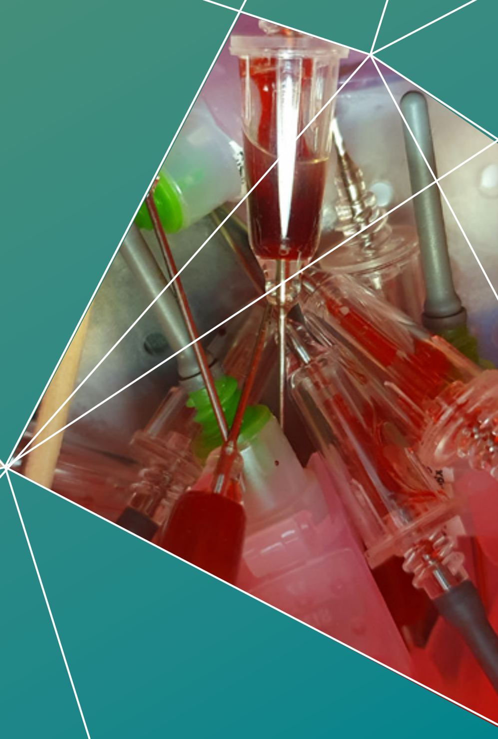
ACT Government

DRAFT ENVIRONMENTAL STANDARDS: ASSESSMENT AND CLASSIFICATION OF LIQUID AND NON-LIQUID WASTES

October 2020



Acknowledgement to Country
We acknowledge the Ngunnawal people as Canberra's first inhabitants and Traditional Custodians. We recognise the special relationship and connection that Ngunnawal people have with this Country. Prior to the displacement of Ngunnawal people from their land, they were a thriving people whose life and culture was connected unequivocally to this land in a way that only they understand and know and is core to their physical and spiritual being. The segregation of the Ngunnawal people from Culture and Country has had long-lasting, profound, and ongoing health and well-being effects on their life, cultural practices, families, and continuation of their law/lore. We acknowledge the historic interruption of the Ngunnawal people of Canberra and their surrounding regions. We recognise the significant contribution the Ngunnawal people have played in caring for Country. For time immemorial they have maintained a tangible and intangible cultural, social, environmental, spiritual, and economic connection to these lands and waters.

Director-General, Environment, Planning and Sustainable Development Directorate, ACT Government, GPO Box 158, Canberra ACT 2601.

Telephone: 02 6207 1923
Website: www.environment.act.gov.au

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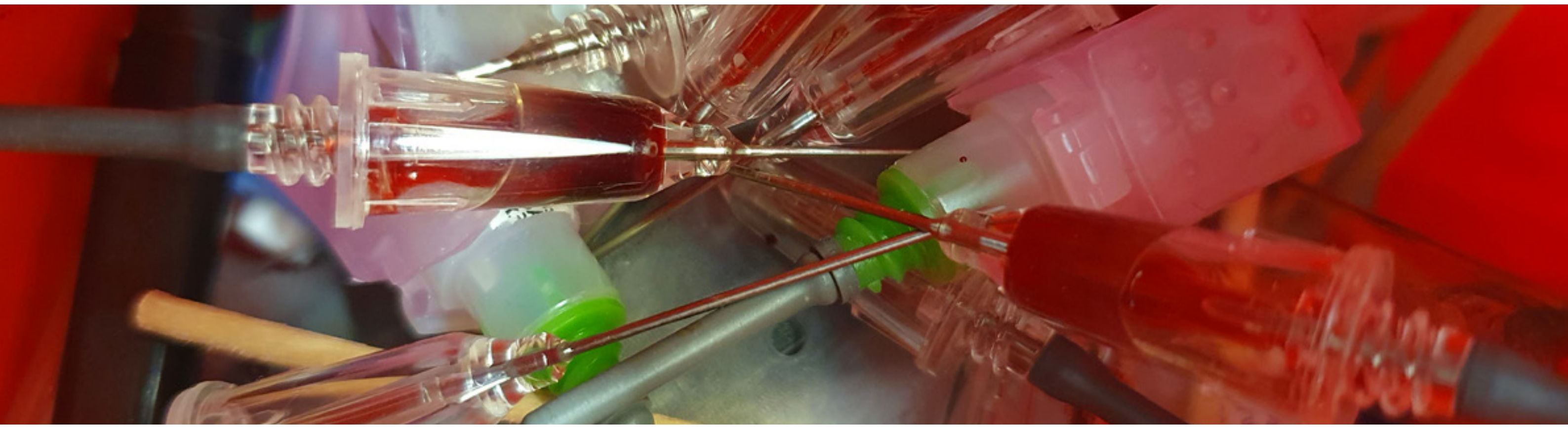


Contents

Background

The ACT is a small jurisdiction with limited industry, whose waste management needs are primarily served by organisations based interstate, principally in New South Wales (NSW). For this reason, the Environment Protection Authority (EPA) has chosen to model the Environmental Standards: Assessment and Classification of Liquid and Non-liquid Waste (the Standards) on the NSW EPA 2017, Waste Classification Guidelines Part 1: Classifying waste. Changes from the NSW document have been made only where necessary to meet particular ACT conditions.

Introduction

The EPA has developed these Standards to help waste generators classify the wastes they produce. The Standards are a step-by-step process for classifying waste and cover the classification of wastes into groups that pose similar risks to the environment and human health.

Under Schedule 1, Section 1.1, of the Environment Protection Act 1997 (the Act) waste is defined as any solid, liquid or gas, or any combination of them, that is a surplus product or unwanted by-product of an activity, whether the product or by-product is of value or not.

The following classes of waste are used throughout the Standards:

- special waste
- liquid waste
- hazardous waste
- restricted solid waste
- general solid waste (putrescible)
- general solid waste (non-putrescible).

To determine which of the above classifications applies to your waste, follow the six steps below. Once a waste's classification has been established under a particular step, do not go to the next step—the waste will be taken to have that classification and must be managed accordingly. The only exception is where special waste is mixed with restricted solid or hazardous waste and managed as both classifications—see Step 1 for further details.

If an environmental authorisation (EA) applies to a waste, a generator who complies with any applicable terms of that EA may classify that waste as set out in the EA, rather than according to the Standards.

General classification principles

The following principles apply when using the step-by-step waste classification process.

- Where practicable, safe and appropriate, it is desirable to separate a mixture containing different classes of wastes before classifying them separately. For example, if waste tyres (special waste) are mixed with lead-acid batteries (hazardous waste), it would be desirable to separate the wastes so only the hazardous component is classified as hazardous waste.
- Two or more classes of waste must not be mixed in order to reduce the concentration of chemical contaminants. Dilution of contaminants is not an acceptable waste management option. This includes the addition of water to any waste prior to laboratory analysis for the purpose of waste classification.
- When classifying waste using chemical assessment it is not appropriate to exclude sample results. Selectively choosing sample results to classify waste introduces bias and violates fundamental statistical principles. For example, where a waste has been chemically assessed 'in situ', and the waste is excavated and chemically assessed as a stockpile, both in-situ and stockpile analytical results are to be used in classifying the waste. There must be scientifically valid reasons for the exclusion of sample results.

Rules for using the Standards

In using the Standards to classify waste, the following rules apply:

1. The steps for waste classification must be applied in the order presented below.
2. Once a waste's classification has been established under a particular step, do not go to the next step.
3. The only exception is where special waste is mixed with restricted solid or hazardous waste. In these circumstances, the waste must be classified as special waste and restricted solid or hazardous waste, and managed as both of those classifications.
4. Otherwise, mixed waste must be classified according to the highest class of waste. For example, if a non-liquid waste contains three contaminants (other than asbestos, tyres, radioactive or clinical and related waste) and only one of these contaminants is present at the concentration specified for hazardous waste, the waste must be classified and treated as hazardous waste.
5. If an immobilisation approval applies to a waste, a generator who complies with the terms of that approval may classify that waste as set out in the approval, rather than the Standards. Further information on immobilisation approvals is detailed in Appendix 3.

Classifying Your Waste

Step 1

Step 1: Is the waste special waste?

'Special waste' is a class of waste with unique regulatory requirements. The potential impacts of special waste need to be managed to minimise the risk of harm to the environment and human health.

Special waste

Any waste of the following:

» clinical and related waste
» asbestos waste
» radioactive waste
» waste tyres
» anything classified as special waste in an EA under the Act.

Generators of special waste do not need to make any further assessment of their waste if it falls within the definitions of special waste above.

The only exception is where special waste is mixed with restricted solid or hazardous waste. In these circumstances, the waste must be classified as special waste and restricted solid or hazardous waste (as applicable), and managed as both of those classifications.

The meanings of the terms 'asbestos waste', 'radioactive waste', 'clinical and related waste' and 'waste tyres' are detailed below.

Asbestos waste

Any waste that contains asbestos. Asbestos is the fibrous form of those mineral silicates that belong to the serpentine or amphibole groups of rock-forming minerals, including actinolite, amosite (brown asbestos), anthophyllite, chrysotile (white asbestos), crocidolite (blue asbestos) and tremolite.

