2022 edition

Australian hazardous waste data and reporting standard

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1. Introduction

National Australian data on hazardous waste is required for several purposes, including annual reporting under the Basel Convention and periodic domestic reporting. Intrastate movements of hazardous waste are substantial, and there is a need for an Australian-wide understanding of the sources, types, fates of hazardous wastes and of the availability of infrastructure to deal with them. The Basel Convention also contains obligations regarding domestic management of hazardous waste, as well as data and reporting.

For national reporting purposes, the Australian Government relies on data collected and submitted by the states and territories, which have legislative responsibilities for wastes generated in their jurisdiction. However, compiling a national data set is not straightforward due to gaps and disparities in state and territory systems for collecting, collating and reporting hazardous waste data. These gaps and disparities reflect the differing development of jurisdictional legislation, policy, regulation and licences for controlling hazardous waste.

This national standard for hazardous waste data and reporting is intended to help alleviate some of the data collation difficulties and also diminish the differences between regulatory systems, reducing costs and providing more certainty for regulators and businesses. The standard guides data management systems and processes and, where the guidance differs from the current system in a state and territory, represents a reference for opportunistic and voluntary adoption where convenient.

The standard seeks to:

- clarify key terms and definitions
- establish principles and processes for classifying hazardous waste
- set out methods for obtaining, adjusting and collating national waste tonnage data
- institute standardised approaches for classifying and reporting hazardous waste source sectors and hazardous waste pathways, fates and receiving infrastructure
- confirm methods for managing and reporting hazardous waste data
- be consistent with relevant standards and guidance[1].

The Australian Government has been working with the states and territories in multiple ways to improve the quality and efficiency of hazardous waste management, tracking and data in Australia. This standard is not the last word in the area of waste data, and is likely to require further revision on an ongoing basis. Any such revisions will occur in consultation with the states and territories.

The *Australian hazardous waste data and reporting standard 2022* was produced by Blue Environment and Ascend Waste and Environment, building on the 2019 version. The document history process is summarised in Appendix A.

Section 2 explains key terms used in this document. It is followed by five sections covering different aspects of hazardous waste data and reporting: classification; tonnage data; source sectors; management; and data management and reporting. For each, a brief introduction is followed by a series of brief 'items' specifying a standard approach, some of which refer to detail in appendices.

[1] Including the *Methodological guide for the undertaking of national inventories of hazardous wastes within the framework of the Basel Convention*, available from: http://www.basel.int/portals/4/download.aspx?d=UNEP-CHW-PUB-GUID-MethodologicalGuide.English.pdf

2. Key terms and definitions

The following list is intended to provide clear and consistent terminology for national conversations on hazardous waste, and to clarify terms used in this document. The terminology is consistent with other authoritative Australian documents[2] but terms are listed here only when they are relevant to the purpose of this document. Terms are listed in alphabetical order. References to terms listed here are shown in red.

Arisings (of hazardous waste)

Hazardous waste is said to 'arise' when it is delivered to infrastructure for management. Typically, arisings data is obtained from intrastate tracking systems. Arisings differ from 'generation' (a more common term in waste reporting) in that if a given mass of hazardous waste is transported to more than one site during a data period, it may arise more than once in the tracking system data.

Basel Convention

The *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal*; an international agreement signed by Australia.

Characterisation and categorisation (of the hazard)

In the classification process for a hazardous waste, when designation does not unambiguously show the material is a hazardous waste, then an understanding of its hazardous characteristics is required through characterisation and categorisation.

- Characterisation is the determination of whether the waste exhibits one or more *hazard characteristics* such as flammability, reactivity, infectiousness or toxicity. The latter involves determining whether the waste contains any of a selection of constituents – typically *chemical contaminants* – at levels above those prescribed as acceptable.
- Categorisation is the process of placing the waste into a category of relative hazard, based on comparison of the level of the constituent in the waste against its prescribed upper limit for each category.

Characterisation and categorisation may involve laboratory testing using methods usually prescribed or recommended in guidance. Such guidance will include the hazard categories developed to direct the management of the waste down different paths depending on the level of hazard. Concentration and solubility may both be significant in the characterisation process. The combination of designation and characterisation/ categorisation provides a transparent determination of a waste's hazard status.

[2] There is an Australian standard focusing on waste terminology: AS/NZS 3831:1998 *Waste Management – Glossary of Terms*; and AS4082:1992 *Recycled Paper – Glossary of Terms*. More recently, relevant definitions, including for 'waste', 'reuse', 'recycling' and 'energy recovery', are given in the *Australian Standard for Waste and Resource Recovery Data and Reporting* (available from: https://https://www.awe.gov.au/environment/protection/waste/publications/national-standard-waste-and-resource-recovery-data-and-reporting).

Classification (of hazardous waste)

The regulatory process of determining if a waste should be considered hazardous and, if so, how it should be described with reference to a list of waste codes. This process can be understood via a three-level typology[3]: (1) designation; (2) characterisation and categorisation of the hazard; and (3) codification. See Section 3 for more detail.

Codification (of a hazardous waste)

In the classification process, when the process of designation and/or characterisation and categorisation have determined that a waste is, in fact, hazardous, then it must be codified. This is giving the waste a name, code and/or description as part of some system. Two examples of codification systems are:

- The two levels of alphanumeric codes and descriptions in the NEPM:
  - the list of 75 waste categories contained in Schedule A, List 1 of the NEPM, which have been given alphanumeric codes (NEPM codes), such as *A100 Waste from heat treatment and tempering operations containing cyanides*
  - the list of 15 headings to aggregate these NEPM codes, used for some reporting purposes, described using the 'alpha' component of NEPM codes, such as A*. Plating and heat treatment*
- the Y-codes used for reporting under the Basel Convention.

Controlled waste

Waste as defined in the NEPM. The NEPM list of controlled wastes is the primary reference for codification of hazardous waste in a national reporting context in Australia.

D and R codes

A set of 28 codes (D1 to D15, and R1 to R13) established under Annex IV of the Basel Convention that represent different types of fates for hazardous waste within the broad groups of disposal and recovery/recycling/reuse.

Designation (of a waste as hazardous)

An element of the hazardous waste classification process involving the high-level determination, usually via regulation, of whether a waste is hazardous. Designation is based on 'in or out' questions such as:

- Does the waste meet a broad regulatory definition for hazardous waste?
- Does it unambiguously appear on an *inclusionary* list?
- Does it unambiguously appear on an *exclusionary* list?

An *inclusionary list* is a specific list that nominates a waste as hazardous based on: inherent chemical or physical characteristics (e.g. 'highly odorous organic chemicals'); a description of the process/ industry from which it arises (e.g. 'tannery wastes'); or the article or product from which it derives (e.g. 'waste pharmaceuticals, drugs and medicines'). An *exclusionary list* may form part of a

[3] This builds on work by: Moore S and Shin-Yu T (1997) *Designation & Classification of Hazardous Wastes. Version 2,* UNSW,; and White R and Heckenberg D (2011) *What is hazardous waste and what makes it hazardous? Briefing Paper No.2,* University of Tasmania, available from: http://www.utas.edu.au/__data/assets/pdf_file/0003/193413/Briefing_Paper_2_What_is_hazardous_waste.pdf

hazardous waste definition of specify exemptions to a category (e.g. intact or partly disassembled televisions in Queensland).

In some cases, the answer to the 'is it in, is it out' question is obvious. In others, a waste is not conclusively designated as hazardous, and classification must be informed by characterisation and categorisation of the waste.

Fate (of hazardous waste)

Waste fate refers to the ultimate destination of the waste within the management system. Types of fate may include recycling, energy recovery, long-term storage and disposal, each of which categories can be divided into more specific fates. Treatment, transfer and short-term storage are not fates, but are rather part of the pathway leading to a fate. See Section 3 for more detail.

Generation (of hazardous waste)

The process of creating a waste. For data purposes, generation of non-hazardous waste is normally taken as the sum of waste disposed of, recycled or sent for energy recovery. Generation of hazardous waste is more difficult to estimate because data on the tonnages to each of these fate types is not always readily available, and additional pathways, such as storage or treatment, may be taken by hazardous waste on route to its final fate.

Typically, in Australia, waste is not considered generated until it leaves a site, but this is not the case under the Basel Convention. For national reporting, to the extent practicable, hazardous waste stored on the site where it was produced should be reported as generated in the year it was stored.

Hazardous waste

Waste that, by its characteristics, poses a threat or risk to public health, safety or to the environment[4]. In national reporting this term is taken to correspond with wastes having one or more of the following characteristics:

- is listed under the Basel Convention
- requires a permit under the *Hazardous Waste (Regulation of Exports and Imports) Act 1989* to be imported or exported from Australia
- is generally regulated by jurisdictions as requiring high levels of control, including: regulated waste (Queensland); trackable waste[5] (New South Wales); priority waste (Victoria); listed waste (South Australia and NT); or controlled waste (ACT, Tasmania and Western Australia)
- is nominated as hazardous by the Australian Government[6].

NSW (along with the ACT[7], due to its adoption of NSW classification procedures) uses the term 'hazardous waste' in a specific regulatory sense. The NSW *Protection of the Environment Operations (Waste) Regulation 2005* and associated guidance defines 'hazardous waste' as one of six classes of

[4] From AS/NZS 3831:1998 *Waste Management – Glossary of Terms.*

[5] 'Trackable waste' is defined in NSW for the purpose of waste transport licensing and waste tracking. Some wastes that do not require tracking in NSW are included in national reporting as hazardous wastes.

[6] For example, the Australian Government has considered waste lithium ion batteries as hazardous in assessing the adequacy of hazardous waste infrastructure.

[7] Environment ACT (2000) *ACT Environmental Standards: Assessment and Classification of Liquid & Non-liquid Wastes,* June, available from: https://files.accesscanberra.act.gov.au/legacy/3470/Assessment%20and%20classification%20of%20liquid%20and%20non-liquid%20wastes.pdf

waste – and it typically cannot be disposed at landfill without hazard reduction treatment such as immobilisation. 'Hazardous waste' in this strict NSW and ACT regulatory interpretation is equivalent only to those *hazardous wastes* (in national reporting terminology) that would be categorised at the higher hazard end of the range.

Infrastructure groups (for managing hazardous waste)

A typology applied to infrastructure that accepts and managed hazardous wastes, as applied in a database maintained by the Australian Government. See Section 6 for more detail.

Management (of hazardous waste)

Management of hazardous waste comprises the activities through which it is dealt with in infrastructure approved to receive it. This term is used in place of the term 'treatment', which is often used by states and territories for a similar purpose (see Item 20).

Management class

A grouping of management categories that allows for high level reporting, including for combined reporting with non-hazardous waste. The classes of management are: recycling, energy recovery, long-term storage, disposal, treatment and short-term storage. The first four of these are a type of fate; the last two are a type of pathway.

NEPM

The *National Environment Protection (Movement of Controlled Waste between States and Territories) Measure*, an agreement between the Australian Government and the states and territories on the regulation of hazardous (controlled) waste movements between Australian states and territories.

Pathway (of hazardous waste)

The various steps in the route between hazardous waste generation and fate, potentially including transfer, storage and/or treatment.

Source (of hazardous waste)

Where a waste is generated. This may be applied to a location (e.g. state or territory) or to a company or industry sector.

Storage (of hazardous waste)

Accumulation or keeping in approved infrastructure, typically while awaiting the development of appropriate and cost-effective management infrastructure or processes, or while building economically viable quantities for transfer and management. Storage can be considered 'short-term' only when there is a plan and reasonable expectation that the term of storage will be less than 10 years.

Waste should be reported as stored notwithstanding the type of receival infrastructure so long as it is recorded as stored on a transport certificate and its storage accords with licence requirements.

Stream (of waste)

The main source types, namely: municipal solid waste; commercial and industrial waste; and construction and demolition waste.

Tracking (of hazardous waste)

Most jurisdictions[8] operate systems for 'cradle to grave' tracking of the movement of each consignment of hazardous waste within the state from point of generation to treatment or disposal. The purpose of these systems is to provide a safeguard against inappropriate or illegal management. Tracking certificates must be created when a waste leaves a facility and when it reaches the receiving facility. They record the type and quantity of waste, the dates, and the producer, transporter and details of the receiving facility. Copies are sent to the government. Increasingly, these records are electronic but paper certificates are still used in some jurisdictions. For simplicity, this document refers to intrastate tracking simply as 'tracking'.

All states and territories track exports of hazardous waste to and from other states and territories using the systems established under the NEPM. Within this document these systems are referred to as 'inter-state tracking'.

Treatment (of hazardous waste)

The removal, reduction or immobilisation of hazardous characteristics to enable the waste to be sent to its final fate or further treatment.

Typology

A system used for putting things into groups according to how they are similar.

[8] At the time of writing: NSW, NT, Qld, SA, Vic and WA operate intrastate tracking systems.

3. Hazardous waste classification

The differences in jurisdictional systems for hazardous waste classification are deeply embedded in legislation, regulation and licensing, and cannot be easily harmonised in the short-term. These differences add a layer of uncertainty in national reporting and increase complexity and cost for businesses operating nationally. The elements of this standard are intended to help resolve the discrepancies over time.

