



Australian Government

Department of Sustainability, Environment,  
Water, Population and Communities



# DEPARTMENT OF SUSTAINABILITY, ENVIRONMENT, WATER, POPULATION AND COMMUNITIES (DSEWPAC)

## LIQUID WASTE ASSESSMENT

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Services





# EXECUTIVE SUMMARY

Hyder Consulting Pty Ltd (Hyder) was engaged by the Waste Reform and Reporting Section of the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) to produce a report that collates and assesses *readily available* Australian data and information on liquid waste.

This report has been produced in response to concerns raised by state and territory governments during the consultation phase of the Hyder report *Waste and Recycling in Australia 2011 (WRIA 2011)*. The WRIA 2011 report collated data on solid wastes only and several states noted that some of the solid waste that were being reported had a liquid waste component.

In response to concerns raised by the states and territories, this report aims to:

- Document the different definitions and classifications of liquid waste in Australia
- Describe the key liquid waste management pathways (from generation through to recovery or disposal)
- Collate and assess the readily available data on liquid waste in Australia
- Analyse the extent to which liquid waste is counted in solid waste data
- Estimate the amount of hazardous liquid waste in solid hazardous waste data
- Report on the availability of liquid waste data and identify any significant gaps in data availability.

Accordingly the report consists of the following sections:

- Liquid waste classifications and definitions
- Key liquid waste pathways
- Data collation and assessment
- Findings and recommendations.

Before discussing the report findings it is necessary define the scope of the report. The report aims to collate liquid waste data from all readily available information sources with the following exceptions:

- Liquid wastes generated from primary industry, stormwater collection systems and stand alone septic tanks are not within the scope of this report.
- Following on from the dot point above, the sewerage system data collated is for urban water utilities (specifically data from the *National Performance Report 2009-2010 Urban Water Utilities, National Water Commission*) and does **not report on rural water services** (specifically it does not report data from the *National Performance Report 2009–10 Rural water service providers*).
- A detailed study of gaseous wastes that are generated from liquid waste management is beyond the scope of this report.
- This report aims to present what data was readily available on liquid waste generation, reuse, recycling, energy recovery and disposal. It is not within the scope of this report to complete further detailed analysis of each of these parameters.

A summary of each of these sections is discussed below:

Liquid waste ***classifications and definitions*** were found to be consistent nationally for sewage and trade waste. Nationally, hazardous liquid wastes have a range of definitions, however, the hazardous or potentially hazardous nature of these wastes is common to all jurisdiction's

definitions. Perhaps more significant are the waste types included in each jurisdiction's definition of hazardous wastes. This is discussed further in section 3.

The **key liquid waste management pathways** (from generation through to recovery or disposal) were found to be consistently followed by the states and territories. The key pathways for liquid waste across Australia are illustrated below in Figure 1-1. From left to right Figure 1-1 illustrates the following: the generators, what they generate, where the waste is moved to and where it is treated, and the management option that is applied to the liquids post treatment (i.e. recycling, energy recovery, or disposal). The figure also illustrates the national estimated volumes (ML) for each management pathway (where data was available to report).