Clinical waste

As defined in the Clinical Waste Act 1990 means any of the following, other than waste that is treated in accordance with the Clinical Waste Manual 1991:

a. waste consisting of a catheter, hypodermic needle, intravenous set, pipette or scalpel
b. waste consisting of any other instrument or object that has been used in the taking of blood, the testing, processing or handling of blood or blood products, the investigation of human or animal diseases or in analysis or research that involves the use of tissue or fluid specimens, whether human or animal
c. sanitary waste that originates from or has been in contact with a person who has a transmissible notifiable condition within the meaning of the Public Health Act 1997
d. waste resulting from the investigation or analysis of tissue or fluid specimens, whether human or animal
e. biological or chemical waste resulting from the investigation of human or animal diseases
f. waste derived from a prescribed activity, being waste that includes or included human blood, or animal blood in any form other than food waste
g. human or animal tissue or body fluids, removed during surgery or an autopsy
h. waste consisting of a cytotoxic substance or waste that is, or is likely to be, contaminated by a cytotoxic substance
i. waste consisting of anything that has been in contact with waste mentioned in a previous paragraph
j. waste derived from the preparation of a human body for burial or cremation
k. waste declared by the Minister under section 3 (Declarations of clinical waste and prescribed activity) to be clinical waste.

Cytotoxic waste

Any substance contaminated with any residues or preparations that contain materials that are toxic to cells, principally through their action on cell reproduction.

Pharmaceutical, drug or medicine waste

Any waste that has been generated by activities carried out for business or other commercial purposes and that is listed as a regulated substance or regulated therapeutic good under Part 3.1 of the Medicines, Poisons and Therapeutic Goods Act 2008.

Radioactive waste

Is any radioactive material with no further value, to be disposed of in accordance with the object of the Radiation Protection Act 2006, being to protect the health and safety of people, and to protect property and the environment from the harmful effects of radiation.

Sharps waste

Sharps means those things:

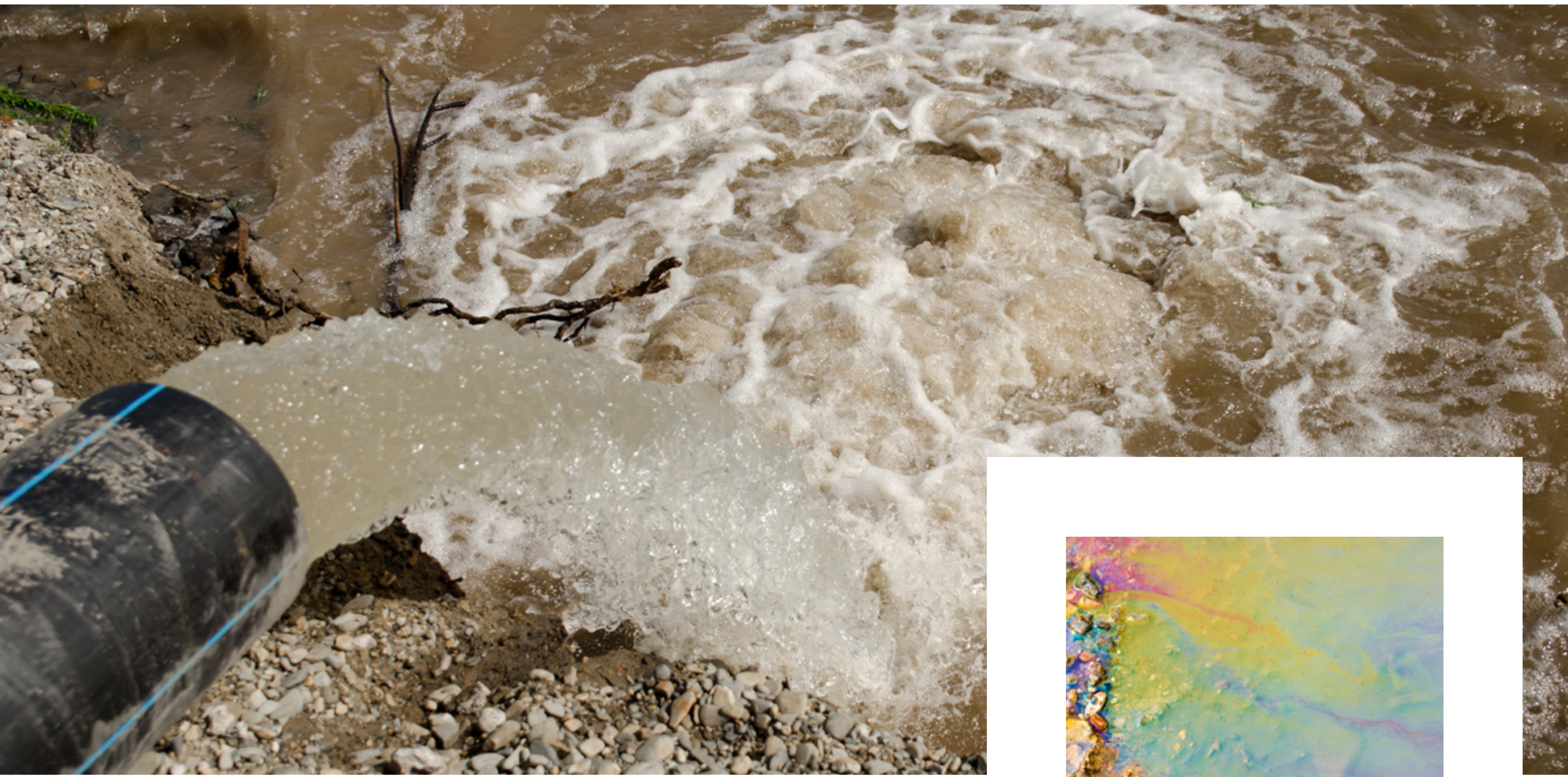
- that have sharp points or edges capable of cutting, piercing or penetrating the skin, such as needles, syringes with needles or surgical instruments
- that are designed for the purpose of cutting, piercing or penetrating the skin
- that have the potential to cause injury or infection.

Sharps waste means any waste collected from designated sharps waste containers used in the course of business, commercial or community service activities, being waste resulting from the use of sharps for any of the following purposes:

- human health care by health professionals and other healthcare providers
- medical research or work on cadavers
- veterinary care or veterinary research
- skin penetration or the injection of drugs or other substances for medical or non-medical reasons
- but does not include waste that has been treated to a standard specified in an EA.

Waste tyres

Any used, rejected or unwanted tyres, including casings, seconds, shredded tyres or tyre pieces.



Step 2: Is the waste liquid waste?

If the waste is not classified as special waste, decide whether it is 'liquid waste'.

Liquid waste

Any waste, other than special waste, that:

» has an angle of repose of less than 5 degrees above horizontal
» becomes free-flowing at or below 60 degrees Celsius or when it is transported
» is generally not capable of being picked up by a spade or shovel
» is classified as liquid waste under an EA.

If the waste meets the above, it is classified as liquid waste, and no further assessment is required.

Note: The waste generator may choose to separate the waste into its liquid and solid fractions so the solid fraction can be further classified in accordance with the Standards.

Step 3: Is the waste pre-classified?

If the waste is not classified as special waste or liquid waste, establish whether the waste has been pre-classified by the EPA.

Some commonly generated waste types have been pre-classified as hazardous waste, general solid waste (putrescible) or general solid waste (non-putrescible). These pre-classifications are contained in the definitions of those classifications in these Standards.

Current pre-classified waste classes are:

Hazardous waste

The following waste types (other than special waste or liquid waste) have been pre-classified as 'hazardous waste':

» containers, having previously contained a substance of Class 1, 3, 4, 5 or 8 within the meaning of the Transport of Dangerous Goods Code, or a substance to which Division 6.1 of the Transport of Dangerous Goods Code applies, from which residues have not been removed by washing or vacuuming

» any waste that meets the criteria for assessment as dangerous goods under the Dangerous Goods Code, and categorised as one of the following:
  - explosives
  - gases (compressed, liquefied or dissolved under pressure)
  - flammable solids (excluding organic waste and all physical forms of carbon such as activated carbon and graphite)
  - flammable liquids
  - substances liable to spontaneous combustion (excluding organic waste and all physical forms of carbon such as activated carbon and graphite)
  - substances that emit flammable gases in contact with water
  - oxidising agents and organic peroxides
  - toxic substances
  - corrosive substances
  - coal tar or coal tar pitch waste (being the tarry residue from the heating, processing or burning of coal or coke) comprising of more than 1% (by weight) of coal tar or coal tar pitch waste

» lead-acid or nickel-cadmium batteries (being waste generated or separately collected by activities carried out for business, commercial or community services purposes)

» lead paint waste arising otherwise than from residential premises or educational or childcare institutions

» quarantine waste

» liquid waste that contains any of the above non-liquid hazardous wastes

» any mixture of the wastes referred to above.

Transport of Dangerous Goods Code means the document called the Australian Code for the Transport of Dangerous Goods by Road and Rail (7th edition), approved by the Ministerial Council for Road Transport and published by the Australian Government from time to time.

Restricted solid waste

Currently, no wastes have been pre-classified as 'restricted solid waste'. Restricted solid waste therefore currently only includes wastes assessed and classified as restricted solid waste in accordance with the procedures in Step 5 of the Standards.