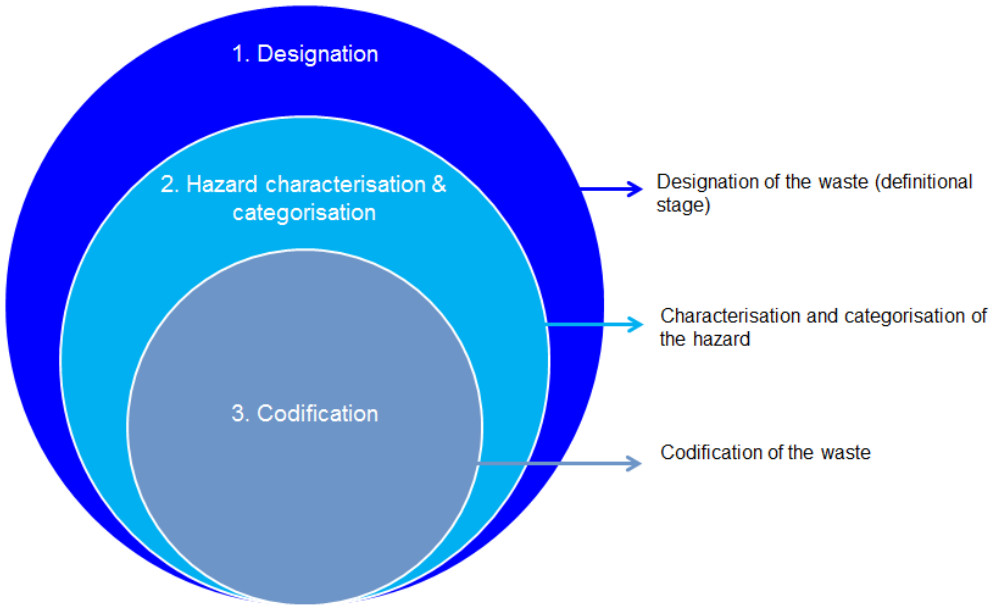
Most jurisdictions have developed and regulated their own codification systems, which generally mirror NEPM codes. However, some wastes could potentially be included in more than one code. Examples: a waste may be contaminated with multiple chemicals and therefore validly placed in multiple codes; soils contaminated with asbestos could potentially be coded (in some states) as *N120 Soils contaminated with a controlled waste* or *N220 asbestos contaminated material*. Discrepancies in coding methods undermine the quality of hazardous waste data, including examination of trends.

Item 1 Classification method

Wastes should be classified using an approach similar to the three-level step-by-step process[9] shown in Figure 1 and with terms explained in Section 2. The process is:

1. *Designation*, which involves checking the waste against pre-defined regulatory definitions and lists.
2. *Characterisation and categorisation*, which may involve laboratory testing, and is necessary if designation is inconclusive. Steps 1 and 2 will always determine if a waste is hazardous.
3. *Codification*, which involves giving the waste a name, code and/or description as part of some system.

Figure 1 Illustration of the typology and process for classifying hazardous waste



[9] This builds on work by: Moore S and Shin-Yu T (1997) *Designation & Classification of Hazardous Wastes. Version 2,* UNSW,; and White R and Heckenberg D (2011) *What is hazardous waste and what makes it hazardous? Briefing Paper No.2,* University of Tasmania, available from: http://www.utas.edu.au/__data/assets/pdf_file/0003/193413/Briefing_Paper_2_What_is_hazardous_waste.pdf

EPA Victoria's now obsolete *Solid industrial waste hazard categorisation and management guideline* and its replacement under the new regulatory framework (Waste disposal categories – characteristics and thresholds[10]) explain the Victorian system, a good example of the categorisation and characterisation approach.

Item 2 Guidance for classifying hazardous waste

The Australian Government may produce or endorse guidance under this standard on:

- principles and methods for classifying hazardous wastes
- hazardous waste classifications, including risk-based contaminant thresholds, that specify whether a waste should be deemed hazardous[11].

Wastes should be classified in accordance with that guidance. (See also Item 9.)

Item 3 Classifying new hazardous wastes

Periodically, 'new'[12] hazardous wastes may come to the attention of regulators in any jurisdiction. When this occurs, the jurisdiction should liaise with other states and territories and the Australian Government concerning classification. On agreement, one government may take the lead in running the classification process on behalf of all, including laboratory-based characterisation of hazards and categorisation of contaminant levels. The Australian Government will update the NEPM codes to ensure they encompass any new wastes.

In January 2021, changes were introduced to the Basel Convention to classify some plastic wastes under the Convention and therefore subject to the its control of transboundary movements between parties[13].

Item 4 Classifying problematic hazardous wastes

Periodically, a government may receive intelligence that inconsistencies in jurisdictional classifications of a hazardous waste are particularly problematic for industry. Inconsistencies may, for example, cause difficulties in complying with transport requirements or tracking certification processes. When this occurs, the jurisdiction should liaise with other states and territories and the Australian Government in relation to the problem. On agreement, one government may take the lead in running the re-classification process on behalf of all, including laboratory-based characterisation of hazard and categorisation of hazards and categorisation of contaminant levels.

Item 5 Classifying hazardous waste treatment outputs

Waste outputs from hazardous waste treatment infrastructure should be designated hazardous unless they have been classified otherwise using the process set out in this standard.

[10] EPA Victoria (2021) *Waste disposal categories – characteristics and thresholds*, available from: https://www.epa.vic.gov.au/about-epa/publications/1828-2

[11] For example, HEPA (Heads of EPAs Australia and New Zealand 2020), PFAS National Environmental Management Plan Version 2.0, available at: https://www.awe.gov.au/sites/default/files/documents/pfas-nemp-2.pdf

[12] 'New' hazardous wastes could be declared if, for example, Australia ratifies new persistent organic pollutants under the Stockholm Convention, or if discarded lithium ion batteries develop into a significant risk for the general waste sector.

[13] Basel Convention Plastic Waste Amendments, *BC-14/12: Amendments to Annexes II, VIII and IX to the Basel Convention*, available at: http://www.basel.int/Implementation/Plasticwaste/PlasticWasteAmendments/FAQs/tabid/8427/Default.aspx#LiveContent[BC-14/12].

Item 6 Hazardous waste codes for national reporting

NEPM codes will be used for most national reporting. Jurisdictional waste codes will be converted to NEPM codes using the mapping process illustrated in Appendix B. The national data set encompasses current Qld regulated waste; NSW trackable waste; Vic priority waste; SA and NT listed waste; and ACT, Tas and WA controlled waste with the following exceptions, which are excluded:

- NSW, Qld, SA, WA and NT: K130 Sewage sludge and residues including nightsoil and septic tank sludge
- Vic and WA: L100 Car and truck washwaters
- Vic and WA: L150 Industrial washwaters from cleaning, rinsing or washing operations, NOS.

Where it considers it appropriate, the Australian Government may:

- include additional hazardous wastes[14]
- collate NEPM codes into other groups for convenient reporting[15].

The Australian Government, in concert with the states and territories, will maintain the list of wastes under the NEPM for relevance, including the potential for new waste codes. Codes that may require review include those shown in Table 1.

Table 1 NEPM waste codes requiring review

Waste type	Suggested amendment
PFAS contaminated materials including waste PFAS containing products and contaminated containers (M270)	Split up individual PFAS wastes to allow PFAS waste matrices to be clearly identified. Options to achieve this include using: • sub-codes (e.g. M271, M272, M273, etc.) • more than one code at a time[16] • contaminant identification (see Item 26).
Asbestos (N220)	Designate: • N220 for wrapped asbestos-containing materials • New code (N221?) for rubble contaminated with asbestos-containing material • Soil contaminated with asbestos containing material to be reported under another new code (N222?) or potentially as a type of N120 (contaminated soil), so long as contaminant types are reported as described in Item 26.
Plastic waste containing hazardous constituents (new)	New waste code to capture the new Basel code, Y48[13], to be codified with a new NEPM code, such as N130 or T150, and to be described along the following lines: 'Plastic waste, including mixtures of such waste, containing contaminants or constituents of a controlled waste, to an extent that it exhibits a hazardous characteristic.'

[14] For example, recent reporting has included waste lithium ion batteries, biosolids and some persistent organic pollutants that have been added to the Stockholm Convention but have not yet been ratified by Australia.

[15] *Hazardous waste in Australia 2021* uses 29 groups based on the NEPM 15 system with some disaggregation and additions.

[16] Vic uses 'combination codes' where M270 denotes PFAS contamination and an additional code denotes the matrix the contamination is within (e.g. PFAS contaminated soil would be M270/ N120 and PFAS containing fire-fighting foams would be M270/ M250, etc). At this early stage in its implementation, it is unclear how this Vic approach will fit with the system of contaminant codes, or how broadly it extends into a range of waste combinations.

States should verify the historical record of their hazardous waste arisings as reported by the Australian Government, including mapping of historical and outdated state waste codes to modern state waste codes where possible.

Item 7 Hazardous waste codes for Basel reporting

Basel reporting needs to occur using 'Y-codes' – a different codification system from NEPM codes. NEPM codes have been mapped to Basel Y-codes as shown in Appendix C . Several NEPM codes do not readily map to Basel Y-codes, so eight new descriptions were created that are referred to as Y+1 through to Y+8.

Item 8 Principles of codifying hazardous waste

Users of waste transport certificates should codify wastes based on the guidance given in Appendix D.

Item 9 Guidance for codifying hazardous waste

Through consultation with industry, the Australian Government and the states and territories should develop guidance on how industry users should code wastes. The principles and examples in Appendix D should form the basis of such guidance. Existing jurisdictional approaches and insights, such as those published by NSW[17] and WA[18] (note the latter's *Guide to classification of category G wastes* in particular), should be utilised.

Item 10 Gradual conversion to NEPM codes

As opportunities arise, states and territories should convert their codification systems to match the list of alphanumeric codes (NEPM codes), such as *A100 Waste from heat treatment and tempering operations containing cyanides*, used for waste tracking under the NEPM.

Item 11 Waste form

States mostly report the 'form' (or physical state) of tracked waste but do not use consistent terminology. The terms that should be adopted are listed in Table 2.

Table 2 Characterising waste form

Term	Comment
Solid, S	
Liquid, L	
Sludge, P	
Mixture, M	For when a load contains waste with different forms
Compressed gas, G	Currently applicable only in NSW
Items, I.	For example, tyres or containers

[17] EPA NSW (2013) *Waste codes & descriptions,* available from: https://www.epa.nsw.gov.au/owt/wclist.htm

[18] WA Department of Environment Regulation (2014) *Guideline: Driver information package for transportation of bulk controlled waste,* available from: https://www.der.wa.gov.au/images/documents/your-environment/controlled-waste/driver-information-package.pdf

4. Hazardous waste tonnage data

Standard approaches are needed for obtaining and reporting hazardous waste tonnage data. These must address several issues.

First, collated tracking system data does not provide a comprehensive and best possible data set. This is because:

- two jurisdictions do not run intrastate systems for tracking of hazardous waste
- tracking systems may not collect data on all hazardous wastes – a list showing which jurisdictions do not track particular codes is given in Appendix E
- alternative sources of data may be available that provide nationally consistent figures[19].

Item 12 addresses this issue.

Second, the representation in the data of hazardous waste that arises in one jurisdiction but is managed in another is variable. It is usually included in the data of the receiving jurisdiction, sometimes included in the data of the source jurisdiction, and sometimes both. This needs to be carefully handled.

Third, unwanted materials are generally recorded as 'waste' only when they move offsite. Materials stored on the site where they are generated are not recognised as waste. The Basel Convention, on the other hand, considers a waste hazardous due to its inherent characteristics rather than when those characteristics have the potential to cause harm off-site. Item 13 addresses this issue.

Fourth, tracking system data need adjusting to take into account that information may be collected in varied units: namely, numbers of items (e.g. drums and tyres); volume (e.g. many liquids); or mass. Item 14 addresses this issue.

Fifth, annual tonnage data is needed in different contexts. In some cases, for example in assessing the adequacy of infrastructure, waste 'arisings' data[20] is required in which a given mass of waste may be counted more than once if it passes through more than one type of infrastructure (e.g. a treatment plant then a landfill). In other cases – for example in compiling overall national waste accounts – waste 'generation' data is required in which a given mass of waste should be counted only once even if it passes through more than one type of infrastructure. The data obtained from tracking systems is waste arisings. To produce generation data from arisings data, adjustments are needed to correct for multiple counting of units of waste that is transported to more than one facility. Item 15 addresses this issue.

Item 12 Sources of hazardous waste tonnage data for the national data set

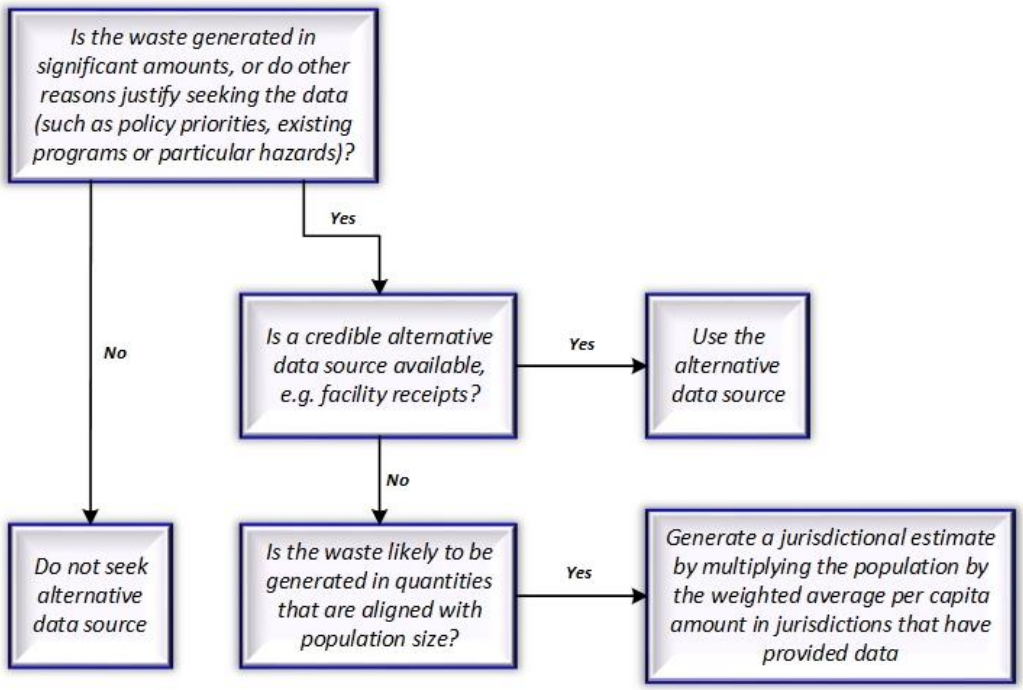
Where available, tracking system data will be used as the primary source of national data on hazardous waste tonnages (with appropriate adjustments – see below). NEPM data will be used as the primary data source in jurisdictions lacking intrastate tracking. Jurisdictional data may be supplemented or adjusted using other sources, such as from industry bodies or landfill data collected by states and territories, based on the considerations illustrated in Figure 2.