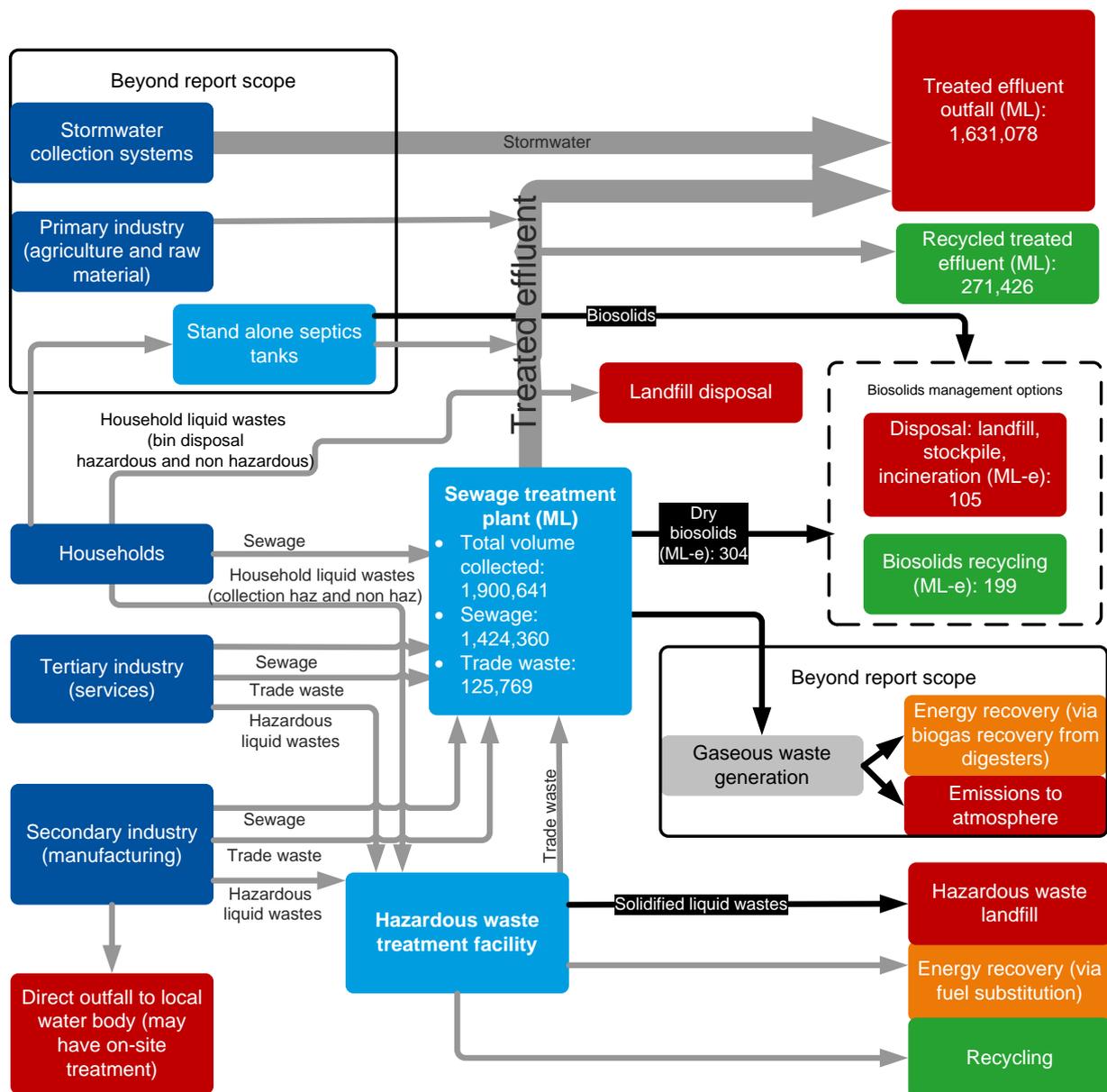


Figure 1-1 Main liquid waste management pathways in Australia and estimated volumes (where available)

**Legend:** Blue=generators, Light blue=treatment, Green= recycling, Orange=energy recovery, Red=disposal

**Note:** Volumes listed to not include primary production, or rural water services.

The **data collation and assessment** found that readily available data for liquid wastes in Australia is good for liquids collected via the sewerage system.

The *National Performance Report 2009-2010 Urban Water Utilities* (NPR), and its supporting workbook, provides an excellent public information resource on the management of sewage and trade waste nationally. The NPR indicates that for all states, apart from Victoria and Tasmania, the total sewage volumes equate almost completely to the amounts of trade waste and sewage generation.

This report notes that solid waste generation and management public reporting does not currently report nationally to a same level of detail as the NPR and that valuable information and learning may be shared from development and reporting of the NPR in the development of any national solid waste reporting systems.

The Australian and New Zealand Biosolids Partnership (ANZBP) (2010), *Biosolids Management National Survey* provides useful information regarding the generation and management of biosolids. For all states, apart for the Northern Territory, the data availability for biosolids generation and management is good.

Readily available data for liquids sent to hazardous waste treatment facilities was found to be limited, however, a complete set of data appears to be collected by most jurisdictions' hazardous waste tracking systems. This data could be used to complete the hazardous liquid waste mass balance and enable estimation of the interface between liquid and solid hazardous wastes, even if this information is not disclosed publically.

The report found that all jurisdictions are signatories to the National Environment Protection (movement of controlled wastes between States and Territories) Measure (the NEPM) and all jurisdictions, apart from Tasmania, ACT, and Northern Territory, operate internal waste tracking systems for hazardous waste. With the exception of Western Australia, the jurisdictions' internal waste tracking systems are well aligned with the NEPM waste categories.

The NEPM grouping of 15 waste types provides the most consistent grouping of wastes, including liquid wastes, that is used by the jurisdictions. All states report their inter-state waste movements using these categories and several of the states intra-state tracking and reporting systems use these categories (or categories based on these categories). It was therefore recommended that where data is available, all hazardous liquid waste generation, import, export, recycling, energy recovery, and disposal will be grouped by these categories.

The report found the issue of defining a liquid or solid waste is complex. Wastes are often in a partial liquid state, commonly referred to as 'sludges' which are a significant 'grey area' between liquid and solid waste classifications and represent a significant area of potential overlap or confusion in liquid and solid waste data accounting. Hazardous waste facilities receive significant amounts of 'sludge' wastes for treatment. During treatment, sludges are normally separated into the liquid and solid components which are then managed into recycling, energy recovery, or disposal to sewer or landfill. Because sludges are typically separated into solid and liquid wastes during treatment, the solid and liquid waste components should be reported appropriately within solid and liquid waste data. However, sludge state wastes remain an area of uncertainty and potential data overlap between solid and liquid waste reporting for the following reasons:

- Wastes classified by the generator as sludges are difficult to allocate accurately to solid or liquid waste generation data.
- Where sludge state wastes are disposed directly to landfill, there will be counting of some liquid waste within the solid waste data.

Data was not available to estimate the levels of liquid household waste chemicals that are being generated. Additional research is required to estimate national consumption volumes of

common household liquid chemicals to enable estimates of liquid waste generation to be made. Once such an estimate of generation is made, it will be possible to estimate the volumes of household chemicals being disposed in bins and to the sewer versus what is recovered by collection programs.