General solid waste (putrescible)

The following wastes (other than special waste, liquid waste, hazardous waste or restricted solid waste) have been pre-classified as 'general solid waste (putrescible)':

- household waste that contains putrescible organics (that is, liable to decay)
- waste from litter bins collected by or on behalf of local councils
- manure and night soil
- disposable nappies, incontinence pads or sanitary napkins
- food waste
- animal waste
- grit or screenings from sewage treatment systems that have been dewatered so the grit or screenings do not contain free liquids
- any mixture of the wastes referred to above.

In assessing whether waste has been pre-classified as general solid waste (putrescible), the following definitions apply:

Animal waste

Any waste that includes dead animals and animal parts and any mixture of dead animals and animal parts.

Food waste

Any waste from the manufacture, preparation, sale or consumption of food but does not include grease-trap waste.

Manure waste

Is any mixture of manure and biodegradable animal bedding, such as straw.

General solid waste (non-putrescible)

The following wastes (other than special waste, liquid waste, hazardous waste, restricted solid waste or general solid waste (putrescible)) are pre-classified as 'general solid waste (non-putrescible)':

» glass, plastic, rubber, plasterboard, ceramics, bricks, concrete or metal
» paper or cardboard
» household waste from municipal clean-up that does not contain food waste
» waste collected by, or on behalf of, local councils from street sweepings
» grit, sediment, litter and gross pollutants collected in, and removed from, stormwater treatment devices and/or stormwater management systems, that has been dewatered so that they do not contain free liquids
» grit and screenings from potable water and water reticulation plants that has been dewatered so that it does not contain free liquids
» garden waste
» wood waste
» waste contaminated with lead (including lead paint waste) from residential premises or educational or childcare institutions
» containers, previously containing dangerous goods, from which residues have been removed by washing (cleaning method must be as good as or better than the triple-rinsing method outlined in Appendix 2) or vacuuming
» drained oil filters (mechanically crushed), rags and oil-absorbent materials that only contain non-volatile petroleum hydrocarbons and do not contain free liquids
» drained motor oil containers that do not contain free liquids
» non-putrescible vegetative waste from agriculture, silviculture or horticulture
» building cavity dust waste removed from residential premises or educational or childcare institutions, being waste that is packaged securely to prevent dust emissions and direct contact
» synthetic fibre waste (from materials such as fibreglass, polyesters and other plastics) being waste that is packaged securely to prevent dust emissions, but excluding asbestos waste
» virgin excavated natural material
» building and demolition waste
» asphalt waste (including asphalt resulting from road construction and waterproofing works)
» biosolids categorised as unrestricted use, or restricted use 1, 2 or 3, in accordance with the criteria set out in the Biosolids Guidelines (NSW EPA 2000)
» cured concrete waste from a batch plant
» fully cured and set thermosetting polymers and fibre-reinforcing resins
» fully cured and dried residues of resins, glues, paints, coatings and inks
» any mixture of the wastes referred to above.

In assessing whether waste has been pre-classified as general solid waste (non-putrescible), the following definitions apply:

Building and demolition waste

Is any unsegregated material (other than material containing asbestos waste or liquid waste) that results from:

» the demolition, erection, construction, refurbishment or alteration of buildings other than
  • chemical works
  • mineral processing works
  • container reconditioning works
  • waste treatment facilities
» the construction, replacement, repair or alteration of infrastructure development such as roads, tunnels, sewage, water, electricity, telecommunications and airports

and includes materials such as:

» bricks, concrete, paper, plastics, glass and metal
» timber, including unsegregated timber, that may contain timber treated with chemicals such as copper chrome arsenate (CCA), high temperature creosote (HTC), pigmented emulsified creosote (PEC) and light organic solvent preservative (LOSP) but does not include excavated soil (for example, soil excavated to level off a site prior to construction or to enable foundations to be laid or infrastructure to be constructed).

Garden waste

Is any waste that consists of branches, grass, leaves, plants, loppings, tree trunks, tree stumps and similar materials, and includes any mixture of those materials.

Virgin excavated natural material (VENM) waste

Virgin excavated natural material (VENM) means excavated natural material (for example, clay, gravel, sand, soil and rock) that is **not mixed** with any other waste and that:

- has been excavated from areas that are not contaminated: as a result of industrial, commercial, mining or agricultural activities; with manufactured chemicals; that does not contain sulphidic ores or soils; and does not contain naturally elevated levels of certain contaminants, or
- consists of excavated natural materials that meet such criteria as may be approved by the EPA.

The following is not classified as VENM:

- excavated material which has been stockpiled, reused or processed in any way or has been sourced from a site where contamination is present or has been previously identified
- fill material, engineered or manufactured topsoil, material which has been impacted by anthropogenic inclusions (for example asphalt, road base and building rubble) or vegetation waste.

Note: This only relates to VENM classification in the ACT. Where the material is proposed for reuse or placement in NSW the material must be classified in accordance with NSW Environment Protection Authority's Waste Classification Guidance. Approval from the appropriate NSW regulatory authorities must be sought and granted prior to the movement of the material from the ACT to NSW.

Wood waste

Is any waste that contains sawdust, timber offcuts, wooden crates, wooden packaging, wooden pallets, wood shavings and similar materials, and includes any mixture of those materials, but does not include wood treated with chemicals such as copper chrome arsenate (CCA), high temperature creosote (HTC), pigmented emulsified creosote (PEC) and light organic solvent preservative (LOSP).

Step 4: Does the waste have hazardous characteristics?

If a waste has not been classified under Steps 1–3, it must be classified as 'hazardous waste' if it is a dangerous good under any of the following classes or divisions of the Transport of Dangerous Goods Code:

- » Class 1: Explosives
- » Class 2: Gases (compressed, liquefied or dissolved under pressure)
    - Division 4.1: Flammable solids (excluding garden waste, natural organic fibrous material and wood waste, and all physical forms of carbon such as activated carbon and graphite)
    - Division 4.2: Substances liable to spontaneous combustion (excluding garden waste, natural organic fibrous material and wood waste, and all physical forms of carbon such as activated carbon and graphite)
    - Division 4.3: Substances which when in contact with water emit flammable gases
- » Class 5: Oxidising agents and organic peroxides
    - Division 6.1: Toxic substances
- » Class 8: Corrosive substances.

For further information on the test methods to establish whether the waste exhibits any of the above characteristics, please refer to the Transport of Dangerous Goods Code (National Transport Commission 2014).

Step 5

Step 5: Determining a waste's classification using chemical assessment

Waste generators must chemically assess their waste in accordance with Step 5 to determine the waste's classification where it has not been classified under Steps 1–4 of the Standards.

If the waste generator does not undertake chemical assessment of the waste, the waste must be classified as hazardous waste. Waste classified as hazardous waste cannot be immediately disposed of in the ACT or NSW and must be treated prior to disposal.

The chemical assessment process is based around the waste's potential to release chemical contaminants into the environment through contact with liquids, which leads to the production of leachates.

Testing of contaminants, as set out below, is not necessary where the waste generator knows the processes which produced the waste and the maximum possible levels of contaminants it contains. To classify the waste, the generator must be certain that the maximum possible levels of contaminants in the waste do not exceed the specific contaminant concentration (SCC) and/or toxicity characteristics leaching procedure (TCLP) test values for that classification (see Measurable properties of waste below). In these cases, the generator must ensure the reasons for not undertaking the chemical assessment are documented and records of the decision are retained for three years.

Guidance on sampling and analytical methods is provided in Appendix 1. Where waste generators are unsure of the appropriate sampling or analytical methods for a particular waste, they are strongly encouraged to seek expert help, either from a laboratory that specialises in waste analysis or someone specialising in waste management issues, or both.

Measurable properties of waste

The two measurable properties of chemical contaminants used to classify waste are:

- the SCC of any chemical contaminant in the waste, expressed as milligrams per kilogram (mg/kg)
- the leachable concentration of any chemical contaminant using TCLP, expressed as milligrams per litre (mg/L).

Waste generators must select the chemical contaminants that are known to be present, or are likely to be present, in the waste. This may be informed by the site activities, site history or the processes which produced the waste. Generators of waste must be able to justify the chemical contaminants selected for testing and keep records of that decision for three years.

If a waste generator reasonably suspects that a waste contains chemical contaminants that are not listed in Tables 1 and 2 below, the waste generator must test for these contaminants and contact the EPA for advice.

Classifying a waste using the SCC test

The first test which must be used to chemically assess waste is the SCC test.

The SCC test acts as an initial screening test for the classification of a waste. Based on SCC alone, the test value for each contaminant must be less than or equal to the contaminant threshold (CT) value specified for that contaminant in Table 1; if so, it will fall into one of the following classes:

- general solid waste ≤CT1
- restricted solid waste ≤CT2.

If a waste's SCC test value exceeds the contaminant threshold value set for general solid waste (CT1), further assessment using the TCLP test may be used.

Where the contaminant threshold value set for restricted solid waste (CT2) is exceeded, a TCLP test must be carried out to determine the leachable concentration of that contaminant and the class of waste.

For waste assessment and classification, it is recommended that the sample mean, the sample standard deviation and the 95% upper confidence limit (UCL) of the mean concentration is calculated for each contaminant to ensure that the 95% UCL for the mean concentration is less than or equal to the CT limit value specified for that contaminant.