[19] In recent years, alternative sources have been used in reporting tyres and biosolids, for example in Basel Convention reports.

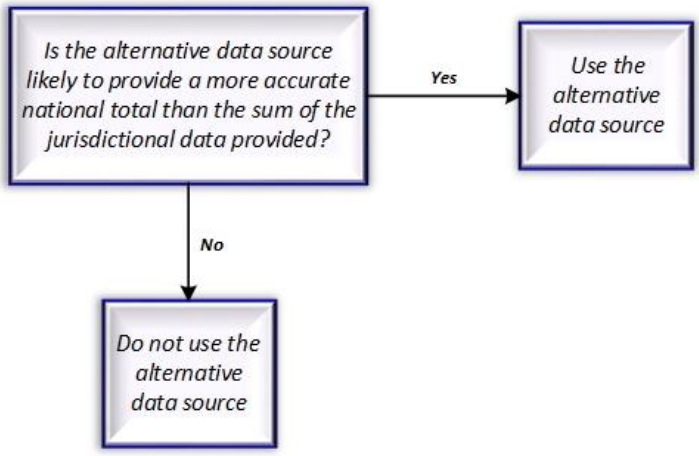
[20] 'Arisings' and 'generation' of hazardous waste are defined in Section 1.

Figure 2 Considerations in determining whether hazardous waste data from the states and territories should be supplemented or adjusted using alternative data sources

a) Where there is a gap in the hazardous waste tonnage data provided by a state or territory



b) Where there is no gap, but an alternative source is available that provides data for all or most jurisdictions, or a national figure



Item 13 Onsite wastes in the national data set

Where known, significant and quantifiable additions to major on-site stockpiles of hazardous waste during the reference year may be included in national hazardous waste data.

Item 14 Unit conversion factors

A set of waste type-specific factors for converting volume measures and numbers of items to tonnes in included in Appendix F of this standard. These factors should be used by all states and territories and the Australian Government for converting hazardous waste data to a consistent tonnage basis.

Item 15 Converting waste arisings data to waste generation data – multiple count adjustments

Hazardous waste arisings are the sum of waste tonnages sent to all types of hazardous waste infrastructure. In using arisings data to estimate hazardous waste generated, the Australian Government will exclude hazardous waste sent to facilities for short-term storage or transfer to the extent the relevant tonnes can be identified and the management can be verified. This is consistent with the definition of hazardous waste 'generation' given in Section 2[21].

As an example, consider the flow diagram in Figure 3 overleaf (the diagram is simplified – only 'treatment' is shown as producing hazardous waste outputs). In this figure, hazardous waste:

- arisings = the sum of hazardous waste received by all infrastructure types = 2,400 kilotonnes
- generation = arisings less 300 kilotonnes to short-term storage or transfer = 2,100 kilotonnes.

Waste sent to facilities for short-term storage or transfer is difficult to identify. Tracking certificate users sometimes use the associated codes for long-term storage. To identify the tonnes for subtraction in converting 'arisings' to 'generation', the following process will be adopted:

1. identify the tonnes sent to management codes D13, D14, D15 and R13 (see Appendix H for descriptions) or their close equivalents
2. characterise these flows as 'major' (management proportion to storage is nominally greater than 20%) or 'minor' (management proportion to storage is nominally less than 20%)
3. inspect the tracking data to determine whether the quantities of hazardous waste leaving the receiving management facility are consistent with short-term storage
4. treat the different flows as shown in Table 3.

Table 3 Multiple count adjustment process

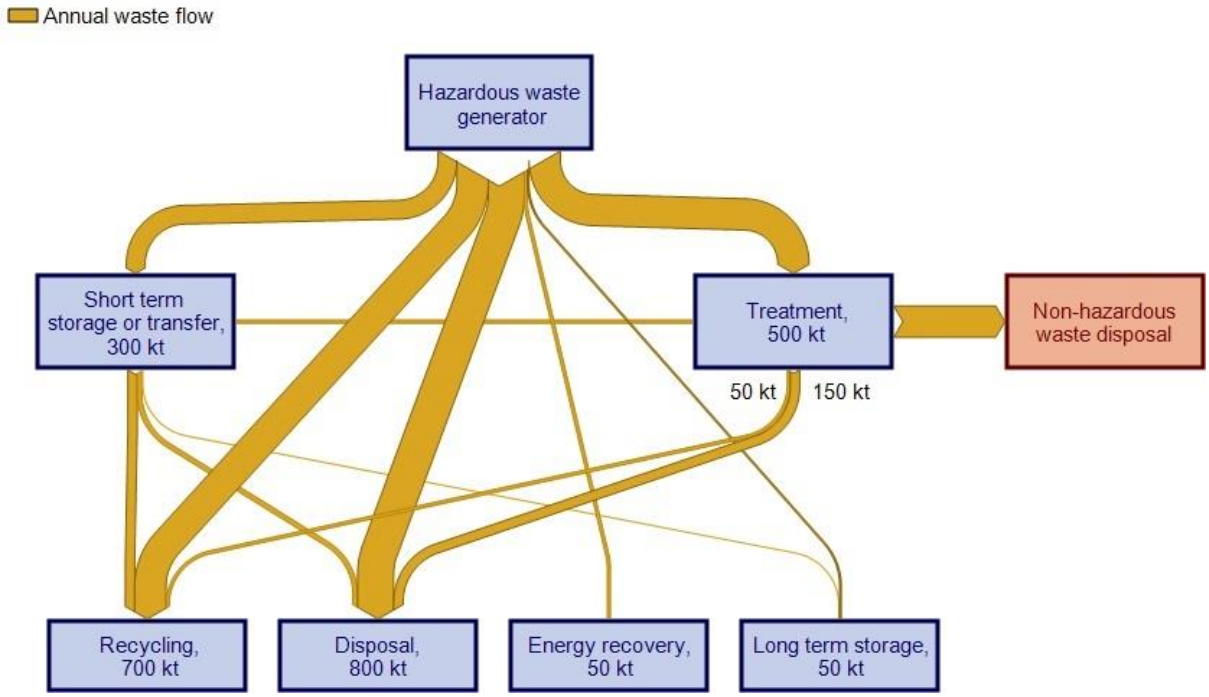
Flow size	Tracking data inspection outcomes	Approach
Minor	n/a	No multiple count adjustment made. Arisings = generation.
Major	The quantities leaving the management facility are consistent with short-term storage	Adjust for multiple count as follows: Generation = arisings – (storage x MC%), where MC% = multiple count percentage, determined from tracking data inspection of tonnages in, and out, of the storage facility over an annual period.
	The quantities leaving the management facility are inconsistent with short-term storage	No multiple count adjustment made. Arisings = generation.

Detailed analysis of major flows to storages will be conducted periodically. Analysis by the authors of this Standard in 2019 showed that, for most wastes analysed, the difference in subtracting a double-count and leaving it unadjusted was less than 10% of that waste's arisings tonnage. This is likely to be well within the uncertainty in the overall method of data collation, given the number of variables involved in the use of tracking system data. Therefore, since the 2019 analysis:

[21] Some hazardous wastes are fundamentally transformed by their management, e.g. incineration of hazardous clinical waste produces hazardous ash fundamentally different from the input material in form, mass and hazard type. The previous version of this standard attempted to exclude this material from 'generation' for simplicity and consistency, However, industry objected to this approach as it wants data on these different wastes. In this revision we therefore include such outputs as generation, noting that they are 'generated' separately from the original waste.

- a portion of stored quantities of NEPM code wastes G110, J120 and K110 has been deducted as potential double-counts
- for other wastes, multiple count correction have been ignored, i.e. generation = arisings.

Figure 3 A simplified schematic of annual flows of hazardous waste



5. Hazardous waste source sectors

Meaningful analysis of hazardous waste flows requires an understanding of industry source sectors. It is a requirement of the NEPM that source industry sectors are reported by Australian and New Zealand Standard Industrial Classification (ANZSIC) codes. However, current tracking systems do not all manage this well. In particular:

- usage rates by reporters are, in some cases, low
- hazardous waste tracking systems generally provide for recording source in codes that are adapted from ANZSIC codes, rather than in actual modern ANZSIC codes – and these adaptations differ
- particular waste loads may comprise material from more than one source
- some material is recorded as sourced from the waste sector when it was not transported from a waste industry premises, suggesting that the definition of 'source' is not always clear.

Item 16 Recording source sector

States and territories should take measures to maximise the identification of source sectors in tracking system data.

Item 17 States and territories to use ANZSIC codes

As opportunities arise, tracking systems should be converted to use only modern ANZSIC codes to record source sectors. Best practice is to use four-digit ANZSIC classes only, because two-digit sub-divisions and three-digit groups are generally not definitive enough to describe a source clearly and, from a practical perspective, jurisdictional database structures housing ANZSIC codes usually require four digits.

ANZSIC codes can be analysed to determine the primary source stream from which a waste derives (i.e. municipal; commercial and industrial; or construction and demolition). Where this information is not available, the assumptions[22] specified in Table 4 will be applied.

Table 4 Assumptions about source stream, where not known

Hazardous waste type	MSW	C&I	C&D
Contaminated soils	0%	28%	72%
Asbestos	0%	46%	54%
All other types of hazardous waste	0%	100%	0%

Item 18 Recording of source sector where there are multiple sources

In tracking systems, where a waste load derives from more than one source, the recorded source should be the one that provides the greatest proportion.

[22] Based on 2012-13 data from Vic and SA.

Item 19 Recording of source sector where waste passes through a chain of handlers

A waste may pass down a chain of handlers. For example, it could be picked up by an agent and taken to a licensed storage premises, then subsequently delivered to a treatment facility that sends treated material and residuals to various other premises. In all cases, the recorded source sector should be the ANZSIC code of the facility or facilities from which the transport vehicle collected the material.

6. Hazardous waste management (pathways, fates and receiving infrastructure)

Meaningful analysis of hazardous waste flows requires an understanding of the facilities to which waste is delivered, including pathways as well as fates, and what happens to it there. This detailed knowledge of various steps in the route between generation and fate provides the transparency and evidence for environmentally sound management of a waste to be assessed.

At the time of writing, state tracking systems include a category variously called 'treatment', 'treatment type' or 'treatment method'. The current arrangements for recording information under this data category are inadequate for national data needs in several ways:

1. Use of the word 'treatment' in this context is confusing. It refers to the fate or pathway of hazardous waste, but the term is also used to represent a particular pathway and infrastructure type in which hazardous waste is processed to reduce the hazard. The term 'management type' would be better (see the definitions for 'treatment' and 'management' set out in Section 2).
2. The typologies under these 'treatment' headings vary from state to state, making it difficult to compile a national data set.
3. The various types of hazardous waste 'treatment' cannot always be readily linked to management class, which encompasses the fate types used for reporting non-hazardous wastes (disposal, recycling, energy recovery). In particular, energy recovery cannot be distinguished in these reporting systems.

   Inability to link 'treatment' to management class isolates the reporting of hazardous waste from non-hazardous waste, which is not ideal since they are often generated and managed by the same companies and end up in similar infrastructure.
4. The Australian Government has developed a database of hazardous waste infrastructure. This is intended to improve infrastructure planning by allowing the correlation of capacity data with waste quantity data and projections. A typology of infrastructure is required that can be readily mapped to waste fates and pathways. Current state systems to not readily facilitate this mapping.

To fix these four areas of inadequacy is not straightforward – amendments are needed to data systems within all five state tracking systems, which would take considerable time under the most optimistic scenarios. This standard therefore establishes different approaches for the short-term and long-term:

- Approach for the short-term – establish a system for mapping state categories of 'treatment type' to a common national typology (see Item 21).
- Approach for the long-term – establish three data categories
  a) hazardous waste management
  b) hazardous waste management class
  c) hazardous waste infrastructure group.

The three data categories for the long-term are discussed below.

a) Hazardous waste management

The current 'treatment type' categories are better considered as management within the receival infrastructure (see Item 20). The most suitable basis for a standard typology of management is Annex IV of the Basel Convention. This establishes a set of 28 D and R fate codes comprising 15 disposal classes (D1-D15) and 13 'processes that may lead to resource recovery, recycling,

reclamation, direct reuse or alternative uses' (R1-R13). Qld and Vic both use D and R codes, but have each adapted them in slightly different ways.

Not all D and R codes are relevant to Australia – for example, D6 *Release into a water body except seas/oceans* may not be needed. Similarly, some codes need amendment, aggregation or disaggregation to make them relevant. For example, *D10 incineration on land* and *D11 incineration at sea* could be merged and amended to a single code *Thermal treatment without energy recovery.* In addition, corresponding with the definitions of fate and pathway in Section 2, there is a need for disaggregation of the D and R codes to provide for treatments (T codes) that are neither disposal nor recovery.

Item 22 addresses these issues.

b) Hazardous waste management class

The various processes undertaken within hazardous waste receival infrastructure need to be categorised as consistently as possible with the primary fate categories applied non-hazardous waste (disposal, recycling, energy recovery) to allow combined reporting.

Some categories of hazardous waste management do not readily fit the categories typically applied to non-hazardous waste:

- Long-term storage is an additional fate applicable to hazardous waste. This is defined in this standard to refer to an intended period of at least 10 years [23].
- Several management activities can be considered 'pathways', or steps in the route between hazardous waste generation and fate. These would include short-term storage and various types of treatment (as defined in this standard).