The report found that biosolids are possibly the most significant area of potential 'double counting' between solid and liquid waste data accounting. The Hyder WRIA 2011, report includes data on the rates of **solid** waste generation, recovery and disposal. WRIA 2011 *excluded data on liquid waste and included data on biosolids*. This report does **not** recommend that liquid waste be included in the scope of WRIA 2011. However, this report does recommend that if and ***where liquid waste reporting is going to occur in parallel to solid waste reporting, that biosolids be excluded from the scope of solid waste reporting and be included in liquid waste reporting (regardless of their physical state, wet or dry)***. Biosolids are a part of the liquid waste management system and data should be counted as part of the liquid waste data as it represents a recovered volume of waste from the sewerage waste system.

Whilst hazardous liquid waste data reporting was limited, this report found that the extent of hazardous liquid waste disposed with total hazardous solid waste could be significant. For example in Victoria, data on wastes sent to hazardous waste landfill indicates that up to 10% of total solid prescribed industrial wastes sent to landfill could be liquid waste that has been solidified to permit disposal. However, further detailed data collation and assessment for hazardous liquid waste management is required to provide an accurate estimate of the extent of hazardous liquid waste in solid waste and vice versa.

Finally, the report found the NPI systems provides good levels of data for emissions and transfers of specific contaminants at the 'end of pipe'. However, data was not readily available to enable the connection of the contaminants with the primary generator of the substance.

The full list of findings the recommendations are listed in section 5.

# 1 INTRODUCTION

Hyder Consulting Pty Ltd (Hyder) was engaged by the Waste Reform and Reporting Section of the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) to produce a report that collates and assesses *readily available* Australian data and information on liquid waste.

This report has been produced in response to concerns raised by state and territory governments during the consultation phase of the Hyder report *Waste and Recycling in Australia 2011 (WRIA 2011)*. The WRIA 2011 report collated data on solid wastes only and several states noted that some of the solid waste that were being reported had a liquid waste component.

In response to concerns raised by the states and territories, this report aims to:

- Document the different definitions and classifications of liquid waste in Australia
- Describe the key liquid waste pathways (from generation through to recovery or disposal)
- Collate and assess the *readily available* data on liquid waste in Australia
- Analyse the extent to which liquid waste is counted in solid waste data
- Estimate the amount of hazardous liquid waste in solid hazardous waste data
- Report on the availability of liquid waste data and identify any significant gaps in data availability.

The report was developed in the following steps:

- a** Undertaking a literature review of the jurisdictions' policy frameworks to document the common liquid waste *definitions* to identify any significant differences.
- b** Identifying and documenting the common and significant *management pathways* for liquid waste that occur across the different jurisdictions.

This step was completed via desktop analysis and using existing working knowledge of both liquid and solid waste management options and policy frameworks.

- c** Reviewing and *compiling the readily available volume or tonnage data* from the states and territories for the liquid waste management pathways documented in point (b) (above).

A significant component of this part of the report involved attempting to align the states and territories data sets, identifying where liquid and solid waste potentially overlap and identifying significant gaps in data measurement or collation.

- d** Considering the findings of the above and making recommendations regarding the use of liquid waste data.

Corresponding to the method, this report includes the following sections:

1. Liquid waste classifications and definitions
2. Key liquid waste pathways
3. Data collation and assessment
4. Findings and recommendations.

## 1.1 Scope and limitations and of this report

It is important to note that this report was developed based on existing readily available data from the states and territories and additional data may be available to complement this report. The scope and primary intention of this report is to provide a broad overview of the liquid waste management frameworks in each of the states and territories and to collate the data collected under these frameworks, where the data was readily available.

This report aims to present what data was readily available on liquid waste generation, reuse, recycling, energy recovery and disposal. It is not within the scope of this report to complete further analysis of each of these parameters.

The report aims to collate liquid waste data from all readily available information sources with the following exceptions:

- Liquid wastes generated from primary industry, stormwater collection systems and stand alone septic tanks are not within the scope of this report.
- Following on from the dot point above, the sewerage system data collated is for urban water utilities (specifically data from the *National Performance Report 2009-2010 Urban Water Utilities, National Water Commission*) and does **not report on rural water services** (specifically it does not report data from the *National Performance Report 2009–10 Rural water service providers*).
- A detailed study of gaseous wastes that are generated from liquid waste management is beyond the scope of this report.
- This report aims to present what data was readily available on liquid waste generation, reuse, recycling, energy recovery and disposal. It is not within the scope of this report to complete further detailed analysis of each of these parameters.

Other important notes are:

- The primary source and calculation of data provided by the reference reports or jurisdictions has not been scrutinised.
- In assessing quantities of liquid wastes, the general assumption has been made that they are essentially aqueous with an average specific gravity of 1.0.

## 1.2 National liquid waste reporting (implications for biosolids)

The National Waste Policy 2010 is intended to cover solid, liquid and gaseous wastes stating the following regarding its scope:

...encompasses wastes, including hazardous wastes and substances, in the municipal, commercial and industrial, construction and demolition waste streams, and covers gaseous, liquid and solid wastes. Radioactive waste is excluded.