Classifying a waste using the SCC and TCLP tests

To establish the waste's classification using both SCC and TCLP, the test values for each chemical contaminant must be compared with the threshold values set in Table 2, and the classification is then determined as follows:

CLASSIFICATION	SCC VALUE	TCLP VALUE
General solid waste	≤SCC1	≤TCLP1
Restricted solid waste	≤SCC2	≤TCLP2
Hazardous waste	>SCC2	>TCLP2

If any of the SCC or TCLP threshold values specified in Table 2 are exceeded for general solid waste, the waste must be classified as restricted solid waste. If any of the SCC or TCLP threshold values specified in Table 2 are exceeded for restricted solid waste, the waste must be classified as hazardous waste. Detailed interpretative guidance regarding the use of both SCC and TCLP values to establish a waste's classification is provided in Table 3.

For waste assessment and classification, it is recommended that the sample mean, the sample standard deviation and the 95% UCL of the mean concentration is calculated for each contaminant to ensure that the 95% UCL for the mean concentration is less than or equal to the SCC or TCLP limit value specified for that contaminant.

Table 1: CT1 and CT2 values for classifying waste by chemical assessment without the TCLP test

For disposal requirements for organic and inorganic chemical contaminants not listed below, contact the EPA. Aluminium, barium, boron, chromium (0 and III oxidation states), cobalt, copper, iron, manganese, vanadium and zinc have not been listed with values in this table and need not be tested for.

CONTAMINANT	MAXIMUM VALUES OF SPECIFIC CONTAMINANT CONCENTRATION (SCC) FOR CLASSIFICATION WITHOUT TCLP		CAS REGISTRY NUMBER
	GENERAL SOLID WASTE[1]	RESTRICTED SOLID WASTE	
	CT1 (MG/KG)	CT2 (MG/KG)	
Arsenic	100	400	
Benzene	10	40	71-43-2
Benzo(a)pyrene[2]	0.8	3.2	50-32-8
Beryllium	20	80	
Cadmium	20	80	
Carbon tetrachloride	10	40	56-23-5
Chlorobenzene	2,000	8,000	108-90-7
Chloroform	120	480	67-66-3
Chlorpyrifos	4	16	2921-88-2
Chromium (VI)[3]	100	400	
m-Cresol	4,000	16,000	108-39-4
o-Cresol	4,000	16,000	95-48-7
p-Cresol	4,000	16,000	106-44-5
Cresol (total)	4,000	16,000	1319-77-3
Cyanide (amenable)[4]	70	280	
Cyanide (total)	320	1,280	
2,4-D	200	800	94-75-7
1,2-Dichlorobenzene	86	344	95-50-1
1,4-Dichlorobenzene	150	600	106-46-7
1,2-Dichloroethane	10	40	107-06-2
1,1-Dichloroethylene	14	56	75-35-4
Dichloromethane	172	688	75-09-2
2,4-Dinitrotoluene	2.6	10.4	121-14-2
Endosulfan[5]	60	240	See below[5]
Ethylbenzene	600	2,400	100-41-4
Fluoride	3,000	12,000	
Fluroxypyr	40	160	69377-81-7
Lead	100	400	
Mercury	4	16	
Methyl ethyl ketone	4,000	16,000	78-93-3
Moderately harmful pesticides[6] (total)	250	1,000	See below[6]
Molybdenum	100	400	
Nickel	40	160	

CONTAMINANT	MAXIMUM VALUES OF SPECIFIC CONTAMINANT CONCENTRATION (SCC) FOR CLASSIFICATION WITHOUT TCLP		CAS REGISTRY NUMBER
	GENERAL SOLID WASTE[1]	RESTRICTED SOLID WASTE	
	CT1 (MG/KG)	CT2 (MG/KG)	
Nitrobenzene	40	160	98-95-3
C6–C9 petroleum hydrocarbons[7]	650	2,600	
C10–C36 petroleum hydrocarbons[7]	10,000	40,000	
Phenol (non-halogenated)	288	1,152	108-95-2
Picloram	60	240	1918-02-1
Plasticiser compounds[8]	20	80	See below[8]
Polychlorinated biphenyls[9]	<50	<50	1336-36-3
Polycyclic aromatic hydrocarbons (total)[10]	200	800	
Scheduled chemicals[11]	<50	<50	
Selenium	20	80	
Silver	100	400	
Styrene (vinyl benzene)	60	240	100-42-5
Tebuconazole	128	512	107534-96-3
1,2,3,4- Tetrachlorobenzene	10	40	634-66-2
1,1,1,2-Tetrachloroethane	200	800	630-20-6
1,1,2,2-Tetrachloroethane	26	104	79-34-5
Tetrachloroethylene	14	56	127-18-4
Toluene	288	1,152	108-88-3
1,1,1-Trichloroethane	600	2,400	71-55-6
1,1,2-Trichloroethane	24	96	79-00-5
Trichloroethylene	10	40	79-01-6
2,4,5-Trichlorophenol	8,000	32,000	95-95-4
2,4,6-Trichlorophenol	40	160	88-06-2
Triclopyr	40	160	55335-06-3
Vinyl chloride	4	16	75-01-4
Xylenes (total)	1,000	4,000	1330-20-7

Notes

1. Values are the same for general solid waste (putrescible) and general solid waste (non-putrescible).
2. There may be a need for the laboratory to concentrate the sample to achieve the TCLP limit value for benzo(a)pyrene with confidence.
3. These limits apply to chromium in the +6 oxidation state only.
4. Analysis for cyanide (amenable) is the established method for assessing potentially leachable cyanide. The EPA may consider other methods if it can be demonstrated that these methods yield the same information.
5. Endosulfan (CAS Registry Number 115-29-7) means the total of Endosulfan I (CAS Registry Number 959-98-8), Endosulfan II (CAS Registry Number 891-86-1) and Endosulfan sulfate (CAS Registry Number 1031-07-8).
6. The following moderately harmful pesticides are to be included in the total values specified:

Moderately harmful pesticides (total)

NAME	CAS REGISTRY NUMBER	NAME	CAS REGISTRY NUMBER
Atrazine	1912-24-9	Imidacloprid	138261-41-3
Azoxystrobin	131860-33-8	Indoxacarb	173584-44-6
Bifenthrin	82657-04-3	Malathion (Maldison)	121-75-5
Brodifacoum	56073-10-0	Metalaxyl	57837-19-1
Carboxin	5234-68-4	Metalaxyl-M	70630-17-0
Copper naphthenate	1338-02-9	Methidathion	950-37-8
Cyfluthrin	68359-37-5	3-Methyl-4-chlorophenol	59-50-7
Cyhalothrin	68085-85-8	Methyl chlorpyrifos	5598-13-0
Cypermethrin	52315-07-08	N-Methyl pyrrolidone	872-50-4
Deltamethrin	52918-63-5	2-octylthiazol-3-one	26530-20-1
Dichlofluanid	1085-98-9	Oxyfluorfen	42874-03-3
Dichlorvos	62-73-7	Paraquat dichloride	1910-42-5
Difenoconazole	119446-68-3	Parathion methyl	298-00-0
Dimethoate	60-51-5	Permethrin	52645-53-1
Diquat dibromide	85-00-7	Profenofos	41198-08-7
Emamectin benzoate	137515-75-4 & 155569-91-8	Prometryn	7287-19-6
Ethion	563-12-2	Propargite	2312-35-8
Fenthion	55-38-9	Pentachloronitrobenzene (Quintozene)	82-68-8
Fenitrothion	122-14-5	Simazine	122-34-9
Fipronil	120068-37-3	Thiabendazole	148-79-8
Fluazifop-P-butyl	79241-46-6	Thiamethoxam	153719-23-4
Fludioxonil	131341-86-1	Thiodicarb	59669-26-0
Glyphosate	1071-83-6	Thiram	137-26-8

7. Approximate range of petroleum hydrocarbon fractions: petrol C6–C9, kerosene C10–C18, diesel C12–C18, and lubricating oils above C18. Laboratory results are reported as four different fractions: C6–C9, C10–C14, C15–C28 and C29–C36. The results of total petroleum hydrocarbons (TPH) (C10–C36) analyses are reported as a sum of the relevant three fractions. Please note that hydrocarbons are defined as molecules that only contain carbon and hydrogen atoms. Prior to TPH (C10–C36) analysis, clean-up may be necessary to remove non-petroleum hydrocarbon compounds. Where the presence of other materials that will interfere with the analysis may be present, such as oils and fats from food sources, you are advised to treat the extract that has been solvent exchanged to hexane with silica gel as described in USEPA Method 1664A (USEPA 2000).
8. Plasticiser compounds means the total of di-2-ethyl hexyl phthalate (CAS Registry Number 117- 81-7) and di-2-ethyl hexyl adipate (CAS Registry Number 103-23-1) contained within a waste.
9. Polychlorinated biphenyls must be managed in accordance with the NSW EPA's polychlorinated biphenyl (PCB) chemical control order 1997, which is available on the NSW EPA website at PCB Chemical Control Order 1997.
10. The following polycyclic aromatic hydrocarbons (PAHs) are assessed as the total concentration of 16 USEPA Priority Pollutant PAHs, as follows:

Polycyclic aromatic hydrocarbons (total)

NAME	CAS REGISTRY NUMBER	NAME	CAS REGISTRY NUMBER
Acenaphthene	83-32-9	Chrysene	218-01-9
Acenaphthylene	208-96-8	Dibenzo(a,h)anthracene	53-70-3
Anthracene	120-12-7	Fluoranthene	206-44-0
Benzo(a)anthracene	56-55-3	Fluorene	86-73-7
Benzo(a)pyrene	50-32-8	Indeno(1,2,3-cd)pyrene	193-39-5
Benzo(b)fluoranthene	205-99-2	Naphthalene	91-20-3
Benzo(ghi)perylene	191-24-2	Phenanthrene	85-01-8
Benzo(k)fluoranthene	207-08-9	Pyrene	

11. Scheduled chemicals must be managed in accordance with the NSW EPA's scheduled chemical wastes chemical control order 2004, which is available on the NSW EPA website at Scheduled Chemical Wastes Chemical Control Order 2004. The following scheduled chemicals are to be included in the total values specified:

Scheduled chemicals (total)

NAME	CAS REGISTRY NUMBER	NAME	CAS REGISTRY NUMBER
Aldrin	309-00-2	Heptachlor	76-44-8
Alpha-BHC	319-84-6	Heptachlor epoxide	1024-57-3
Beta-BHC	319-85-7	Hexachlorobenzene	118-74-1
Gamma-BHC (Lindane)	58-89-9	Hexachlorophene	70-30-4
Delta-BHC	319-86-8	Isodrin	465-73-6
Chlordane	57-74-9	Pentachlorobenzene	608-93-5
DDD	72-54-8	Pentachloronitrobenzene	82-68-8
DDE	72-55-9	Pentachlorophenol	87-86-5
DDT	50-29-3	1,2,4,5-Tetrachlorobenzene	95-94-3
Dieldrin	60-57-1	2,3,4,6-Tetrachlorophenol	58-90-2
Endrin	72-20-8	1,2,4-Trichlorobenzene	120-82-1
Endrin aldehyde	7421-93-4	2,4,5-Trichlorophenoxyacetic acid, salts and esters	93-76-5

Table 2: TCLP and SCC values for classifying waste by chemical assessment

For disposal requirements for organic and inorganic chemical contaminants not listed below, contact the EPA. Aluminium, barium, boron, chromium (0 and III oxidation states), cobalt, copper, iron, manganese, vanadium and zinc have not been listed with values in this table and need not be tested for. For PFOA, PFOS and PFHSX the landfill criteria detailed in the PFAS National Environmental Management Plan (PFAS NEMP) is based on the type of landfill. For PFOA, PFOS and PFHSX the applicable leachability test method is the Australian Standard Leaching Procedure (ASLP).

Maximum values for leachable concentration and specific contaminant concentration when used together

	GENERAL SOLID WASTE[1]		RESTRICTED SOLID WASTE		
	LEACHABLE CONCENTRATION	SPECIFIC CONTAMINANT CONCENTRATION	LEACHABLE CONCENTRATION	SPECIFIC CONTAMINANT CONCENTRATION	
NAME	TCLP1 (MG/L)	SCC1 (MG/KG)	TCLP2 (MG/L)	SCC2 (MG/KG)	CAS REGISTRY NUMBER
Arsenic	5.0[2]	500	20	2,000	
Benzene	0.5[2]	18	2	72	71-43-2
Benzo(a)pyrene[3]	0.04[4]	10	0.16	23	50-32-8
Beryllium	1.0[5]	100	4	400	
Cadmium	1.0[2]	100	4	400	
Carbon tetrachloride	0.5[2]	18	2	72	56-23-5
Chlorobenzene	100[2]	3,600	400	14,400	108-90-7
Chloroform	6[2]	216	24	864	67-66-3
Chlorpyrifos	0.2	7.5	0.8	30	2921-88-2
Chromium (VI)[6]	5[2]	1,900	20	7,600	
m-Cresol	200[2]	7,200	800	28,800	108-39-4
o-Cresol	200[2]	7,200	800	28,800	95-48-7
p-Cresol	200[2]	7,200	800	28,800	106-44-5
Cresol (total)	200[2]	7,200	800	28,800	1319-77-3
Cyanide (amenable)[7,8]	3.5[7]	300	14	1,200	
Cyanide (total)[7]	16[7]	5,900	64	23,600	
2,4-D	10[2]	360	40	1,440	94-75-7
1,2- Dichlorobenzene	4.3[2]	155	17.2	620	95-50-1
1,4- Dichlorobenzene	7.5[2]	270	30	1,080	106-46-7
1,2- Dichloroethane	0.5[2]	18	2	72	107-06-2
1,1- Dichloroethylene	0.7[2]	25	2.8	100	75-35-4
Dichloromethane	8.6[2]	310	34.4	1,240	75-09-2
2,4-Dinitrotoluene	0.13[2]	4.68	0.52	18.7	121-14-2
Endosulfan[9]	3	108	12	432	
Ethylbenzene	30[10]	1,080	120	4,320	100-41-4
Fluoride	150[10]	10,000	600	40,000	
Fluroxypyr	2	75	8	300	69377-81- 7
Lead	5[2]	1,500	20	6,000	
Mercury	0.2[2]	50	0.8	200	

NAME	GENERAL SOLID WASTE[1] LEACHABLE CONCENTRATION TCLP1 (MG/L)	SPECIFIC CONTAMINANT CONCENTRATION SCC1 (MG/KG)	RESTRICTED SOLID WASTE LEACHABLE CONCENTRATION TCLP2 (MG/L)	SPECIFIC CONTAMINANT CONCENTRATION SCC2 (MG/KG)	CAS REGISTRY NUMBER
Methyl ethyl ketone	200[2]	7,200	800	28,800	78-93-3
Moderately harmful pesticides[11](total)	N/A[12]	250	N/A[12]	1,000	
Molybdenum	510	1,000	20	4,000	
Nickel	210	1,050	8	4,200	
Nitrobenzene	22	72	8	288	98-95-3
C6–C9 petroleum hydrocarbons[13]	N/A12	650	N/A12	2,600	
C10–C36 petroleum hydrocarbons[13]	N/A[12]	10,000	N/A[12]	40,000	
PFOS + PFHxS[14]	0.007[15]	50[15]	0.007	50	
PFOA[14]	0.056[15]	50[15]	0.056	50	
Phenol (non-halogenated)	14.4[16]	518	57.6	2,073	108-95-2
Picloram	3	110	12	440	1918-02-1
Plasticiser compounds[17]	1	600	4	2,400	
Polychlorinated biphenyls[12]	N/A[12]	< 50	N/A[12]	< 50	1336-36-3
Polycyclic aromatic hydrocarbons (total)[18]	N/A[12]	200	N/A[12]	800	
Scheduled chemicals[19]	N/A[12]	< 50	N/A[12]	< 50	
Selenium	1[2]	50	4	200	
Silver	5.0[2]	180	20	720	
Styrene (vinyl benzene)	3[10]	108	12	432	100-42-5
Tebuconazole	6.4	230	25.6	920	107534- 96-3
1,2,3,4-Tetrachlorobenzene	0.5	18	2	72	634-66-2
1,1,1,2-Tetrachloroethane	10[2]	360	40	1,440	630-20-6
1,1,2,2-Tetrachloroethane	1.3[2]	46.8	5.2	187.2	79-34-5
Tetrachloroethylene	0.7[2]	25.2	2.8	100.8	127-18-4
Toluene	14.4[16]	518	57.6	2,073	108-88-3
1,1,1- Trichloroethane	30[2]	1,080	120	4,320	71-55-6
1,1,2- Trichloroethane	1.2[2]	43.2	4.8	172.8	79-00-5
Trichloroethylene	0.5[2]	18	2	72	79-01-6
2,4,5- Trichlorophenol	400[2]	14,400	1,600	57,600	95-95-4
2,4,6- Trichlorophenol	2[2]	72	8	288	88-06-2

NAME	GENERAL SOLID WASTE[1] LEACHABLE CONCENTRATION TCLP1 (MG/L)	GENERAL SOLID WASTE[1] SPECIFIC CONTAMINANT CONCENTRATION SCC1 (MG/KG)	RESTRICTED SOLID WASTE LEACHABLE CONCENTRATION TCLP2 (MG/L)	RESTRICTED SOLID WASTE SPECIFIC CONTAMINANT CONCENTRATION SCC2 (MG/KG)	CAS REGISTRY NUMBER
Triclopyr	2	75	8	300	55335-06- 3
Vinyl chloride	0.22	7.2	0.8	28.8	75-01-4
Xylenes (total)	50[20]	1,800	200	7,200	1330-20-7