Item 22 addresses this issue.

c) Hazardous waste infrastructure group

The Australian Government has established a set of infrastructure groups that correspond with the various management classes. The groups are based on the main wastes received and the primary function of the facility, providing a more detailed understanding of their main activities so as to be suitable for infrastructure planning. Industry feedback indicated that these infrastructure groups were reasonable and acceptable. The groups provide a suitable foundation for a standard infrastructure typology.

To provide a complete set of fate data, waste generation needs to be mapped not only to management type but also to the infrastructure group receiving the waste. For example, the tonnages sent to chemical and physical treatment facilities need to be quantified and then the proportions of the outputs of these facilities sent to recycling, energy recovery, and disposal would need to be estimated.

Item 23, Item 24 and Item 25 address this issue.

[23] Includes both pre-approved long-term storage of hazardous waste in designated area/s as well as storage or isolation of hazardous wastes for long periods (≥10 years or indefinitely), such as in the case of geological repository.

Item 20 Hazardous waste management terminology

Application of the term 'treatment' to refer generally to management of hazardous waste should be phased out. The definition of 'management' given in this standard should be applied. 'Treatment' should be considered a type of hazardous waste management.

Figure 4 (p.21) illustrates how this revised terminology fits with the overall system of describing and coding the activities that occur in hazardous waste infrastructure.

Item 21 National reporting of hazardous waste management (short-term)

National reporting of hazardous waste management will apply the typology shown in Table 5, which is similar to that used by NSW and SA.

Table 5 National reporting of hazardous waste management types (short-term)

Management type	Comment
Recycling	
Chemical / physical treatment	Can also include thermal treatment of contaminated soils to remove contaminants.
Landfill	
Biodegradation[24]	Describes either composting (to produce a product to condition soil or improve plant growth) or bioremediation (which may not produce a beneficiation product per se).
Thermal destruction	A disposal method that includes incineration, waste to energy (and related thermal technologies) and thermal destruction of non-soil wastes and their contaminants.
Storage or transfer	
Other	Includes a few rarely used codes such as 'release into seas or oceans', but in practice comprises mostly incorrectly coded or unrecorded management types.

The different jurisdictional typologies for management are mapped to the national set of hazardous waste management types as shown in Appendix G [25].

These management types do not perfectly respond to management class. In particular, the management class of:

- the short-term management type 'biodegradation' may be either 'recycling' or 'disposal'
- the short-term management type 'thermal destruction' may be either 'energy recovery' or 'disposal'.

These problems are due to the aggregated management codes within the data systems of NSW, SA and WA. They would be overcome by adoption of the long-term hazardous waste management codes described in Item 22 and listed in Appendix H.

[24] Unfortunately this management type does not map perfectly to management class – it may include waste to either 'recycling' or 'treatment'. Adoption of the long-term management typology described in Item 22 will resolve this problem.

[25] This mapping is from D and R codes in Vic 'treatment type', not the descriptions in Vic 'disposal type'.

Item 22 Hazardous waste management codes (long-term)

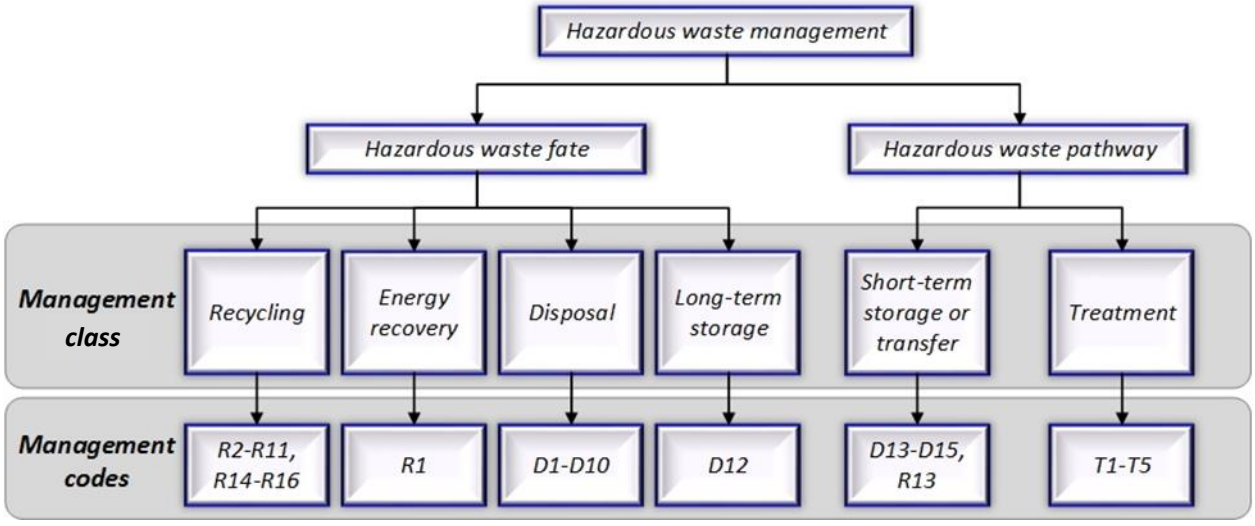
A typology for hazardous waste management is set out Appendix H, and is proposed for use over the long-term. It is based on Basel D and R codes and the Vic and Qld amendments of these, but is further adapted so as to be more suitable to use in Australia. Specifically:

- a T code category is created to cover hazardous waste treatments, which are neither disposal nor recycling, and represent a pathway rather than a fate
  - T1-T3 replace the Basel code D9, which is split by Vic into D9A, D9B and D9C and by Qld into D9A and D9B (the definitions of T1-T3 would need to be worked out with Vic and Qld)
  - T4 replaces Vic code D9D *Thermal treatment to remove contaminants*
  - T5 replaces Basel code D8 *Biological treatment resulting in final compounds or mixtures that are discarded ...*
- three disposal codes are excluded[26]
- four codes added by Vic and/or Qld are included
  - R14 Recycling, reconditioning or laundering of steel drums or plastic containers
  - R15 Recycling/reclamation of soils (incorporating R17 Bioremediation)
  - R16 Organic waste processing (e.g. composting or anaerobic digestion without methane recovery and use)
  - T4 (see above).

Inclusion of a T code category enables accurate mapping to infrastructure groups (see Item 22). As indicated in Appendix H, issues in relation to codes D2 and T1-T3 require resolution. As opportunities arise, tracking systems should be converted to use it.

Figure 4 illustrates the overall system of describing and coding hazardous waste management.

Figure 4 A simplified schematic of annual flows of hazardous waste showing long-term management codes



[26] D3 *Deep injection, (e.g., injection of pumpable discards into wells, salt domes of naturally occurring repositories, etc.)*; D6 *Release into a water body except seas/oceans*; D11 *Incineration at sea*.

Item 23 Hazardous waste infrastructure groups

The Australian Government will maintain a database of hazardous waste infrastructure and its capacity for use in assessing the adequacy of national infrastructure. Infrastructure is classified into groups for assessing capacities. The typology that will be applied for this purpose is shown in Appendix I.

Item 24 Adoption of the national hazardous waste infrastructure typology

As opportunities arise, states and territories should adopt the national infrastructure typology shown in Appendix I in licensing and tracking systems. Tracking systems will need to make provision to record hazardous waste flows into and out of infrastructure groups to help prevent multiple counting in estimating waste generation (see Item 15).

Item 25 Populating the national database of hazardous waste infrastructure

The Australian Government will consult with the states and territories in populating the national database of hazardous waste infrastructure using data obtained through licences, tracking systems, annual performance statements and surveys. This will include characterisation of the outputs of different infrastructure groups in order to map hazardous waste flows to the broad categories of disposal, energy recovery, recycling and etc.

The Australian Government will coordinate with GeoScience Australia with a view to ensuring that the national database of hazardous waste infrastructure is integrated with the GeoScience Australia database of waste infrastructure through the use of their site identification number. The states and territories will be encouraged to adopt use of the GeoScience Australia site identification number in their own databases.

7. Hazardous waste data management and reporting

With more than one level of government (and representatives) needing access to data, it is important that roles and responsibilities are well understood by all parties.

Tracking systems should comprehensively record and report waste type, source, tonnes and management as set out in this standard.

In addition, all states with tracking systems require laboratory testing of contaminants as part of their hazard characterisation and classification mechanisms (although Qld also allows the option of a default characterisation in lieu of this). Not recording this information in tracking certificates is a wasted opportunity to better understand the hazard of a waste, particularly for: contaminated soils; hazardous waste packaging materials; fly ash; encapsulated or chemically fixed wastes; filter cake; and treatment residues and wastes with only generic reference to their organic chemical contaminants or constituents, such as PFAS wastes (M270), other organohalogens (M160) and surface active agents (M250). Some states already provide text fields to record this information. Victoria has historically provided for reporting the four most significant contaminants in order of significance using a contaminant coding system[27], but in 2021-22 this was expanded to also allow the use of combination waste codes[28]. This issue is addressed in Item 26.

A baseline level of data quality management is needed to limit the probability of major misinterpretations due to readily identifiable errors. This issue is addressed in Item 27.

The difficulty in managing data quality is exacerbated where paper-based systems are in use, which are prone to errors, gaps and ambiguities. Electronic systems are used partly in Qld and WA and fully in NSW, SA and Vic. Full adoption of electronic reporting would significantly improve data quality. This issue is addressed in Item 28.

Jurisdictions have a responsibility to appropriately protect the commercial confidentiality of data provided by industry waste generators or receivers. This responsibility may be established through legislation or other means. Waste data could potentially reveal to commercial rivals a business's customers, waste types, quantities and processes. The issue in protecting commercial confidentiality is hiding identities. For a given waste type, appropriate protection of commercial confidentiality depends on the number of generators or receivers within a reporting boundary (state, territory or national). This issue is addressed in Item 29.

Data on tracked hazardous waste can be an important resource for reporters, enabling them to monitor and audit company activities and undertake financial and environmental analyses. Industry has a reasonable expectation that their data can be made available to them in collated and summarised form. This issue is addressed in Item 30.

National reporting of hazardous waste data currently occurs for a variety of purposes. It is important that the Australian Government informs the states and territories about its needs for their data,

[27] See list 2 of EPA Victoria (2021) *Waste codes*, publication IWRG822.4, available at: https://www.epa.vic.gov.au/about-epa/publications/iwrg822-4

[28] 'Combination codes' allow the use of more than one code to describe a waste. For example M270/ N120, where M270 denotes PFAS contamination and an additional code denotes the matrix the contamination, in this case soil. This approach has only been adopted by Vic to date and is limited to data systems that enable the use of multiple entries in this field.

including the form and timing, and that its requests are not duplicative. This issue is addressed in Item 31 and Item 32.

National reporting may involve manipulation of the data submitted by states and territories. Section 4 describes some circumstances in which this might occur. Data manipulations, adjustments and substitutions should be transparent so that states and territories are able to understand how their data has been changed. This issue is addressed in Item 33.

A summary of roles and responsibilities under this standard is given as Item 34 at the foot of this section.

Item 26 Recording contaminants

States and territories should collect and record data on the contaminants that characterise the following wastes as hazardous: contaminated soils, hazardous waste packaging materials, fly ash, encapsulated or chemically fixed wastes, filter cake, treatment residues and wastes with only generic reference to their organic chemical contaminants or constituents, such as PFAS wastes (M270), other organohalogens (M160) and surface active agents (M250). This information should be recorded on waste transport certificates.

The Australian Government may produce or endorse an approach to doing so under this standard. Consideration should be given to the Vic approach[27, 28].

Item 27 Data validation

Prior to provision to the Australian Government, states and territories should ensure hazardous waste data is validated through data quality checks and cleaning. The checks should consider completeness, accuracy, consistency and reasonableness. In particular, checks should be made to look for:

- unit errors (such as mistaking kilograms for tonnes), including through checking for loads exceeding 50 tonnes
- inconsistent coding of wastes from the same company or of the same type
- major gaps (for example, hazardous wastes that are not included in tracking systems)
- major differences from previous years (e.g. in the quantity of a particular waste type)
- use of historical reporting codes (these should be converted to modern codes).

Significant errors should be identified and removed, and significant gaps should be filled to the extent practicable. Suspect data should be identified in the submission.

Item 28 Electronic tracking systems

As opportunities arise and mobile coverage allows, hazardous waste tracking systems should be converted to require only electronic systems for reporting waste movements.

Item 29 Data confidentiality

The Australian Government may negotiate a memorandum of understanding with the states and territories in relation to the confidentiality of hazardous waste data. The types of confidentiality covered will include:

- commercial-in-confidence information

- regulator-in-confidence information.

The Australian Government may consider hazardous waste data commercial-in-confidence if either:

- a state or territory specifically advises the Australian Government to that effect and provides supporting information, or
- each of the following apply[29]
  - public release of that data could reasonably be expected to have significant adverse impacts on the commercial interests of one or more of the original providers of that information
  - the damage to those commercial interests outweighs the public interest in publication of that information
  - the information is not available elsewhere in the public domain.

Hazardous waste data may be considered regulator-in-confidence if a state or territory specifically advises the Australian Government to that effect and provides supporting information.

Notwithstanding the above, state and territory data collated by NEPM or Basel Y-code is not considered confidential.

Item 30 Data availability

States and territories should provide simple, and preferably automated, methods for reporters of hazardous waste to obtain collated data on the wastes they have reported on a quarterly basis.

Item 31 Information on national reporting to be kept up-to-date in this standard

The Australian Government will ensure that the states and territories are kept informed of the requirements and schedule for national reporting of hazardous waste. This will occur through this standard by ensuring that Appendix J is kept up-to-date. Note that the methods by which the Australian Government obtains hazardous waste data may change as a result of investigations and plans under development and in consultation with the states and territories.