The Hyder WRIA 2011 report includes data on the rates of **solid** waste generation, recovery and disposal, and included the following recommendations about methods for compiling national data from current public data sets that are relevant to liquid waste reporting:

*Recommendation 3: Liquid and gaseous wastes should be excluded from the scope at this stage.*

*Recommendation 15: Bio-solids should be included in the scope.*

This report is the first attempt to compile data on liquid waste. Whilst it is **not** recommended that liquid waste be included in the scope of WRIA 2011, this report recommends that if and **where liquid waste reporting is going to occur in parallel to solid waste reporting, that biosolids be excluded from the scope of solid waste reporting and included in liquid waste reporting (regardless of their physical state)**. Biosolids are a part of the liquid waste management system and data should be counted as part of the liquid waste data as it represents a recovered volume of waste from the sewerage waste system.

It follows that if liquid waste is not reported then biosolids data inclusion in solid waste data is appropriate, as biosolids management still requires reporting.

## 2 LIQUID WASTE CLASSIFICATIONS AND DEFINITIONS

The review found that there are similar infrastructure and policy frameworks across the nation for the collection and management of liquid wastes. Liquid waste is divided into three main streams: sewage, trade waste, and hazardous liquid waste. State definitions and classifications for these three main streams are described below.

To illustrate each jurisdiction's framework and the definitions used in each jurisdiction, liquid waste classification trees have been developed and are presented in Section 2.4.

Based on the findings of Section 2.1 – 2.4, Section 2.5 sets out the important definitions that are adopted and used throughout this report.

### 2.1 Sewage

Table 2-1 presents the definitions for sewage for each jurisdiction.

**Table 2-1 Sewage Definition**

Jurisdiction	Definition	Source
ACT	<p><b>Sewage:</b></p> <p>(a) means waste water from the community, including faecal matter, urine and household and commercial waste water that contains human waste; but</p> <p>(b) does not include stormwater.</p>	<p><i>Water and Sewerage Act 2000</i>, p. 38</p> <p>ACT Government</p>
NSW	<p><b>Sewage of a Domestic Nature:</b></p> <p>Human faecal matter and urine and waste water associated with ordinary kitchen, laundry and ablution activities of a household, but does not include waste in or from a sewage management facility.</p>	<p><i>Liquid Trade Waste Regulation Guidelines 2009</i>, p. xii</p> <p>NSW Office of Water</p>
NT	<p><b>Domestic Sewage:</b></p> <p>The liquid or liquid borne waste discharged to a sewer from a toilet, shower, hand basin, sink or similar fixture.</p>	<p><i>Trade Waste Code 2001</i></p> <p>Power and Water Authority</p>
QLD	<p><b>Blackwater</b> is defined as:</p> <p>(a) the waste discharged from the human body into a toilet, and</p> <p>(b) the water used for the discharge.</p> <p>Greywater means wastewater from a bath, basin, kitchen, laundry or shower, whether or not the wastewater is contaminated with human waste.</p>	<p><i>Queensland plumbing and wastewater code 2011</i>, p. 2 and p. 3</p>
SA	<p><b>Wastewater:</b></p> <p>(a) water used to flush human waste into the undertaking or other sewage disposal or treatment system; and</p> <p>(b) water used for personal washing; and</p> <p>(c) water used for washing clothes or dishes; and</p> <p>(d) water used in a swimming pool.</p> <p>Wastewater does not include material from a septic tank, an AWT system or any other facility for the onsite treatment or storage of wastewater.</p>	<p><i>Sewerage Regulations 1996</i>, p. 4 and p. 12</p> <p>SA Water</p>

Jurisdiction	Definition	Source
TAS	" <b>sewage</b> " means sewage as defined in the Plumbing Regulations 2004: "sewage" means water-borne waste of human origin comprising faecal matter, greywater, urine or liquid household waste. ("greywater" means the domestic wastes from baths, showers, basins, laundries and kitchens but does not include toilet and urinal wastes.)	<i>Environmental Management and Pollution Control (Waste Management) Regulations 2010</i> , p. 4 Tasmanian Government & <i>Plumbing Regulations 2004</i>
VIC	<b>Sewage</b> means any human excreta or domestic waterborne waste, whether untreated or partially treated, but does not include trade waste.	<i>Water Act 1989</i> , p. 23 Version No. 100 EPA
WA	<b>Wastewater</b> means liquid waste, whether domestic or otherwise, and includes faecal matter and urine.	<i>Water Agencies (Powers) Act 1984</i>

## Summary

Sewage is called wastewater in South Australia and Western Australia, greywater or blackwater in Queensland and sewage in all other jurisdictions.

## 2.2 Trade waste

Table 2-2 provides details on the classification of trade waste in each jurisdiction.