Notes

1. Values are the same for general solid waste (putrescible) and general solid waste (non- putrescible).
2. See Hazardous Waste Management System: Identification and Listing of Hazardous Waste – Toxicity Characteristics Revisions, Final Rule (USEPA 2012b) for TCLP levels.
3. There may be a need for the laboratory to concentrate the sample to achieve the TCLP limit value for benzo(a)pyrene with confidence.
4. Calculated from Hazardous Waste: Identification and Listing (USEPA 2012a).
5. Calculated from 'Beryllium' in The Health Risk Assessment and Management of Contaminated Sites (DiMarco & Buckett 1996).
6. These limits apply to chromium in the +6 oxidation state only.
7. Taken from the Land Disposal Restrictions for Newly Identified and Listed Hazardous Wastes and Hazardous Soil: Proposed Rule (USEPA 1993).
8. Analysis for cyanide (amenable) is the established method used to assess the potentially leachable cyanide. The EPA may consider other methods if it can be demonstrated that these methods yield the same information.
9. Endosulfan (CAS Registry Number 115-29-7) means the total of endosulfan I (CAS Registry Number 959-98-8), endosulfan II (CAS Registry Number 891-86-1) and endosulfan sulfate (CAS Registry Number 1031-07-8).
10. Calculated from Australian Drinking Water Guidelines (NHMRC 2011).
11. The following moderately harmful pesticides are to be included in the total values specified:

Moderately harmful pesticides (total)

NAME	CAS REGISTRY NUMBER	NAME	CAS REGISTRY NUMBER
Atrazine	1912-24-9	Imidacloprid	138261-41-3
Azoxystrobin	131860-33-8	Indoxacarb	173584-44-6
Bifenthrin	82657-04-3	Malathion (Maldison)	121-75-5
Brodifacoum	56073-10-0	Metalaxyl	57837-19-1
Carboxin	5234-68-4	Metalaxyl-M	70630-17-0
Copper naphthenate	1338-02-9	Methidathion	950-37-8
Cyfluthrin	68359-37-5	3-Methyl-4-chlorophenol	59-50-7
Cyhalothrin	68085-85-8	Methyl chlorpyrifos	5598-13-0
Cypermethrin	52315-07-08	N-Methyl pyrrolidone	872-50-4
Deltamethrin	52918-63-5	2-octylthiazol-3-one	26530-20-1
Dichlofluanid	1085-98-9	Oxyfluorfen	42874-03-3
Dichlorvos	62-73-7	Paraquat dichloride	1910-42-5
Difenoconazole	119446-68-3	Parathion methyl	298-00-0
Dimethoate	60-51-5	Permethrin	52645-53-1

NAME	CAS REGISTRY NUMBER	NAME	CAS REGISTRY NUMBER
Diquat dibromide	85-00-7	Profenofos	41198-08-7
Emamectin benzoate	137515-75-4 & 155569-91-8	Prometryn	7287-19-6
Ethion	563-12-2	Propargite	2312-35-8
Fenthion	55-38-9	Pentachloronitrobenzene (Quintozene)	82-68-8
Fenitrothion	122-14-5	Simazine	122-34-9
Fipronil	120068-37-3	Thiabendazole	148-79-8
Fluazifop-P-butyl	79241-46-6	Thiamethoxam	153719-23-4
Fludioxonil	131341-86-1	Thiodicarb	59669-26-0
Glyphosate	1071-83-6	Thiram	137-26-8

12. No TCLP analysis is required. Moderately harmful pesticides, petroleum hydrocarbons, polychlorinated biphenyls, polycyclic aromatic hydrocarbons and scheduled chemicals are assessed using SCC1 and SCC2. Polychlorinated biphenyls must be managed in accordance with the EPA's polychlorinated biphenyl (PCB) chemical control order 1997, which is available on the NSW EPA website at Polychlorinated Biphenyl (PCB) Chemical Control Order 1997.
13. Approximate range of petroleum hydrocarbon fractions: petrol C6–C9, kerosene C10–C18, diesel C12–C18, and lubricating oils above C18. Laboratory results are reported as four different fractions: C6–C9, C10–C14, C15–C28 and C29–C36. The results of total petroleum hydrocarbons (C10–C36) analyses are reported as a sum of the relevant three fractions. Please note that hydrocarbons are defined as molecules that only contain carbon and hydrogen atoms. Prior to TPH (C10–C36) analysis, clean-up may be necessary to remove non-petroleum hydrocarbon compounds. Where the presence of other materials that will interfere with the analysis may be present, such as oils and fats from food sources, you are advised to treat the extract that has been solvent exchanged to hexane with silica gel as described in USEPA Method 1664A (USEPA 2000).
14. PFOS and PFHxS are to be summed for comparison against the ACLP and SCC values. Where the criteria refer to the sum of PFOS and PFHxS, this includes PFOS only, PFHxS only, and the sum of the two.
15. For PFOA, PFOS and PFHxS and any other forms of PFAS assessed ASLP is the method to be used.
16. Proposed level for phenol and toluene in Hazardous Waste Management System: Identification and Listing of Hazardous Waste – Toxicity Characteristics Revisions, Final Rule (USEPA 2012b).
17. Plasticiser compounds means the total of di-2-ethyl hexyl phthalate (CAS Registry Number 117- 81-7) and di-2-ethyl hexyl adipate (CAS Registry Number 103-23-1) contained within a waste.
18. The following polycyclic aromatic hydrocarbons are assessed as the total concentration of 16 USEPA Priority Pollutant PAHs, as follows:

Polycyclic aromatic hydrocarbons (total)

NAME	CAS REGISTRY NUMBER	NAME	CAS REGISTRY NUMBER
Acenaphthene	83-32-9	Chrysene	218-01-9
Acenaphthylene	208-96-8	Dibenzo(a,h)anthracene	53-70-3
Anthracene	120-12-7	Fluoranthene	206-44-0
Benzo(a)anthracene	56-55-3	Fluorene	86-73-7
Benzo(a)pyrene	50-32-8	Indeno(1,2,3-cd)pyrene	193-39-5
Benzo(b)fluoranthene	205-99-2	Naphthalene	91-20-3
Benzo(ghi)perylene	191-24-2	Phenanthrene	85-01-8
Benzo(k)fluoranthene	207-08-9	Pyrene	

19. Scheduled chemicals must be managed in accordance with the NSW EPA's scheduled chemical wastes chemical control order 2004, which is available on the NSW EPA website at Scheduled Chemical Wastes Chemical Control Order 2004. The following scheduled chemicals are to be included in the total values specified:

20. Scheduled chemicals (total)

NAME	CAS REGISTRY NUMBER	NAME	CAS REGISTRY NUMBER
Aldrin	309-00-2	Heptachlor	76-44-8
Alpha-BHC	319-84-6	Heptachlor epoxide	1024-57-3
Beta-BHC	319-85-7	Hexachlorobenzene	118-74-1
Gamma-BHC (Lindane)	58-89-9	Hexachlorophene	70-30-4
Delta-BHC	319-86-8	Isodrin	465-73-6
Chlordane	57-74-9	Pentachlorobenzene	608-93-5
DDD	72-54-8	Pentachloronitrobenzene	82-68-8
DDE	72-55-9	Pentachlorophenol	87-86-5
DDT	50-29-3	1,2,4,5-Tetrachlorobenzene	95-94-3
Dieldrin	60-57-1	2,3,4,6-Tetrachlorophenol	58-90-2
Endrin	72-20-8	1,2,4-Trichlorobenzene	120-82-1
Endrin aldehyde	7421-93-4	2,4,5-Trichlorophenoxyacetic acid, salts and esters	93-76-5

21. Calculated from Guidelines for Drinking Water Quality (WHO 2011).

Table 3: Summary of criteria for chemical assessment to determine waste classification

WASTE CLASSIFICATION	CRITERIA[1] FOR CLASSIFICATION BY CHEMICAL ASSESSMENT (ANY OF THE ALTERNATIVE OPTIONS GIVEN)	COMMENTS
General solid waste	1. SCC test values ≤ CT1	TCLP test not required
	2. TCLP test values ≤ TCLP1 and SCC test values ≤ SCC1	
	3. TCLP test values ≤ TCLP1 and SCC test values > SCC1[2]	Classify as restricted solid or hazardous (as applicable) If immobilisation approval applies, classify in accordance with that approval
Restricted solid waste	1. SCC test values ≤ CT2	TCLP test not required
	2. TCLP1 < TCLP test values ≤ TCLP2 and SCC test values ≤ SCC2	
	3.TCLP test values ≤ TCLP2 and SCC1 < SCC test values ≤ SCC2	
	4. TCLP1 < TCLP test values ≤ TCLP2 and SCC test values > SCC2[2]	Classify as hazardous. If immobilisation approval applies, classify in accordance with that approval
Hazardous waste	1. TCLP test values > TCLP 2	
	2. TCLP test values ≤ TCLP2 and SCC test values > SCC2	Classify as hazardous if no immobilization approval applies

Notes

1. These criteria apply to each toxic and ecotoxic contaminant present in the waste (see Tables 1 and 2).
2. In certain cases the EPA will consider specific conditions, such as segregation of the waste from all other types of waste in a monofill or monocell in order to achieve a greater margin of safety against a possible failure of the immobilisation in the future. Information about the construction and operation of a monofill/monocell is available in the Draft Environmental Guidelines for Industrial Waste Landfilling (NSW EPA 2016).

Step 6

Step 6: Is the waste putrescible or non-putrescible?