Item 32 Transparency in national reporting

The Australian Government will ensure that manipulations, adjustments and substitutions applied to state and territory data are transparent, so that states and territories can follow the logic, assumptions and calculations linking their data to the corresponding national data.

Item 33 Recording data methods and backdating changes

The Australian Government will record the sources, methods and assumptions it applies in compiling hazardous waste data. To the extent practical, where changes occur, it will retrospectively apply those changes to previously reported data in order to maintain an accurate record of trends.

[29] This is adapted from the Department of Environmental Regulation of Western Australia (2014) *National Pollutant Inventory WA – commercial in confidence guideline*, available from: https://www.der.wa.gov.au/images/documents/our-work/programs/NPI_Guideline_for_Claims_of_Commercial_in_Confidence.pdf

Item 34 Roles and responsibilities in national reporting of hazardous waste

The Australian and the state and territory governments should act in accordance with the responsibilities in relation to reporting hazardous waste data as summarised in Table 6.

Table 6 Steps and responsibilities in national reporting of hazardous waste data

Step & responsibility	Task	Reference item
1. Data needs (Australian Government)	Maintain up-to-date information on national reporting needs.	Item 30 & Appendix I
2. Data request (Australian Government)	Request data from the states and territories annually, providing at least three weeks' notice.	
	Expect submission no less than three months after the end of the reporting period.	
	Provide a convenient template or method for providing data.	
	Provide any necessary confidentiality commitments.	
3. Data provision (states and territories)	Undertake validation and quality checks data prior to provision to the Australian Government.	Item 27
	Provide data from tracking systems and/or other sources as necessary, either in raw form or in six-monthly blocks (Jan-Jun; Jul-Dec) to allow for aggregation by financial and calendar year.	
	Communicate any data quality problems.	
4. Data collation and analysis (Australian Government)	Collate the provided data in a workbook that excludes any commercially confidential data.	Item 29
	Undertake quality checks and communicate any concerns with the data provider.	
	Undertake collations and adjustments using methods explained and followable within the workbook and based on the following principles: • conversion to nationally consistent codes • comprehensiveness, with gap filling occurring for wastes generated in significant quantities or otherwise significant when data can be reasonably estimated • inclusion of on-site storage and management • consistent assumptions and data, including densities • avoiding multiple counts of the same waste, including those associated with inter-jurisdictional transfers and (in reporting generation) those associated with arising at more than one waste management facility • transparency in assumptions and calculations.	 Item 12 Item 13 Item 14 Item 15 Item 32
	Provide the collated and adjusted data to the states and territories as draft for review.	
	Ensure that data manipulations are transparent.	Item 32
	Add international export data.	
5. Draft review (states and territories)	Check the collated data and communicate concerns.	
6. Finalisation (Australian Government)	Finalise the data collation and report as appropriate.	
	Issue the finalised data collation to the states and territories.	

Appendix A How this document was developed

A How this standard was developed

In November 2015 the Department of the Environment commissioned a consultant team led by Blue Environment and supported by Ascend Waste and Environment and Randell Environmental Consulting to develop this *Hazardous waste data and reporting standard.*

The consultant team firstly prepared an options paper that discussed a range of issues and canvassed potential approaches for addressing them in the standard. The options paper was distributed in mid-January 2015 to each state and territory, selected major industry operators, academics and an environmental group, as tabulated below.

Table 7 Consultees in developing this document

Category	Name
States and territories	ACT, NSW, NT, Qld, SA, Tas, Vic, WA
Industry	GeoCycle, JJ Richards, SteriHealth, Suez, Toxfree Australia, Cleanaway, Veolia Environmental Services
Researchers	Academics at the universities of Melbourne, Monash and Griffith, plus CSIRO
Environmental groups	National Toxics Network

Presentations on the standard were prepared and delivered to representatives of state and territory governments in Sydney, Melbourne, Brisbane, Adelaide, Hobart and Darwin in early February 2016.

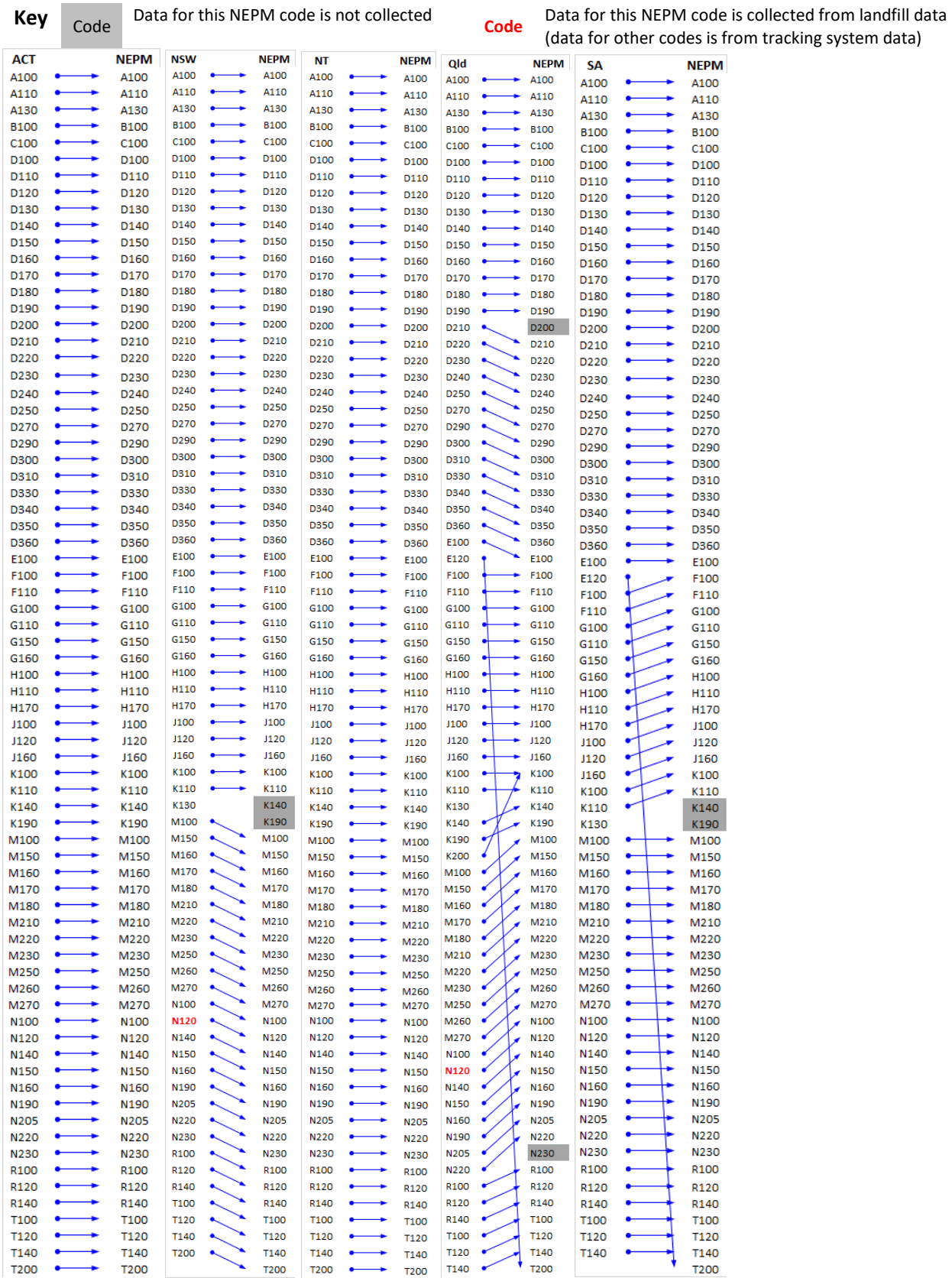
A draft was prepared and circulated firstly to the Department then to the states and territories and other consultees as listed in Table 7. This culminated in a 'test version' that was applied in preparing subsequent documents.

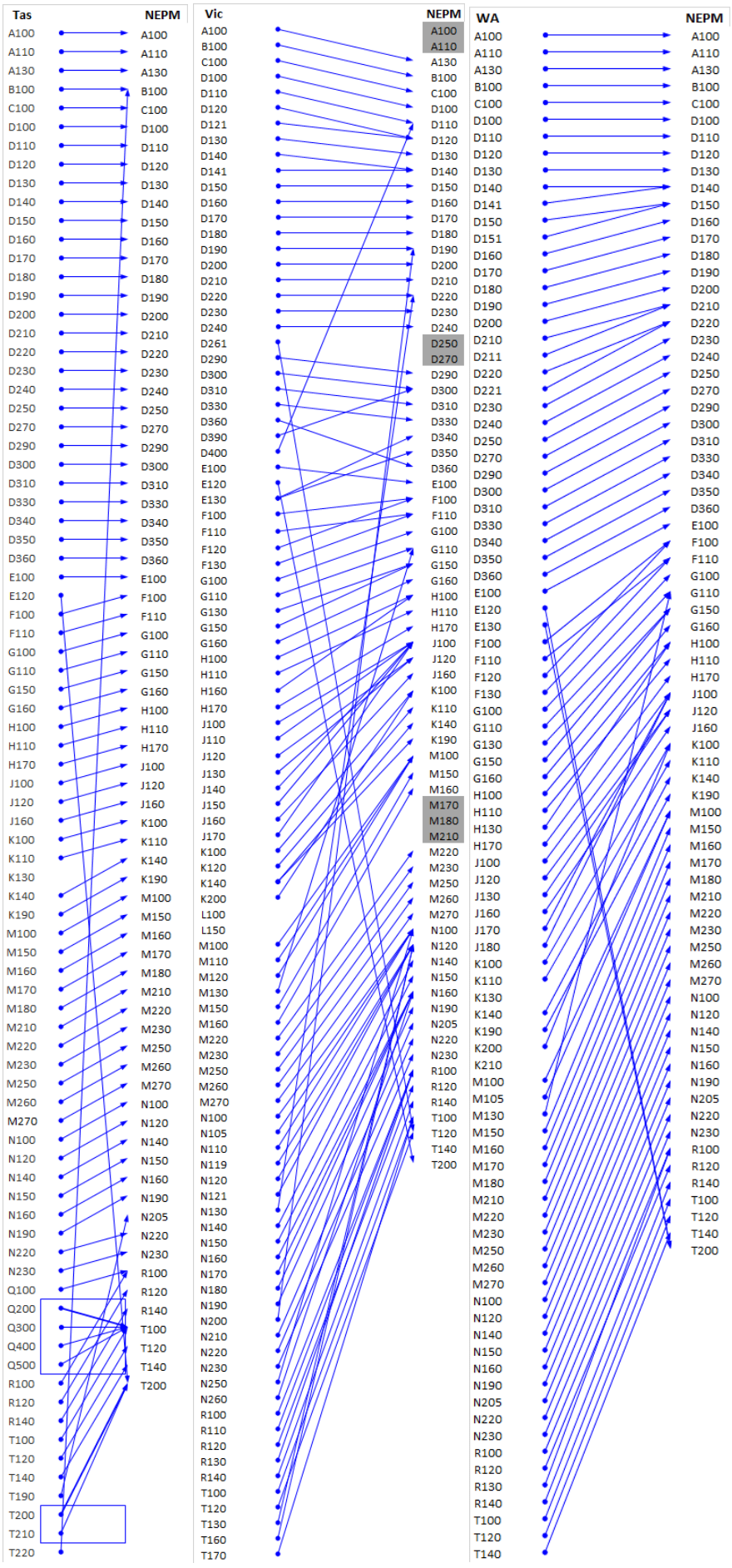
The original version has been revised three times: in 2017; 2019 and 2022, each time in consultation with the states and territories.

Appendix B Waste codes maps – jurisdictional to NEPM codes

B Waste codes maps – jurisdictional to NEPM codes

Jurisdictional waste codes will be converted to NEPM codes using the mapping process illustrated below (*see the explanation under Item 6*).