Table 2-2 Trade Waste Definitions

Jurisdiction	Definition	Source
ACT	Not found.	
NSW	<b>Liquid trade waste</b> means all liquid waste other than sewage of a domestic nature.	<i>Liquid Trade Waste Regulation Guidelines 2009</i> , p. xii NSW Office of Water
NT	<b>Trade Waste:</b> The liquid or liquid borne waste generated from any industry, business, trade, manufacturing process or similar that is approved for discharge to sewer but does not include wastewater from a toilet, shower, hand basin or similar fixture.	<i>Trade Waste Code 2001</i> Power and Water Authority
QLD	" <b>trade waste</b> " means water-borne waste from business, trade or manufacturing premises, other than (a) waste that is a prohibited substance; and (b) human waste; and (c) stormwater.	<i>Sewerage and Water Supply Act 1949</i> , p. 12 Queensland Government
SA	<b>Trade waste</b> means material (other than wastewater) that is discharged or otherwise introduced into the undertaking in the course of carrying out an industrial or manufacturing process or carrying on a business of any kind.	<i>Sewerage Regulations 1996</i> , p. 12 SA Water
TAS	" <b>trade waste</b> " means the liquid waste generated by any industry, business, trade or manufacturing process. (p. 11)	<i>Water and Sewerage Industry Act 2008</i> Tasmanian Government

Jurisdiction	Definition	Source
VIC	<p><b>Trade waste</b> means:</p> <p>(a) any waterborne waste (other than sewage) which is suitable, according to the criteria of an Authority, for discharge into the Authority's sewerage system; or</p> <p>(b) any other matter which is declared by a by-law made under this Act to be trade waste.</p>	<p><i>Water Act 1989</i>, p.25 Version No. 100 EPA</p>
WA	<p>Any wastewater discharge from business or industry, other than that which comes from staff amenities or office facilities, is generally classified as <b>Industrial Waste</b>.</p>	<p><i>INDUSTRIAL WASTE PERMITS – PUB 100</i> Water Corporation</p>

## Summary:

Trade waste is called industrial waste in Western Australia and trade waste in all other jurisdictions.

## 2.3 Hazardous liquid wastes

Table 2-3 presents the classifications for hazardous liquid wastes in each jurisdiction. Unlike sewage and trade wastes, the hazardous stream often consists of some wastes that are solid and some that are liquids, therefore, the definitions outlined below may apply to both liquid and solid hazardous wastes. Sewage and trade wastes have suspended solids content, however, the waste stream is defined as liquid.

**Table 2-3 Hazardous Liquid Waste**

Jurisdiction	Definition	Source
ACT	<p><b>Hazardous wastes</b> are defined as,</p> <p>Any waste that meets the criteria for assessment as dangerous goods under the <i>Australian Code for the Transport of Dangerous Goods by Road and Rail</i>, and categorised as one of the following:</p> <p>(a) explosives,</p> <p>(b) gases (compressed, liquefied or dissolved under pressure),</p> <p>(c) flammable solids (excluding organic waste, and all physical forms of carbon such as activated carbon and graphite),</p> <p>(d) flammable liquids,</p> <p>(e) substances liable to spontaneous combustion (excluding organic waste, and all physical forms of carbon such as activated carbon and graphite),</p> <p>(f) substances which in contact with water emit flammable gases,</p> <p>(g) oxidising agents and organic peroxides,</p> <p>(h) toxic substances,</p> <p>(i) corrosive substances.</p> <p>Pharmaceuticals and poisons (being waste generated by activities carried out for business or other commercial purposes and that consists of pharmaceutical or other chemical substances specified in the Poisons List under the Poisons and Therapeutic Goods Act 1966 (NSW)).</p> <p>Clinical waste.</p>	<p><i>ACT's Assessment &amp; Classification of Liquid &amp; Non-liquid Wastes</i> ACT Government</p>

Jurisdiction	Definition	Source
	<p>Cytotoxic waste.</p> <p>Sharps waste.</p> <p>Quarantine waste.</p>	
NSW	<p><b>'Trackable liquid waste'</b> means liquid waste of a type described in Part 1 of Schedule 1 of the Protection of the Environment Operations (Waste) Regulation 2005.</p>	<p>New South Wales Government</p> <p><i>Protection of the Environment Operations (Waste) Regulation 2005</i></p>
NT	<p><b>Hazardous waste</b> means:</p> <p>(a) waste prescribed by the regulations, where the waste has any of the characteristics mentioned in Annex III to the Basel Convention; or</p> <p>(b) wastes covered by paragraph 1(a) of Article 1 of the Basel Convention; or</p> <p>(c) household waste; or</p> <p>(d) residues arising from the incineration of household waste; but does not include wastes covered by paragraph 4 of Article 1 of the Basel Convention.</p>	<p><i>Hazardous Waste (Regulation of Exports and Imports) Act 1989</i></p>
QLD	<p>Hazardous wastes are defined as <b>regulated waste</b>.</p> <p>Also, a substance is <b>'trackable waste'</b> if it is regulated waste of a type mentioned in Schedule 1 of the Environmental Protection (Waste Management) Regulation 2000.</p> <p>Regulated waste is waste that:</p> <p>(a) is commercial or industrial waste, whether or not it has been immobilised or treated; and</p> <p>(b) is of a type, or contains a constituent of a type, mentioned in schedule 7. (p. 54)</p> <p>Limited regulated waste means any of the following types of regulated waste—</p> <p>(a) asbestos;</p> <p>(b) fish processing waste;</p> <p>(c) food processing waste;</p> <p>(d) poultry processing waste;</p> <p>(e) quarantine waste that has been rendered non-infectious;</p> <p>(f) sludge or residue from water treatment plants;</p> <p>(g) sewage sludge or residue produced in carrying out an activity to which schedule 2, section 63 applies;</p> <p>(h) treated clinical waste;</p> <p>(i) tyres.</p>	<p><i>Environmental Protection Act 1994</i></p> <p><i>Environmental Protection (Waste Management) Regulation 2000</i></p> <p>and</p> <p><i>Environmental Protection Regulation 2008</i>, p. 201</p> <p>Queensland Government</p>
SA	<p>The SA Environment Protection Act 1993 Prescribed activities of environmental significance—Schedule 1, outlines a set of <b>'Listed wastes'</b> that are required to be tracked using SA's waste tracking certificates.</p>	<p><i>Environment Protection Act 1993</i></p> <p>Prescribed activities of environmental significance—Schedule 1, Part B.</p>