Where chemical assessment of a waste under Step 5 results in classification of the waste as general solid waste, further assessment may be undertaken to determine whether the waste can be classified as 'general solid waste (putrescible)' or 'general solid waste (non- putrescible)'. Otherwise (for example, if the waste generator does not wish to undertake this chemical assessment), the waste must be classified as 'general solid waste (putrescible)'.

General solid waste may only be classified as non-putrescible if:

- it does not readily decay under standard conditions, does not emit offensive odours and does not attract vermin or other vectors (such as flies, birds and rodents), or
- it has a specific oxygen uptake of less than 1.5 milligrams O_2 per hour per gram of total organic solids at 20 degrees Celsius, or
- it is such that, during composting (for the purpose of stabilisation), the mass of volatile solids in the organic waste has been reduced by at least 38%, or
- it has been treated by composting for at least 14 days, during which time the temperature of the organic waste must have been greater than 40 degrees Celsius and the average temperature greater than 45 degrees Celsius.

Non-putrescible materials typically do not:

- readily decay under standard conditions
- emit offensive odours
- attract vermin or other vectors (such as flies, birds and rodents).

Wastes that are generally not classified as putrescible include soils, timber, garden trimmings, agricultural, forestry and crop materials, and natural fibrous organic and vegetative materials.

Output from Alternative Waste Technology facilities (AWTs) that requires disposal must be assessed in accordance with the above to determine its putrescibility.

Appendix 1: Chemical assessment

Sampling and analytical methods

Sampling identifies the average levels of contaminants in the waste being assessed. While the following is provided as a guide, it is not possible to recommend sampling methods for all waste types. Appropriate sampling depends on how consistent any tested property is throughout a batch of waste. It is the waste generator's responsibility to ensure that the sampling and analytical methods used are appropriate for the contaminants they are testing for and that it is undertaken by a suitably qualified environmental consultant.

Where the property being tested for is highly consistent throughout the waste, sampling is relatively straightforward and useful guidance can be found at:

» AS 1199.0–2003: Sampling procedures for inspection by attributes – Introduction to the ISO2859 attribute sampling system (Standards Australia 2003)

» AS 1141.3.1–2012: Methods for sampling and testing aggregates – Sampling – Aggregates (Standards Australia 2012a) is useful for sampling wastes such as aggregates, foundry sand, furnace slag or mining waste.

It is more difficult to accurately sample waste that consists of many different types of waste materials or has chemical contaminants that are not distributed evenly throughout the batch. In such situations, keeping different waste types separate, or separating portions of waste that contain high levels of contaminants from the rest, can be of great benefit.

If unsure of the appropriate sampling or analytical methods for a particular waste, waste generators are strongly encouraged to seek expert help, either from a laboratory that specialises in waste analysis or an appropriately qualified environmental consultant, or both. Since most incorrect chemical assessments of waste are due to poor sampling, it is essential that the sampling regime and analytical method used ensure the results are representative of all components and their variability in the waste and undertaken in accordance with any requirements of an EA.

Test methods for determining SCC and TCLP

The reference test methods for determining both the SCC and TCLP values are as described in the United States Environmental Protection Agency's Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (USEPA 2007) and Updates I, II, IIIA, IIIB, IVA and IVB, available at Hazardous Waste Test Methods / SW-846 – US EPA.

The following procedures for leachate preparation are recommended:

» AS 4439.2–2019: Wastes, sediments and contaminated soils, Part 2: Preparation of leachates - Zero headspace procedure (Standards Australia 2019a).

» AS 4439.3–2019: Wastes, sediments and contaminated soils – Preparation of leachates, bottle leaching procedure (Standards Australia 2019b)

The standard pH for the leaching solutions used must be either 4.93 ± 0.05 if the pH of the waste sample is less than 5.0, or 2.88 ± 0.05 if the pH of the waste sample is greater than 5.0.

To determine the pH of the waste sample, use the test method specified in Clause 7.5 (Selection of Leaching Fluid) of AS 4439.3–2019 (Standards Australia 2019b).

In some instances, the EPA may permit the use of leachates with a pH different from those specified above. EPA authorisation to use an alternative must be sought in writing and will only be provided with adequate justification for the proposed variation. An example might be the testing of a non-putrescible waste for disposal into a monofill or monocell in which it can be shown will not be penetrated by acidic leachate or groundwater.

Precision in chemical analyses

It is important that the test methods and instruments used in analysing a waste are capable of measuring the concentration of each chemical contaminant with enough confidence to assure correct classification.

It is recommended that the upper limit of the combined confidence interval of sampling and analysis (at a probability of 95%) is used for comparison with the maximum values specified in Tables 1 and 2. This approach should give the assessor confidence that a correct classification has been made.

Who can do the chemical analysis and leaching tests?

It is strongly recommended that analytical laboratories accredited by the National Association of Testing Authorities (NATA) perform these analyses and tests.

Frequency of testing

There may be situations in which frequent testing of the waste for an initial period establishes that the characteristics of the waste are consistent enough to give the waste generator confidence to reduce the frequency of testing.

On the other hand, some waste streams may show such large variations in properties that every load of waste would need to be tested before classification.

It is the responsibility of the waste generator to ensure that frequency of testing provides representative samples for all contaminants in that waste.

Appendix 2: Triple-rinsing procedure for cleaning containers

Containers, having previously contained a substance of Class 1, 3, 4, 5 or 8 within the meaning of the Transport of Dangerous Goods Code, or a substance to which Division 6.1 of the Transport of Dangerous Goods Code applies, from which residues have not been removed by washing or vacuuming, are pre-classified as hazardous waste.

The triple rinsing procedure outlined below is for effective washing of empty chemical containers in an effort to change the waste classification of such containers from hazardous waste to general solid waste (non-putrescible). Rinsing must be done immediately after emptying the container, as residues on the walls are more difficult to remove when dry. It is acceptable to use other rinsing treatments, such as pressure rinsing, integrated rinsing or vacuuming, if the results achieved are equal to or better than those from the triple-rinse procedure.

Triple-rinsing (a three-stage rinsing process)

1. Empty the contents into the spray tank and allow the container to drain for an extra 30 seconds after the flow reduces to drops.
2. Fill the container with clean water to between 20% and 25% of its capacity and replace the cap securely.
3. Shake, rotate, roll or invert the container vigorously for at least 30 seconds, so that the rinse reaches all inside surfaces.
4. Empty the rinsate from the container into the spray tank. Let it drain for an extra 30 seconds after the flow reduces to drops.
5. Repeat until the container has been rinsed three times.

Follow these procedures after rinsing the container

After rinsing the container, check the container thread and outside of the container and, if contaminated, rinse with a hose into the spray tank. Rinse the cap separately in a bucket of water and empty the rinsate into the spray tank.

To ensure that it is fully drained, puncture the container from the inside, for example using a crowbar through the container opening. Allow the container to dry completely and store it in a dry place awaiting disposal.

Appendix 3: Immobilisation

Part 1 Introduction

The immobilisation of a contaminant in waste may be the result of a specific treatment process that the waste has been subjected to, or it may simply be a natural property of that type of waste. From a protection-of-the-environment perspective the key issue is whether this immobilisation (that is, resistance to being leached out of the waste) is likely to last in the long term.

It is critical that the immobilisation of the contaminant is sustained over time, otherwise the rate of release of the contaminant could exceed the rate at which the local environment can cope with it or safely mineralise it.

The EPA may approve the immobilisation of specified contaminant(s) contained in a particular type of waste. Approvals of the immobilisation of contaminants may be given in the following ways:

» the EPA can issue general approvals which would apply to all waste generated that has the properties specified in the approval, or

» for a specific waste as a result of an individual application received by the EPA.

In either case, an approval is subject to such conditions determined by the EPA and remains in force until such time as it is revoked by the EPA.

Approvals of immobilisation may specify conditions relating to the subsequent storage, treatment or disposal of the waste. For example, in certain cases the EPA will consider specific conditions (such as the segregation of such waste from all other types of waste in a monofill or a monocell) in order to achieve a greater margin of safety against a possible failure of the immobilisation in the future. These must not be contravened, otherwise a penalty may be imposed.

Table A1 (on the last page of this Appendix) shows the waste types to which the EPA has granted general approval in respect of the immobilisation of specific contaminants. It also specifies the conditions relevant to each approval. If the waste is not currently covered by a general approval, an application for a specific approval has to be made to the EPA.

Information to be provided for a waste that is already covered by a specific approval of immobilisation is covered in Part 3 of this Appendix.

An immobilisation approval enables a waste to be reassessed and reclassified. Conformity with an immobilisation approval would enable a waste to be disposed of at a landfill appropriate to its reclassification. **Immobilisation approvals are applicable to non-liquid waste only**. In granting an immobilisation approval for a given waste, the EPA may attach special conditions and/or disposal restrictions to the approval in accordance with the hazardous and/or toxic properties of the waste.

Part 2 Treatment of waste to achieve the immobilisation of contaminants

Unless the application for the approval of immobilisation relies on a natural property of the waste, some form of treatment/processing will be necessary to achieve the fixing of contaminants.

