval is detailed in R.12(3) of the Regulations.

In situations where a site investigation report has already been lodged with the Director, duplication of information provided in that report is not required. However, in all cases, the application will need to make reference to the specific sample numbers used for soil classification.

**6. Transport of contaminated material**

If a controlled waste is to be transported for fee or reward, a waste transport business holding a current relevant approval for that particular waste type and issued under EMPCA is required. The Controlled Waste Transport Officer (see below) can be contacted for information regarding currently approved Waste Transporters.

Caution should be taken when carting *Fill Material* to ensure its safe transportation and prevention of secondary impacts (*e.g.* dust).

**7. Further information**

For further information relating to this bulletin or to make a contaminated soil or controlled waste disposal application contact:

Waste Management Section  
 EPA Division  
 GPO Box 1751  
 HOBART TASMANIA 7001

<b>Controlled Waste Management Officer</b> .....	EPA Division
<b>Contaminated Sites Officer</b> .....	Telephone: (03) 6233 6518
<b>Controlled Waste Transport Officer</b> .....	Facsimile: (03) 6233 3800
<b>Landfill Officer</b> .....	

Legislation may be viewed on the Internet at <http://www.thelaw.tas.gov.au>.  
 General information relating to waste management can be viewed either on the EPA Division's website at <http://www.environment.tas.gov.au>.

## 8. Currency of this bulletin

This bulletin may be subject to amendment and persons relying on this bulletin should check with an officer of the Waste Management Section or on the above EPA Division and EPA websites to ensure that it is current at any given time.

### **Disclaimer**

***The Crown gives no warranty, express or implied, as to the accuracy or completeness of the information provided in this Bulletin. The contents are based on the best information available to the Environment Protection Authority (EPA) at the time of publication and are subject to revision based upon further advice received by the EPA. Please note that other national or state agencies may have additional requirements relating to the import/export and/or disposal of controlled wastes.***


\*Edition 1 is the first edition as a controlled document.

**Table 3.** Potentially Contaminating Activities

<b>Potentially Contaminating Activities</b>	
Acid / Alkali plant and formulation	Laboratories
Airports	Landfill sites
Asbestos production or disposal	Lime works
Bottling works	Marinas and associated boat yards
Bowling Greens	Metal treatment
Breweries	Mining and extractive industries
Brickworks	Petroleum product or oil storage
Cement Works	Paint formulation and manufacture
Cemeteries	Pesticide disposal sites
Ceramic works	Pesticide manufacture and formulation
Chemical manufacture and formulation	Pharmaceutical manufacture and formulation
Chemical storage	Power stations
Coal handling and storage	Railway yards
Defence works	Recreational, public parks and gardens
Disturbance of potential acid sulfate soils	Rifle ranges
Dredge spoil reuse	
Dredging and dewatering of sediments	
Drum re-conditioning works	
Dry cleaning establishments	Rubber or plastic works
Electroplating and heat treatment premises	Sawmills and joinery works

Electrical transformers	Scrap yards
Ethanol production plants	Service stations
Engine works	Sheep and cattle dips
Explosives industries	Sites of incidents involving spillage of hazardous material
Fertiliser manufacturing plants	Sites of fires involving hazardous materials
Foundry operations	Smelting and refining
Gas works	Spray mixing sites
Glass manufacturing works	Tanning and associated trades
Golf courses	Transport / storage depots
Heavy industrial sites	Tyre manufacturing and retreading works
Herbicide manufacture	Waste treatment plants
Horticulture	Wood storage and treatment
Intensive agriculture	Wood preservation
Iron and steel works	

**Figure 1** Summary of Waste Management for Contaminated Soil.