Jurisdiction	Definition	Source
TAS	<p>Hazardous wastes are defined as <b>controlled wastes</b>.</p> <p>Controlled Waste: a substance or item is prescribed as a controlled waste if the substance or item</p> <p>(a) exhibits an environmentally significant characteristic and is derived or arises from</p> <ul style="list-style-type: none"> <li>(i) an agent chemical as defined in the Dangerous Substances (Safe Handling) Act 2005; or</li> <li>(ii) dangerous goods as defined in the Dangerous Goods (Safe Transport) Act 1998; or</li> <li>(iii) a poison as defined in the Poisons Act 1971; or</li> <li>(iv) a scheduled waste within the meaning of a National Management Plan; or</li> </ul> <p>(b) is a waste within the meaning of the Quarantine Regulations 2000 of the Commonwealth, as amended; or</p> <p>(c) is sewage sludge, sewage residue, nightsoil or sludge from an on-site waste water management system; or</p> <p>(d) is a tyre. (p. 5)</p>	<p><i>Environmental Management and Pollution Control (Waste Management) Regulations 2010</i></p> <p>Tasmanian Government</p> <p><i>(Plumbing Regulations 2004)</i></p>
VIC	<p>Hazardous wastes are described as <b>prescribed industrial wastes (PIW)</b>. PIWs are divided into three categories: Category A, B and C wastes. Category A wastes are the highest hazard category and require treatment before landfill disposal can occur. Industrial liquid wastes that cannot be disposed of to sewer are all effectively prescribed wastes as no liquid wastes can be disposed to landfill and must be reused or treated to enable recycling, energy recovery or disposal.</p>	<p><i>Environment Protection (Industrial Waste Resource) Regulations 2009</i>, p. 38</p> <p>EPA</p>
WA	<p><b>Controlled Waste</b> is defined as all liquid waste, and any waste that cannot be disposed as a Class I, II or III landfill site. Controlled Waste also includes asbestos, clinical or related waste, tyres and waste that has been immobilised or encapsulated.</p> <p>The Controlled Waste Regulations apply to a controlled waste that is produced by, or as a result of:</p> <ul style="list-style-type: none"> <li>An industrial or commercial activity</li> <li>A medical, nursing, dental, veterinary, pharmaceutical or other related activity</li> <li>Activities carried out on or at a laboratory</li> <li>An apparatus for the treatment of sewage.</li> </ul>	<p><i>Environmental Protection (Controlled Waste) Regulations 2004</i>.</p>

## Summary

Hazardous liquid wastes have a range of definitions across the states and territories. The hazardous or potentially hazardous nature of these wastes is common to all jurisdictions' definitions and therefore hazardous liquid waste will be the definition adopted for this report. Perhaps more significant is the waste types that are included in each jurisdiction's definition of hazardous wastes. This is discussed further in section 3.

## 2.4 Liquid waste classification trees

The figures below show the liquid waste classification trees for each jurisdiction. The classification trees show a reasonably consistent set of policy frameworks and definitions for liquid wastes.