While avoidance, reuse, recycling or reprocessing of waste are preferred options for waste management, it is recognised that sometimes treatment, then disposal, is the only option. If treatment is unavoidable the EPA's preferred options for waste treatment involve the removal or destruction of the toxic or ecotoxic contaminants to achieve total concentration (SCC) levels of less than SCC2, and leachable concentration levels of less than TCLP2. If this preferred option is not feasible, the permanent immobilisation of inorganic contaminants by the use of physical and/or chemical treatment processes is encouraged. Dilution without achieving the immobilisation of contaminants is not an acceptable waste treatment option.

Macroencapsulation as a treatment option

Macroencapsulation of hazardous waste is the least-preferred treatment option, since it merely places a physical barrier between the chemical contaminants in the waste and the surrounding environment. For example, macroencapsulation of mercury-containing batteries in cement will significantly reduce the degree of chemical attack on the batteries by landfill leachate, but only while the cement casing is intact and free of cracks. On the other hand, if the batteries were finely ground up, treated with appropriate chemicals and then mixed with cement and set into a solid block, the process would be microencapsulation.

Microencapsulation as a treatment option

When waste is microencapsulated, the availability of the immobilised chemical contaminants for release into the environment is low because of the chemical and/or physical interactions between them and the encapsulating material, so that even if the encapsulated material is finely ground up (it should be noted the normal TCLP test for microencapsulated wastes requires crushing of the solid block only to pieces no larger than 9 mm in any dimension before leaching—as specified in Appendix 1, the leachable concentration test results (TCLP) for the chemical contaminants of concern would be significantly lower than those for the untreated waste.

Part 3 The process for approval of immobilisation

All inquiries or applications for immobilisation approvals must be directed to the EPA by phoning Access Canberra on 13 22 81 or emailing environment.protection@act.gov.au

In general the following steps need to be followed by applicants:

Step 1. Check whether there is a general approval for immobilisation

The applicant should check if the waste type is the same as one that is already the subject of a general approval of immobilisation.

If there is a general approval of immobilisation, and there are no additional chemical contaminants that require approvals of immobilisation, then the general approval may be used and there is no need to make an application to the EPA for a specific approval. The onus will be on the waste generator to ensure that the waste is the same as the waste type specified in the general approval and that it is handled according to conditions set in the approval.

If there is no general approval, or there are additional contaminants that require approval, then proceed to Step 2.

Step 2. Check if there is a similar specific approval that might apply to your waste

The applicant should check with the EPA if the waste in question or a similar waste stream has already been approved for immobilisation. Previous approvals can be considered only if the physical/chemical properties of waste and the contaminants of concern are identical.

If there is no previous approval—general or specific—then follow Step 3. If there is an existing approval go to Step 4.

Step 3. Information to be provided by to the EPA for consideration when applying for approval of immobilisation

When applying for the approval of the immobilisation of chemical contaminants in waste as a result of treatment, the applicant will need to demonstrate that avoidance, reuse, recycling or reprocessing of the waste is not feasible. If the application is for recognition of natural immobilisation, the above information will not be required.

For applications involving macroencapsulation, the applicant will also need to demonstrate that another treatment method including microencapsulation is not feasible for the hazardous waste. The application must include a detailed description of the process undertaken to identify other treatment options. If other options are discarded because of cost factors, an estimate of the costs must be supplied.

The applicant should include the following information in a submission seeking specific immobilisation approval:

» the quantity of waste requiring treatment and/or disposal

» background information of the waste (origin), including the history of the site and the source of contamination if the waste is contaminated soil

» a description of the chemical composition of the waste

» the physical/chemical nature of the untreated waste, with test results, including pH, solid/moisture content, concentrations of chemical contaminants and TCLP (or other relevant leaching test) test values.

» chemical contaminants of concern (to be approved as immobilised)

» a description of the immobilisation treatment method/process, if any, with a detailed account of the materials and methods used in the process

» scientific evidence/justification to support the immobilisation of the contaminants of concern. This should include a summary of the following as applicable:

- the mechanism and/or chemistry of immobilisation
- reliable evidence of the successful application of any treatment process (that is proposed to be used) for the immobilisation of the contaminant(s) in the waste, in Australia or overseas
- copies of reputable scientific or engineering journal articles supporting the successful immobilisation of contaminants (either natural or as a result of using the proposed process).

» a treatability report, based on a trial/pilot program or a bench scale study. The treatability report should include:

- leaching performance (based on TCLP or other acceptable relevant leaching tests) of the immobilised contaminants
- physical/chemical properties of the waste (as is, or after treatment if it is processed). For example, pH and physical characteristics (solid/moisture content, and whether it is rigid, powdery or a paste)
- evidence that the treated waste is likely to be stable in the long-term.

Note: This aspect is especially relevant to the immobilisation of waste with high concentrations of contaminants that are bonded within the matrix solely by physical means (for example, in some cases of microencapsulation), where, for example, it is desirable for the treated waste to attain an unconfined compressive strength in excess of 350 kPa as an indicator of long-term stability; we can conclude that unconfined compressive strength is an important factor when the leachable concentrations of contaminants determined for treated waste that has been reduced to a fine powder are at least twice as large than those obtained by testing the coarse sample (less than 9 mm in any dimension), which is normally used for the TCLP testing of encapsulated waste.

» information demonstrating that they can operate any treatment process involved reproducibly, and that they can consistently achieve test results similar to those of the treatability study upon which an approval is based (Include a description of the proposed quality assurance scheme for the treatment process.)

Step 4. Information to be provided by the applicant for types of waste already covered by a specific approval of immobilisation issued to another waste generator.

If the waste or similar waste stream has already been subject to a specific approval issued by the EPA to another waste generator but is not covered by a general approval, the applicant should submit the following information:

- the quantity of waste to be disposed of
- background information on the waste (origin), including the history of the site and the source of contamination if the waste is contaminated soil
- the physical/chemical nature of the untreated waste, with test results, including pH, solid/moisture content, concentrations of chemical contaminants and TCLP (or other relevant leaching test) test values
- a description of the chemical composition of the waste
- chemical contaminants of concern (to be approved as immobilised)
- a treatability report based on a trial/pilot program or a bench-scale study.

How the EPA is likely to assess applications

There is no single assessment criterion for measuring the performance of the immobilised waste. Since the chemistry of different waste types and/or of treatment processes used to fix chemical contaminants in waste can be very different, it is difficult to make hard and fast rules that will apply to the assessment of all wastes.

The EPA's primary concern is to ensure that the immobilisation of the contaminant is sustained over time, otherwise the rate of release of the contaminant could exceed the rate at which the local environment can cope with it or safely mineralise it. The thrust of the EPA's assessment of applications will be to determine if adequate information has been supplied to demonstrate that this is the situation. The EPA will consider information and test results supplied by applicants on both the physical and chemical nature of the immobilised waste while assessing the application.

Depending on the waste, such test results and other information to be provided by the applicant may typically include:

- Toxicity Characteristics Leaching Procedure
- Multiple Extraction Procedure for highly alkaline waste (for example, cement/lime treated waste or waste with pH >11)
- a buffering capacity test to determine the ability of the immobilised waste to maintain a pH value when exposed to acidic or basic situations
- a test to determine whether unreacted treatment reagents are present in the chemically treated waste. If such reagents are present, then discuss whether they are toxic and/or bioavailable
- the likelihood of long-term stability, to determine the durability and/or physical strength of the immobilised waste as discussed in Part 3, Step 3 above
- documentation showing that appropriate sampling and statistical procedures are used to ensure that the test results are representative of the whole of the waste being assessed/evaluated.

It is important for the applicant to demonstrate that the fixing of the contaminants works 'in principle'. It is equally important for the applicant to demonstrate that the waste stream for which the approval will apply is consistent in its characteristics from one batch to the next, irrespective of whether the waste is proposed to be treated or a natural immobilisation is involved. If the EPA requires additional information to be supplied by the applicant, the EPA will advise the applicant of this.

Part 4 How to assess waste once an approval of immobilisation is obtained

When EPA approval has been given for the immobilisation of one or more of the contaminants that it contains, the waste can be classified according to the leachable concentration (TCLP) test results alone for the specifically nominated contaminants in the approval. In other words, the total concentration (SCC) of the contaminants specifically nominated in the approval may be ignored in the assessment of the waste. However, any contaminants not specifically nominated in the approval must still be assessed using both SCC and TCLP. If the immobilisation of a contaminant for which TCLP limits are not specified in this Standards is approved, the EPA will advise on the management options that are available for such materials.

Table 4: Waste types for which a general approval of immobilisation applies[1]

WASTE TYPE	IMMOBILISED CONTAMINANT(S)	SPECIFICATION OF NATURE OF IMMOBILISATION OR TREATMENT PROCESS
CCA-treated timber	Arsenic and chromium	Natural
Creosote-treated timber	Creosote	Natural
Cattle-dip- contaminated soil	Arsenic	Natural
Activated carbon	Contaminants in Table 2 (of the Standards) 1) **except:** chemicals or declared chemical wastes subject to Chemical Control Order issued by the NSW EPA 2) C6-C9 petroleum hydrocarbons.	Natural

Notes:

1. This means that total concentration (SCC1, SCC2) limits in Table 2 of the Standards do not apply to the contaminants listed in this table (in the same row as the waste type), and therefore these particular contaminants may be assessed according to their leachable concentration (TCLP) only. For contaminants not listed here, the normal assessment process applies.

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