Tas
NEPM
A100 A110 A130 B100 C100 D100 D110 D120 D130 D140 D150 D160 D170 D180 D190 D200 D210 D220 D230 D240 D250 D270 D290 D300 D310 D330 D340 D350 D360 E100 E120 F100 F110 G100 G110 G150 G160 H100 H110 H170 J100 J120 J160 K100 K110 K130 K140 K190 M100 M150 M160 M170 M180 M210 M220 M230 M250 M260 M270 N100 N120 N140 N150 N160 N190 N205 N220 N230 R100 R120 R140 T100 T120 T140 T190 T200 T210 T220
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NEPM
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WA
NEPM
A100 A110 A130 B100 C100 D100 D110 D120 D130 D140 D141 D150 D151 D160 D170 D180 D190 D200 D210 D211 D220 D221 D230 D240 D250 D270 D290 D300 D310 D330 D340 D350 D360 E100 E120 E130 F100 F110 F120 F130 G100 G110 G130 G150 G160 H100 H110 H130 H170 J100 J120 J130 J160 J170 J180 K100 K110 K130 K140 K190 K200 K210 M100 M105 M130 M150 M160 M170 M180 M210 M220 M230 M250 M260 M270 N100 N120 N140 N150 N160 N190 N205 N220 N230 R100 R120 R130 R140 T100 T120 T140
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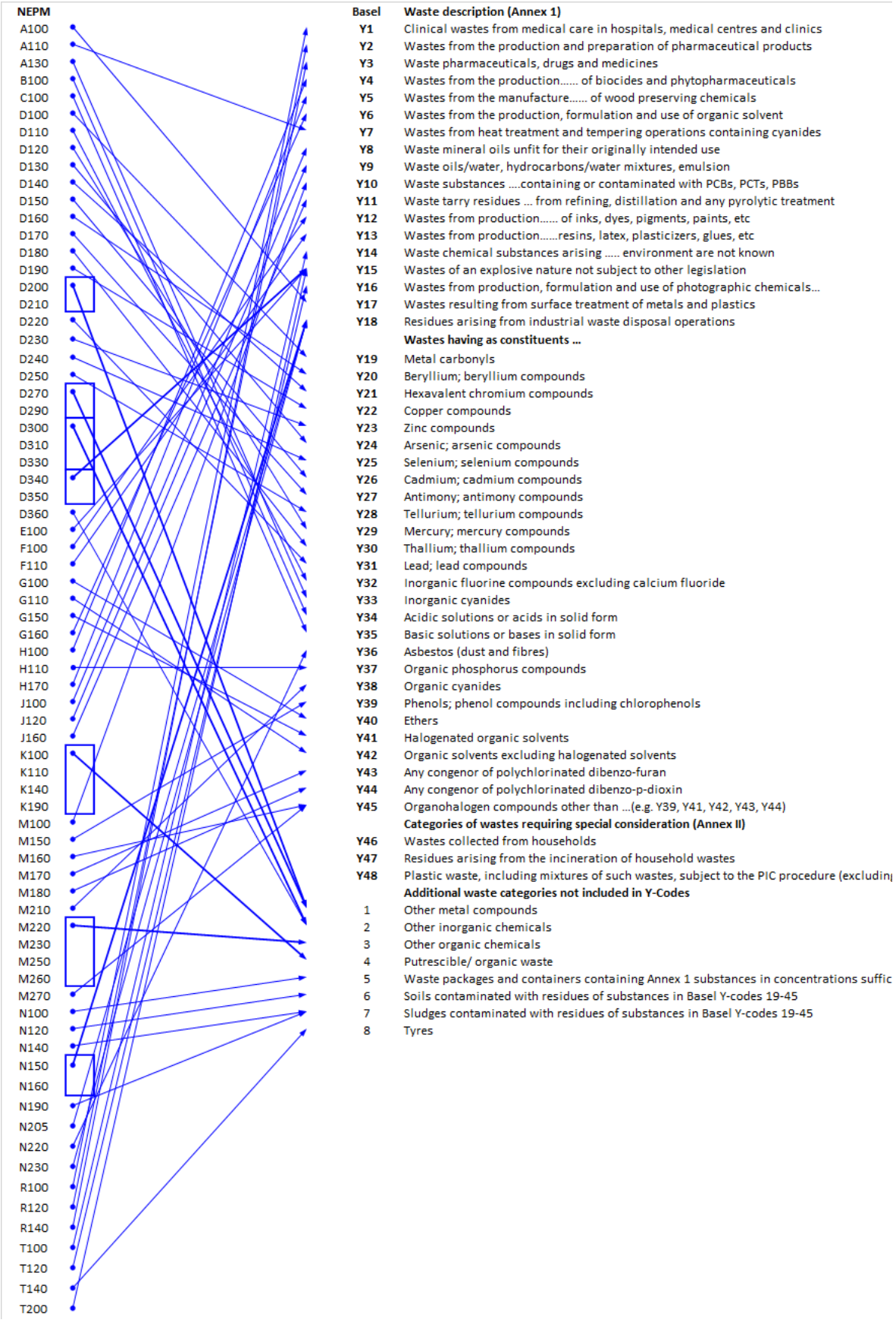
Appendix C Waste codes maps – NEPM to Basel codes

C Waste codes maps – NEPM to Basel codes

For Basel reporting, NEPM codes are mapped to Basel codes as illustrated below (*see Item 7*).



Appendix D Principles for codifying hazardous waste

D Principles for codifying hazardous waste

See the explanation under Item 8.

Users of waste transport certificates and others who need to codify wastes should apply the following hierarchical principles for waste codification:

1. If the waste can be neatly described by either the process/ industry from which it arises, the article or product from which they derive, or inherent physical or chemical characteristics (obvious without any testing), as listed in Table 8, use that waste code.
2. Understand the major hazardous characteristics of the waste. This may be apparent from historical knowledge of company or industry processes and/or may involve testing for a range of chemical contaminants and assessment against jurisdictional contaminant threshold lists[30].
3. If the waste can be described by a single hazardous characteristic that matches a NEPM code (for example D120 Mercury; mercury compounds), use that waste code.
4. If testing indicates that more than one contaminant or characteristic is present, use the code that describes the contaminant of highest potential hazard. This can be determined as follows:
   a) Firstly, compare the test results for each against contaminant thresholds (used by your jurisdiction or another's, in the event your jurisdiction does not have them) and codify the waste according to the contaminant in the highest hazard category. Note that this may not be the contaminant that is present at the highest concentration because threshold values vary.
   b) If there is more than one contaminant in the highest hazard category, then prioritise the hazard by reference to the contaminant with the highest ratio of waste concentration to category contaminant threshold (or upper limit). The waste code corresponding to the contaminant with the highest ratio should be used.

Consult the list of example wastes by NEPM code given below in Table 9. Codification based on this table should be confirmed through consultation with the relevant jurisdictional regulator.

[30] See, for example, Table 2 of EPA Victoria (2021) *Waste disposal categories – characteristics and thresholds*, available from: https://www.epa.vic.gov.au/about-epa/publications/1828-2

Table 8 Descriptively coded wastes

NEPM code	Waste description (NEPM Schedule A, List 1)
Process/ Industry described wastes	
A100	Waste resulting from surface treatment of metals and plastics
A110	Waste from heat treatment and tempering operations containing cyanides
F100	Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish
F110	Waste from the production, formulation and use of resins, latex, plasticisers, glues and adhesives
G160	Waste from the production, formulation and use of organic solvents
H100	Waste from the production, formulation and use of biocides and phytopharmaceuticals
H170	Waste from manufacture, formulation and use of wood-preserving chemicals
J160	Waste tarry residues arising from refining, distillation, and any pyrolytic treatment
K100	Animal effluent and residues (abattoir effluent, poultry and fish processing wastes)
K110	Grease trap waste
K140	Tannery wastes (including leather dust, ash, sludges and flours)
K190	Wool scouring wastes
N140	Fire debris and fire wash waters
N160	Encapsulated, chemically-fixed, solidified or polymerised wastes referred to in this list
N190	Filter cake contaminated with residues of substances referred to in this list
N205	Residues from industrial waste treatment/disposal operations
R100	Clinical and related wastes
R140	Waste from the production and preparation of pharmaceutical products
T100	Waste chemical substances arising from research and development or teaching activities, including those which are not identified and/or are new and whose effects on human health and/or the environment are not known
T120	Waste from the production, formulation and use of photographic chemicals and processing materials
Article/ product described wastes	
M230	Triethylamine catalysts for setting foundry sands
N100	Containers and drums that are contaminated with residues of substances referred to in this list
N150	Fly ash, excluding fly ash generated from Australian coal fired power stations
R120	Waste pharmaceuticals, drugs and medicines
T140	Tyres
Inherent characteristics	
J100	Waste mineral oils unfit for their original intended use
M260	Highly odorous organic chemicals (including mercaptans and acrylates)
T200	Waste of an explosive nature not subject to other legislation

Table 9 Example wastes for selected NEPM codes

NEPM waste type		NEPM code	Waste description	Waste examples
A	Plating and heat treatment	A100	Waste resulting from surface treatment of metals and plastics	• Liquid phosphates or chromates from metal coating (e.g. commercial product Alodine 1200S) • Liquids or sludges from polyurethane-based plastics treatment • Wastes from cleaning, sandblasting and surface protection of ship hulls and vehicle bodies
		A110	Waste from heat treatment and tempering operations containing cyanides	• Case hardening residues such as potassium cyanide/ potassium carbonate mixtures
B	Acids	B100	Acidic solutions or acids in solid form	• Wastes with pH <2 • Acids including sulfuric, hydrochloric, nitric, phosphoric, chromic, hydrofluoric, acetic, other organic acids • Pickle liquors • Mixtures of the above
C	Alkalis	C100	Basic solutions or bases in solid form	• Wastes with pH >10 • Alkaline cleaners • Ammonia • Hydroxides such as ammonium, sodium (caustic soda), calcium (lime), potassium • Caustic neutralised waste • Potash
D	Inorganic chemicals	D110	Inorganic fluorine compounds excluding calcium fluoride	• Spent pot liner waste from aluminium smelting • Simple fluoride salts such as sodium fluoride and potassium fluoride
		D120	Mercury; mercury compounds	• Fluorescent lamps • Dental amalgam waste • Spent catalysts • Articles containing mercury (such as old thermometers)
		D130	Arsenic; arsenic compounds	• Arsenic containing wastes from glass manufacturing, metal smelting & mine processing
		D140	Chromium compounds (hexavalent and trivalent)	• Casting/ foundry wastes • Chrome plating wastes • Brick linings and dyes
		D150	Cadmium; cadmium compounds	• Electroplating wastes • Industrial paint pigments • Nickel cadmium (NiCad) batteries • Semi-conductors such has cadmium telluride in solar panels • Spent catalysts
		D160	Beryllium; beryllium compounds	• Machining wastes from copper beryllium alloys (aircraft and electronics industries)
		D170	Antimony; antimony compounds	• Antimony mine tailings • Other metal mine tailings

NEPM waste type		NEPM code	Waste description	Waste examples
		D190	Copper compounds	• Refinery slags and flue dusts • Water treatment sludges • Shipyard barnacle removal washings • Spent catalysts • Blue dyes and spent liquors
		D200	Cobalt compounds	• Pigment and paint wastes • Spent catalysts
		D210	Nickel compounds	• Spent catalysts
		D220	Lead; lead compounds	• Lead acid batteries • Leaded glass (CRT glass) • Grit blast waste • Used fire assay cupels • Mine tailings • Refinery and smelter wastes
		D230	Zinc compounds	• Zinc smelting and refining slags, fines and other wastes • Zinc ash/dust • Galvaniser's ash • Smelting slag • Spent filter cartridges (from electroplating/ galvanising)
		D250	Tellurium; tellurium compounds	• Anode sludges from refining of blister copper • Blast furnace dusts (likely to contain more hazardous metals, such as lead)
		D270	Vanadium compounds	• Spent catalysts
		D300	Non-toxic salts	• Coal seam gas industry brine and salt wastes • Aluminium dross • Salt cake, salt slag • Furnace slags from lead acid battery recycling • Desalination plant salt/brine wastes • Simple inorganic chlorides
F	Paints, resins, inks, organic sludges	F100	Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish	• Waste paint and other surface coatings
		F110	Waste from the production, formulation and use of resins, latex, plasticisers, glues and adhesives	• Fibreglass resin wastes
G	Organic solvents	G100	Ethers	• Family of ether compounds including 'ether' itself (diethyl ether)
		G110	Organic solvents excluding halogenated solvents	• Naphtha solvents, benzene and xylenes, alcohols, glycols, epoxides, ketones and aldehydes • Methylated spirits, mineral turpentine, kerosene • Cyclohexane

NEPM waste type		NEPM code	Waste description	Waste examples
				• Klenasol (non-chlorinated)
		G150	Halogenated organic solvents	• Any solvent with a halogen element in its structure (chloro, fluoro, bromo, iodo in the chemical or product name) • Carbon tetrachloride • Genklene • Methylene chloride (dichlormethane) • paint stripper • Tetrachloroethylene (perchloroehtylene/ perc) • Trichloroethane • Trichloroethylene • Klenasol 75/25 • Dry cleaning sludge (containing perchloroethylene)
		G160	Waste from the production, formulation and use of organic solvents	• Solvent recovery residues
H	Pesticides	H100	Waste from the production, formulation and use of biocides and phytopharmaceuticals	• Inorganic & organo-metallic pesticides • Nitrogen containing pesticides • Organochlorine pesticides • Sulfur containing pesticides • Biological pesticides • Mixed pesticide residue • Phytopharmaceutical wastes such as from alkaloid production in Tasmania
		H110	Organic phosphorous compounds	• Organo phosphorus pesticide such as Diazinon, Azinphos-methyl, Chlorpyrifos and Dichlorvos • Triphenyl and tricresyl phosphates (as flame retardants)
		H170	Waste from manufacture, formulation and use of wood-preserving chemicals	• Copper chrome arsenic (CCA) solutions and solids • Other inorganic wood preserving compounds • Organic wood preserving compounds (such as creosote)
J	Oils	J100	Waste mineral oils unfit for their original intended use	• Waste oils/ hydrocarbons • Used oil filters • Transformer fluids (excluding PCB's)
		J120	Waste oil/water, hydrocarbons/water mixtures or emulsions	• Vehicle washwaters • Boiler blowdown sludge • Cooling tower washwaters • Textile effluent & residues • Industrial plant washwaters • Ethylene glycol-water (antifreeze) • Oil/hydrocarbon (<50%) mixed with water • Oil/hydrocarbon (>50%) mixed with water

NEPM waste type		NEPM code	Waste description	Waste examples
K	Putrescible/ organic waste	K100	Animal effluent and residues (abattoir effluent, poultry and fish processing wastes)	• Includes Animal oils & derivatives (e.g. tallow)
		K110	Grease trap waste	• Separated grease and oil-based wastes from grease interceptor traps used in cooking establishments.
M	Organic chemicals	M100	Waste substances and articles containing or contaminated with polychlorinated biphenyls, polychlorinated napthalenes, polychlorinated terphenyls and/or polybrominated biphenyls	• Oil, solvents & materials contaminated with PCBs, PCTs and PBBs • Equipment containing PCBs, PCTs and PBBs • PCNs, PCTs and PBBs
		M160	Organo halogen compounds—other than substances referred to in this Table or Table 2	• Waste containing these organohalogen chemicals above jurisdiction-specific acceptance criteria • Organohalogen chemicals are organic chemicals that contain fluorine, chlorine, bromine or iodine atoms, generally providing specific properties to the chemical (for example flame retardancy) • Chemicals listed on the Stockholm Convention (not otherwise specified in this list) are relevant to this category. • Hexachlorobenzene (HCB) • PFOS and other PFAS-containing wastes • Halogenated refrigerants
		M170	Polychlorinated dibenzo-furan (any congener)	• Waste containing these chemicals above jurisdiction-specific acceptance criteria
		M180	Polychlorinated dibenzo-p-dioxin (any congener)	• Waste containing these chemicals above jurisdiction-specific acceptance criteria
		M210	Cyanides (organic)	• More correctly known as nitriles such as acetonitrile and acrylonitrile solvents used in polymer industry • Cyanogen (ethanedinitrile) fumigant
		M220	Isocyanate compounds	• Toluene diisocyanate (TDI) and methylene bisphenyl isocyanate (MDI) used in polymer production and polyurethane foam blowing
		M230	Triethylamine catalysts for setting foundry sands	• Catalysts for phenolic urethane cold box binders in the foundry industry
		M250		• Detergents • Emulsifiers • Firefighting foams (that do not contain PFOS, PFOA or other PFASs as active ingredients) • Surface active agents/ surfactants (that do not contain PFOS, PFOA or other PFASs as active ingredients) • Wetting agents