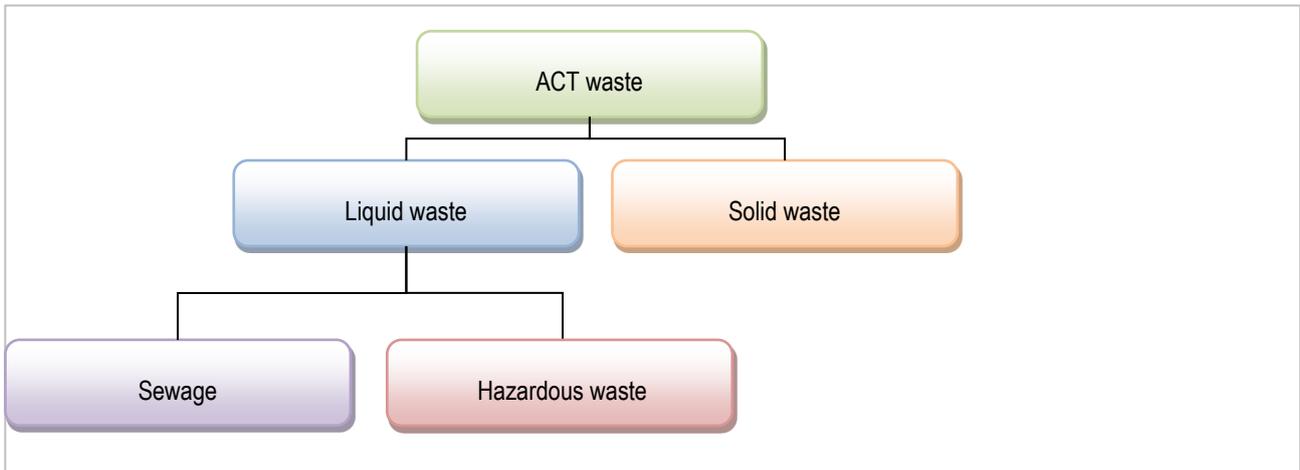


Figure 2-1 ACT liquid waste classification tree

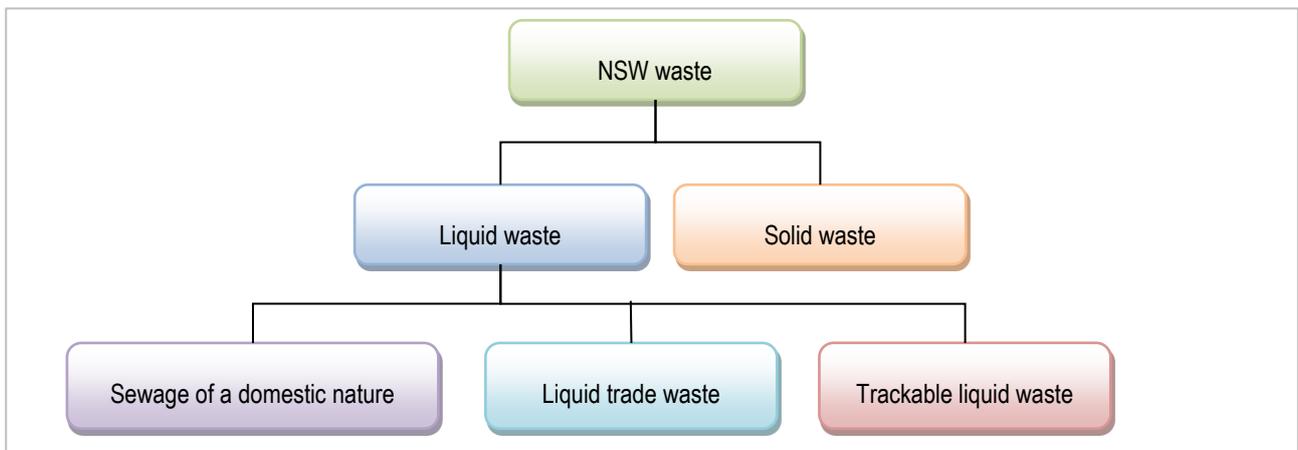


Figure 2-2 New South Wales liquid waste classification tree

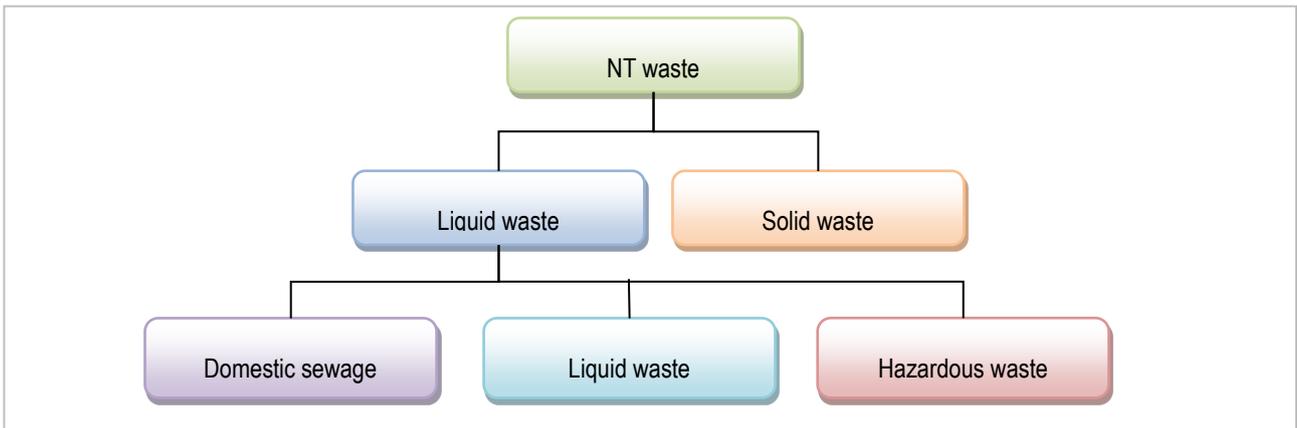


Figure 2-3 Northern Territory liquid waste classification tree