NEPM waste type		NEPM code	Waste description	Waste examples
				• Note: Refer to M270 for PFAS contaminated materials and/or firefighting foams containing PFAS chemicals.
		M270	Per- and poly-fluoroalkyl substances (PFAS) contaminated materials, including waste PFAS-containing products and contaminated containers	• Per- and poly-fluoroalkyl substances (PFAS), including associated subclasses and homologues • PFAS (including but not restricted to PFOS and/or PFOA) contaminated fire-fighting foams (known as AFFF – aqueous film forming foams), stain repellents or other surfactant-application wastes
N	Soil/ sludge	N100	Containers and drums that are contaminated with residues of substances referred to in this list	• Drums, bags or other containers (such as aerosol cans) containing waste which must be tracked
		N120	Soils contaminated with a controlled waste	• Soils contaminated with residues of substances contained in this list at a concentration which exceeds jurisdiction-specific landfill acceptance criteria.
		N205	Residues from industrial waste treatment/disposal operations	• Scrubber sludge • Ion-exchange column residues • Industrial waste treatment sludges and residues • Residues from pollution control operations • May include sewerage sludge & residues (including biosolids, where contaminated with substances contained in this list above guideline levels)
		N220	Asbestos	• Defined on a state by state basis; generally, if a material (including soil) contains asbestos fibres it is classified as asbestos (or asbestos containing material, ACM)
		N230	Ceramic-based fibres with physico-chemical characteristics similar to those of asbestos	• Aluminium silicate fibre products used mainly for fire protection and insulation purposes
R	Clinical and pharmaceutical	R100	Clinical and related wastes	• Sharps such as syringes, needles, lancets, scalpels • No-sharps clinical waste such as – human blood or body fluids; – human tissue; – a clinical specimen (other than urine or faeces); – a laboratory culture; – tissue, carcasses or other waste arising from animals used for laboratory investigation or for medical or veterinary research;

NEPM waste type		NEPM code	Waste description	Waste examples
				– materials or equipment contaminated with any of the above; – waste from patients known to have, or suspected of having a communicable disease NOTE: Sanitary napkins, incontinence pads, nappies, emptied colostomy/ urine bags and dressings which are not saturated in blood, are NOT controlled waste
		R120	Waste pharmaceuticals, drugs and medicines	• RUM (Return Unwanted Medicines) project wastes such as out of date, unsold and unwanted pharmaceutical products and subsequent residues in packaging • Includes cytotoxic drugs such as azathioprine, chlorambucil, chlornaphazine, ciclosporin, cyclophosphamide, melphalan, semustine, tamoxifen, thiotepa and treosulfan • Includes sharps contaminated with cytotoxins
		R140	Waste from the production and preparation of pharmaceutical products	• Similar to R120 but waste may be related to raw materials of manufacture and preparation of similar drugs and medicines.
T	Miscellaneous	T100	Waste chemical substances arising from research and development or teaching activities, including those which are not identified and/or are new and whose effects on human health and/or the environment are not known	• Waste chemicals from R&D or teaching • Waste from domestic chemical collections
		T120	Waste from the production, formulation and use of photographic chemicals and processing materials	• Waste from production or formulation of photographic chemicals • Wastes from film processing materials such as fixer or developer (may or may not contain silver)
		T140	Tyres	• Used truck and passenger tyres
		T200	Waste of an explosive nature not subject to other legislation	• Highly reactive chemicals

Appendix E Gaps in waste tracking systems

E Gaps in waste tracking systems

The following diagram shows the extent of intra-state tracking systems (*see the intro to Section 4*).

Status of waste tracking: Tracked Not tracked Not fully tracked

15 code & description		75 code and description (NEPM Schedule A, List 1)		NSW	NT	Qld	SA	Vic	WA
A	Plating and heat treatment	A100	Waste resulting from surface treatment of metals & plastics						
		A110	Waste from heat treatment & tempering operations containing cyanides						
		A130	Cyanides (inorganic)						
B	Acids	B100	Acidic solutions or acids in solid form						
C	Alkalis	C100	Basic solutions or bases in solid form						
D	Inorganic chemicals	D100	Metal carbonyls						
		D110	Inorganic fluorine compounds excluding calcium fluoride						
		D120	Mercury; mercury compounds						
		D130	Arsenic; arsenic compounds						
		D140	Chromium compounds (hexavalent & trivalent)						
		D150	Cadmium; cadmium compounds						
		D160	Beryllium; beryllium compounds						
		D170	Antimony; antimony compounds						
		D180	Thallium; thallium compounds						
		D190	Copper compounds						
		D200	Cobalt compounds						
		D210	Nickel compounds						
		D220	Lead; lead compounds						
		D230	Zinc compounds						
		D240	Selenium; selenium compounds						
		D250	Tellurium; tellurium compounds						
		D270	Vanadium compounds						
		D290	Barium compounds (excluding barium sulphate)						
		D300	Non-toxic salts						
		D310	Boron compounds						
		D330	Inorganic sulfides						
		D340	Perchlorates						
		D350	Chlorates						
		D360	Phosphorus compounds excluding mineral phosphates						
E	Reactive chemicals	E100	Waste containing peroxides other than hydrogen peroxide						
F	Paints, resins, inks, organic sludges	F100	Waste from production, formulation & use of inks, dyes, pigments, paints, lacquers						
		F110	Waste from the production, formulation & use of resins, latex, plasticisers, glues &						
G	Organic solvents	G100	Ethers						
		G110	Organic solvents excluding halogenated solvents						
		G150	Halogenated organic solvents						
		G160	Waste from the production, formulation & use of organic solvents						
H	Pesticides	H100	Waste from the production, formulation & use of biocides & phytopharmaceuticals						
		H110	Organic phosphorous compounds						
		H170	Waste from manufacture, formulation & use of wood-preserving chemicals						
J	Oils	J100	Waste mineral oils unfit for their original intended use						
		J120	Waste oil/water, hydrocarbons/water mixtures or emulsions						
		J160	Waste tarry residues arising from refining, distillation, & any pyrolytic treatment						
K	Putrescible/ organic waste	K100	Animal effluent & residues (abattoir effluent, poultry & fish processing wastes)						
		K110	Grease trap waste						
		K140	Tannery wastes (incl. leather dust, ash, sludges & flours)						
		K190	Wool scouring wastes						
M	Organic chemicals	M100	Waste substances & articles containing or contaminated with polychlorinated biph						
		M150	Phenols, phenol compounds including chlorophenols						
		M160	Organo halogen compounds—other than substances referred to in this Table or Tab						
		M170	Polychlorinated dibenzo-furan (any congener)						
		M180	Polychlorinated dibenzo-p-dioxin (any congener)						
		M210	Cyanides (organic)						
		M220	Isocyanate compounds						
		M230	Triethylamine catalysts for setting foundry sands						
		M250	Surface active agents (surfactants), containing principally organic constituents & w						
		M260	Highly odorous organic chemicals (including mercaptans & acrylates)						
		M270	Per- and poly-fluoroalkyl substances (PFAS) contaminated materials, including was						
N	Soil/ sludge	N100	Containers & drums that are contaminated with residues of substances referred to i						
		N120	Soils contaminated with a controlled waste						
		N140	Fire debris & fire wash waters						
		N150	Fly ash, excluding fly ash generated from Australian coal fired power stations						
		N160	Encapsulated, chemically-fixed, solidified or polymerised wastes referred to in this						
		N190	Filter cake contaminated with residues of substances referred to in this list						
		N205	Residues from industrial waste treatment/disposal operations						
		N220	Asbestos						
		N230	Ceramic-based fibres with physico-chemical characteristics similar to those of asb						
R	Clinical and pharmaceutical	R100	Clinical & related wastes						
		R120	Waste pharmaceuticals, drugs & medicines						
		R140	Waste from the production & preparation of pharmaceutical products						
T	Miscellaneous	T100	Waste chemical substances arising from research & development or teaching activi						
		T120	Waste from the production, formulation & use of photographic chemicals & process						
		T140	Tyres						
		T200	Waste of an explosive nature not subject to other legislation						

Appendix F Unit conversion factors

F Unit conversion factors

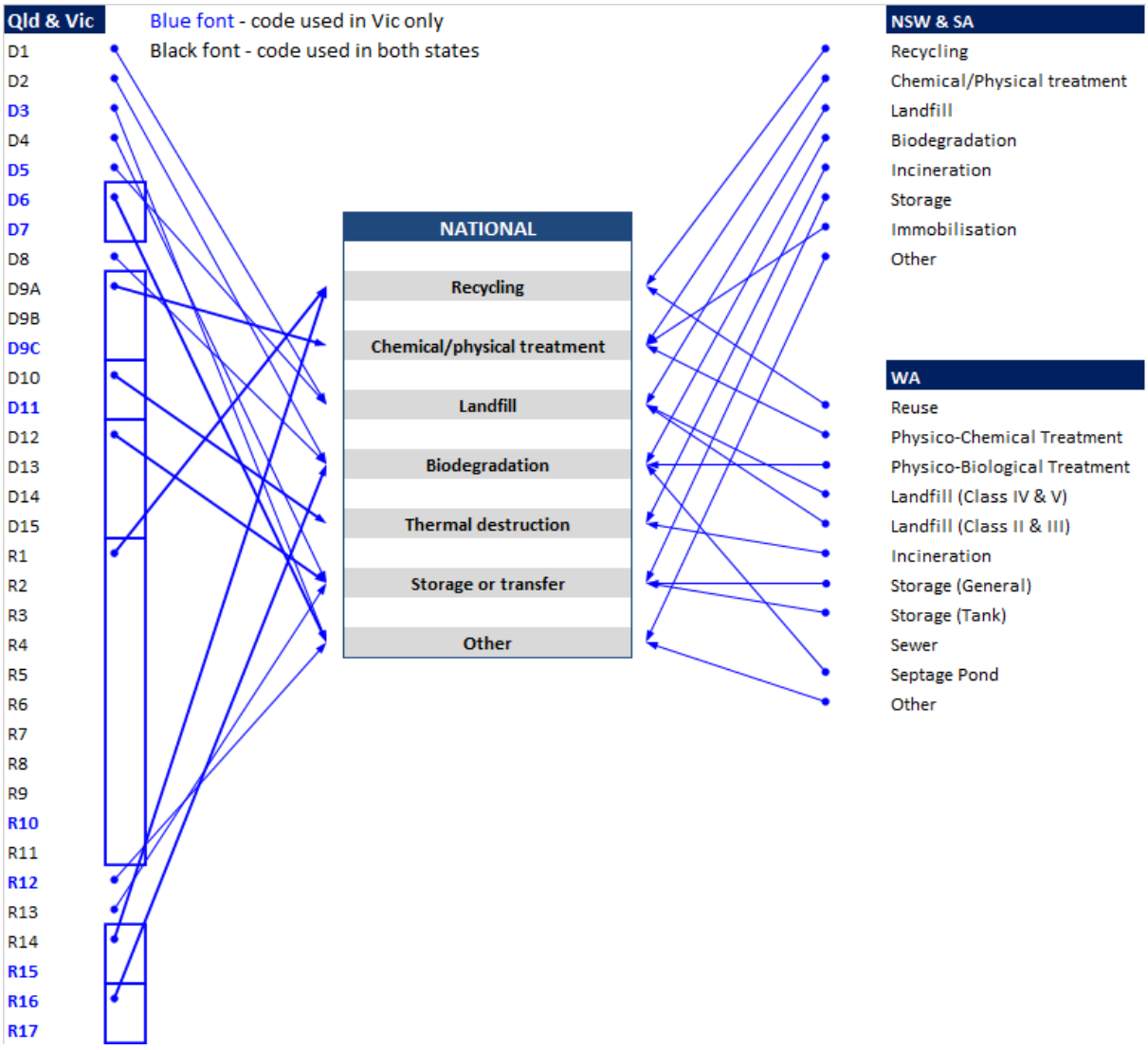
The following density and unit conversion factors are for use in translating waste quantities to tonnes when data is received in numbers of items or volumetric units (*see Item 14)*.

"15" code	NEPM 15 waste description	"75" code	Waste description (NEPM Schedule A, List 1)	Waste density (t/m3)	Conversion factor (t/unit)
A	Plating and heat treatment	A100	Waste resulting from surface treatment of metals & plastics	1.5	
		A110	Waste from heat treatment & tempering operations containing cyanides	2.0	
		A130	Cyanides (inorganic)	1.2	
B	Acids	B100	Acidic solutions or acids in solid form	1.2	
C	Alkalis	C100	Basic solutions or bases in solid form	1.3	
D	Inorganic chemicals	D100	Metal carbonyls	1.0	
		D110	Inorganic fluorine compounds excluding calcium fluoride	1.4	
		D120	Mercury; mercury compounds	0.3	
		D130	Arsenic; arsenic compounds	1.7	
		D140	Chromium compounds (hexavalent & trivalent)	1.9	
		D150	Cadmium; cadmium compounds	1.0	
		D160	Beryllium; beryllium compounds	4.1	
		D170	Antimony; antimony compounds	1.0	
		D180	Thallium; thallium compounds	1.0	
		D190	Copper compounds	1.8	
		D200	Cobalt compounds	1.0	
		D210	Nickel compounds	1.0	
		D220	Lead; lead compounds	7.5	
		D230	Zinc compounds	1.8	
		D240	Selenium; selenium compounds	1.0	
		D250	Tellurium; tellurium compounds	1.0	
		D270	Vanadium compounds	1.0	
		D290	Barium compounds (excluding barium sulphate)	1.0	
		D300	Non-toxic salts	1.2	
		D310	Boron compounds	1.0	
		D330	Inorganic sulfides	0.8	
		D340	Perchlorates	1.0	
		D350	Chlorates	1.0	
		D360	Phosphorus compounds excluding mineral phosphates	1.0	
E	Reactive chemicals	E100	Waste containing peroxides other than hydrogen peroxide	1.0	
F	Paints, resins, inks, organic sludges	F100	Waste from production, formulation & use of inks, dyes, pigments, paints, lacq	1.3	
		F110	Waste from the production, formulation & use of resins, latex, plasticisers, glu	1.3	
G	Organic solvents	G100	Ethers	0.7	
		G110	Organic solvents excluding halogenated solvents	0.9	
		G150	Halogenated organic solvents	1.5	
		G160	Waste from the production, formulation & use of organic solvents	1.0	
H	Pesticides	H100	Waste from the production, formulation & use of biocides & phytopharmaceut	1.0	
		H110	Organic phosphorous compounds	1.0	
		H170	Waste from manufacture, formulation & use of wood-preserving chemicals	1.2	
J	Oils	J100	Waste mineral oils unfit for their original intended use	0.9	
		J120	Waste oil/water, hydrocarbons/water mixtures or emulsions	1.0	
		J160	Waste tarry residues arising from refining, distillation, & any pyrolytic treatme	1.2	
K	Putrescible/ organic waste	K100	Animal effluent & residues (abattoir effluent, poultry & fish processing wastes)	0.9	
		K110	Grease trap waste	0.9	
		K140	Tannery wastes (incl. leather dust, ash, sludges & flours)	1.0	
		K190	Wool scouring wastes	1.0	
M	Organic chemicals	M100	Waste substances & articles containing or contaminated with polychlorinated	1.0	
		M150	Phenols, phenol compounds including chlorophenols	1.2	
		M160	Organo halogen compounds—other than substances referred to in this Table o	1.0	
		M170	Polychlorinated dibenzo-furan (any congener)	1.0	
		M180	Polychlorinated dibenzo-p-dioxin (any congener)	1.0	
		M210	Cyanides (organic)	1.0	
		M220	Isocyanate compounds	1.0	
		M230	Triethylamine catalysts for setting foundry sands	1.0	
		M250	Surface active agents (surfactants), containing principally organic constituents	1.0	
		M260	Highly odorous organic chemicals (including mercaptans & acrylates)	1.0	
N	Soil/ sludge	N100	Containers & drums that are contaminated with residues of substances referre	0.1	0.018
		N120	Soils contaminated with a controlled waste	0.9	
		N140	Fire debris & fire wash waters	1.0	
		N150	Fly ash, excluding fly ash generated from Australian coal fired power stations	1.7	
		N160	Encapsulated, chemically-fixed, solidified or polymerised wastes referred to in	0.8	
		N190	Filter cake contaminated with residues of substances referred to in this list	1.0	
		N205	Residues from industrial waste treatment/disposal operations	0.7	
		N220	Asbestos	0.8	
		N230	Ceramic-based fibres with physico-chemical characteristics similar to those of	0.8	
R	Clinical and pharmaceutical	R100	Clinical & related wastes	0.2	
		R120	Waste pharmaceuticals, drugs & medicines	0.3	
		R140	Waste from the production & preparation of pharmaceutical products	1.0	
T	Miscellaneous	T100	Waste chemical substances arising from research & development or teaching a	1.0	
		T120	Waste from the production, formulation & use of photographic chemicals & pr	1.0	
		T140	Tyres - passenger	0.3	0.008
			Tyres - SUV		0.012
			Tyres - truck		0.040
		T200	Waste of an explosive nature not subject to other legislation	1.0	

Appendix G Hazardous waste management types map (short term)

G Hazardous waste management types map (short-term)

Jurisdictional 'treatment type' (or fate/pathway) codes are to be mapped to a national set of hazardous waste management types using the mapping process illustrated below (*see the explanation under Item 21*).



Note: These management types do not perfectly respond to management class. In particular, the management class of:

- the short-term management type 'biodegradation' may be either 'recycling' or 'disposal'
- the short-term management type 'thermal destruction' may be either 'energy recovery' or 'disposal'.

These problems are due to the aggregated management codes within the data systems of NSW, SA and WA. They would be overcome by adoption of the long-term hazardous waste management codes described in Item 22 and listed in Appendix H.

Appendix H Hazardous waste management typology (long-term)

H Hazardous waste management typology (long-term)

A proposed management typology is illustrated below (*see the explanation under Item 22*).

= Basel description is significantly different or there is no corresponding Basel code
= issue needs resolution

Code	Process description under this standard	Management class	Fate or pathway?	Issues with using this code in a national standard
D1	Deposit into or onto land (e.g. landfill, etc.)	Disposal	Fate	
D2	Land treatment, (e.g. biodegradation of liquid or sludgy discards in soils, etc.) that does not result in benefit to agriculture or ecological improvement	Disposal	Fate	Need to confirm this code is necessary and appropriate
D4	Surface impoundment, (e.g. placement of liquid or sludge discards into pits, ponds or lagoons, etc.) for disposal by evaporation and periodic removal of residuals for disposal	Disposal	Fate	
D5	Specially engineered landfill, (e.g. placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)	Disposal	Fate	
D7	Release into seas/oceans including sea-bed insertion	Disposal	Fate	
D10	Thermal destruction	Disposal	Fate	
D12	Storage for a period expected to exceed 10 years	Long-term storage	Fate	
D13	Blending or mixing prior to submission to any of the operations in codes D1-D15	Short-term storage or transfer	Pathway	
D14	Repackaging prior to submission to any of the operations in codes D1-D15	Short-term storage or transfer	Pathway	
D15	Storage pending any of the operations in codes D1-D15	Short-term storage or transfer	Pathway	
T1		Treatment	Pathway	Replaces Basel D9 (Physico chemical treatment ...) and Qld/Vic D9A, D9B & D9C. Qld/Vic to work out categories & descriptions
T2		Treatment	Pathway	
T3		Treatment	Pathway	
T4	Thermal treatment to remove contaminants	Treatment	Pathway	Replaces Vic code 9D
T5	Biological treatment resulting in final compounds or mixtures that are discarded by means of any of the operations in codes D1-D15	Treatment	Pathway	Replaces Basel D8
R1	Use as a fuel (other than in direct incineration) or other means to generate energy	Energy recovery	Fate	
R2	Solvent reclamation/regeneration	Recycling	Fate	
R3	Recycling/reclamation of organic chemicals which are not used as solvents	Recycling	Fate	
R4	Recycling/reclamation of metals and metal compounds	Recycling	Fate	
R5	Recycling/reclamation of other inorganic materials	Recycling	Fate	
R6	Regeneration of acids or bases	Recycling	Fate	
R7	Recovery of components used for pollution abatement	Recycling	Fate	
R8	Recovery of components from catalysts	Recycling	Fate	
R9	Used oil re-refining or other reuses of previously used oil	Recycling	Fate	
R10	Land treatment resulting in benefit to agriculture or ecological improvement	Recycling	Fate	The extent of Vic use is puzzling given that there is no corresponding code for Qld
R11	Uses of residual materials obtained from any of the operations numbered R1-R17	Recycling	Fate	
R13	Accumulation of material intended for any operation in codes R1-R17	Short-term storage or transfer	Pathway	
R14	Recycling, reconditioning or laundering of steel drums or plastic containers	Recycling	Fate	Used by Qld and Vic
R15	Recycling/reclamation of soils (including bioremediation)	Recycling	Fate	Combines two Vic codes, R15 Recycling/ reclamation of soils and R17 Bioremediation
R16	Organic waste processing (e.g. composting or anaerobic digestion)	Recycling	Fate	Used by Vic

Appendix I Hazardous waste infrastructure typology

I Hazardous waste infrastructure typology

The Australian Government will maintain a database of hazardous waste infrastructure and its capacity for use in assessing the adequacy of national infrastructure. Infrastructure will be classified into groups for assessing capacities based on the typology illustrated below *(see explanation in Item 23*).

Hazardous waste management class	Hazardous waste infrastructure group	Activities	Management code
Recycling	Hazardous waste packaging facility	Reuse or recycling of industrial packing that contains residual hazardous wastes. Containers are typically refurbished and reused, or materials are recycled.	R14
	E-waste facility	Large-scale e-waste physical/chemical and manual disassembly and processing. Receive inorganic hazardous wastes, such as copper, cobalt, and lead.	R4
	Oil re-refining facility	Re-refining (recycling) of waste oil. (Facilities that only dewater and filter waste oil should be considered primarily 'oil/water treatment facilities).	R9
	Lead facility	Recycling of lead. Typically, the lead is from used lead acid batteries.	R4
	Zinc facility	Recycling of zinc.	R4
	Mercury facility	Recycling of mercury. Used fluorescent light fittings are usually a key waste.	R4
	Solvents/paints/organic chemicals facility	Recycling of paints, resins, inks, organic sludges and/or organic solvents, but not for energy recovery.	R2, R3
	Organics processing facility	Recycling of a range of low hazard organic wastes such as grease trap waste, cooking oil, animal effluents, etc. through composting or similar. These also accept non-hazardous organics, which typically represent the majority of their inputs.	R16
	End-of-life tyres facility	Recycling of end-of-life-tyres (EOLTs).	
	Spent pot lining facility	Recycling of spent pot lining waste from the aluminium industry.	R5
Energy recovery	Alternative fuels facility	Preparation of fuels from recovered solvents, paints or other hazardous wastes (excluding tyres) with calorific value.	R1
	Tyre derived fuel facility	Preparation of fuels from end-of-life tyres.	R1
	Energy recovery facility	Use of hazardous wastes or fuels derived from them in a thermal process to derive energy.	R1
Treatment	Chemical physical treatment (CPT) plant	Apply chemical and physical treatments to a broad range of wastes. Processes may include many of oxidation, reduction, precipitation, neutralisation sedimentation, filtration, adsorption and immobilisation.	D13, D14, R6, T1

Hazardous waste management class	Hazardous waste infrastructure group	Activities	Management code
	Clinical waste treatment facility	Treatment of clinical waste, typically using an autoclave.	T2
	Bioremediation facility	Treatment of hazardous waste (including contaminated soil) by land-farming or bioremediation. May be temporary or permanent, and may be co-located with an organics processing facility, but does not generate a useful product.	D2, T5
	Oil/water treatment (OWT) facility	Treatment of waste oil/water, hydrocarbons/water mixtures or emulsions. Recovered oils are typically sent on to an oil re-refining facility.	D9C
	Soils thermal treatment facility	Thermal treatment of contaminated soils to destroy contaminants.	T4
Disposal	Hazardous waste landfill facility	Landfilling of a wide range of hazardous wastes, many of which can only be landfilled at these sites.	D1, D5
	Landfill facility (NEPM codes N, T)	Landfilling of facilities licensed to dispose of low-risk hazardous wastes such as low-level contaminated soils, asbestos, and tyres (NEPM 15 codes N and T). These landfills also generally dispose of accept non-hazardous wastes, which typically represent the majority of their inputs.	D1
	Persistent organic pollutants (non-soil) thermal destruction facility	Disposal of persistent organic compounds using thermal destruction.	D10
	Clinical waste facility thermal destruction	Disposal of medical waste using thermal destruction.	D10
Short-term storage or transfer	Transfer facility	Short-term storage and subsequent transfer of hazardous wastes to another facility. Some short-term storage or transfer facilities receive a wide range of wastes, which may include non-hazardous wastes, while others receive only specific wastes.	D15, R13
Long-term storage	Long-term on-site storage facility	Pre-approved on-site (or near site) long-term storages of hazardous waste in designated area/s.	D12
	Long-term isolation facility	Storage or isolation of hazardous wastes for long periods (≥10 years), typically indefinitely or until an economically viable treatment or disposal solution is developed. Includes geological repository.	D12

Appendix J National reporting of hazardous waste

J National reporting of hazardous waste

National hazardous waste reporting requirements are set out below (*see explanation in Item 31*).

Report	Rationale	Period	Frequency	State & territory data needed by	Content
Report to the Basel Secretariat	Requirement of the Basel Convention	Calendar year	Annually	By end of previous calendar year	Quantities generated nationally by waste type
Hazardous Waste in Australia	Government commitment	Financial year	Every two years	Sept/Oct	Quantities, trends in quantities, sources, pathways and fates, potentially with sub-analyses by jurisdiction
National waste reports	Government commitment	Financial year	Every two years	Sept/Oct	Quantities, pathways and fates by jurisdiction
OECD reports	Requirement of OECD membership	Calendar year	Various	Varied	Various
NEPM reports	Requirement of under the NEPM and its implementation agreement	Financial year	Annual	Not fixed	Collated summary information on the: (i) movement of controlled waste into each jurisdiction, indicating jurisdiction of origin, waste code and quantity of waste; (ii) level of discrepancies (e.g. non-arrival of a consignment) as a percentage of total authorised controlled waste movements; and (iii) benefits arising from the implementation of the Measure. *NEPM 13(i)*