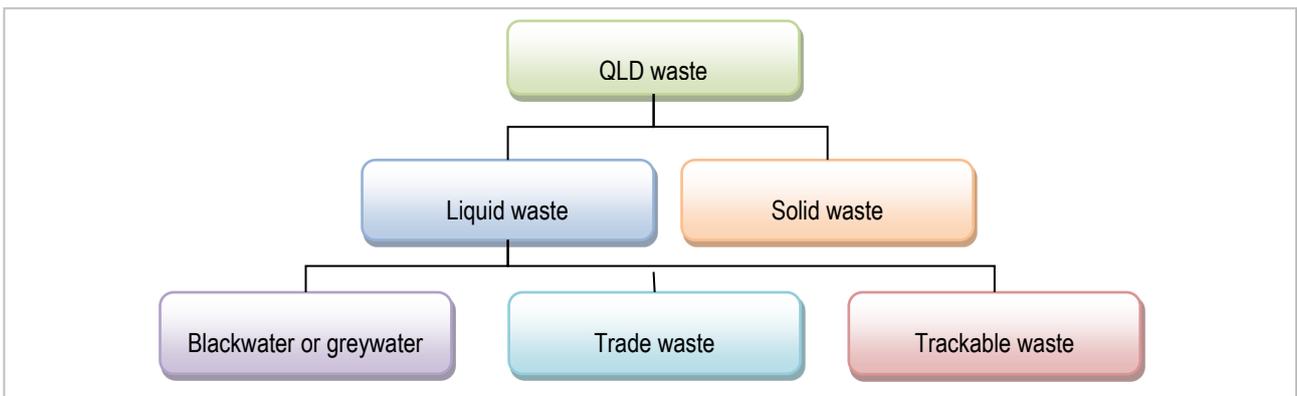


Figure 2-4 Queensland liquid waste classification tree

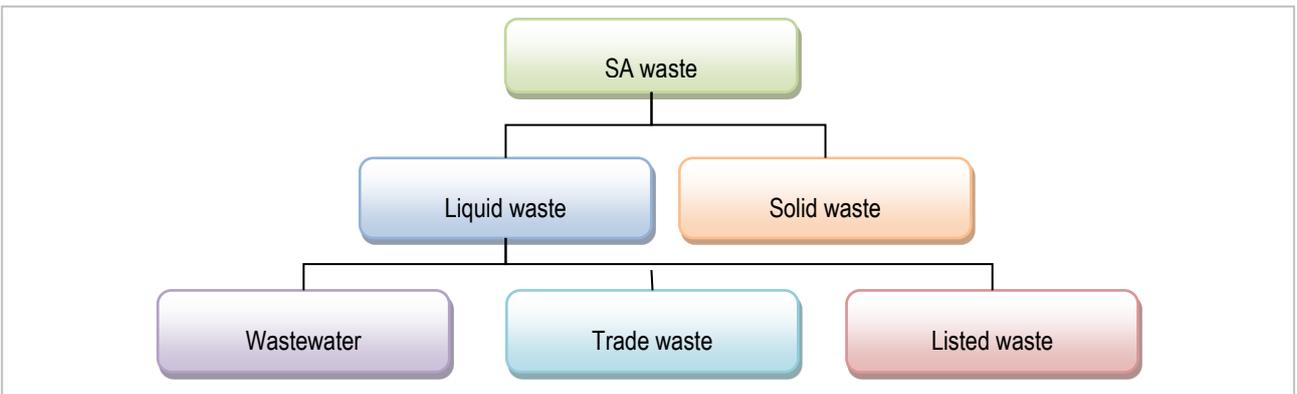


Figure 2-5 South Australia liquid waste classification tree

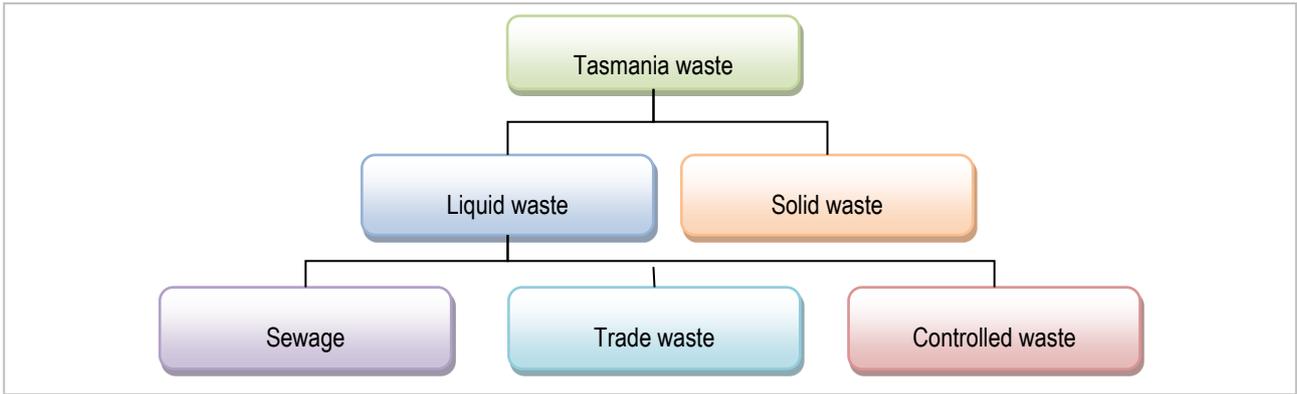


Figure 2-6 Tasmania liquid waste classification tree

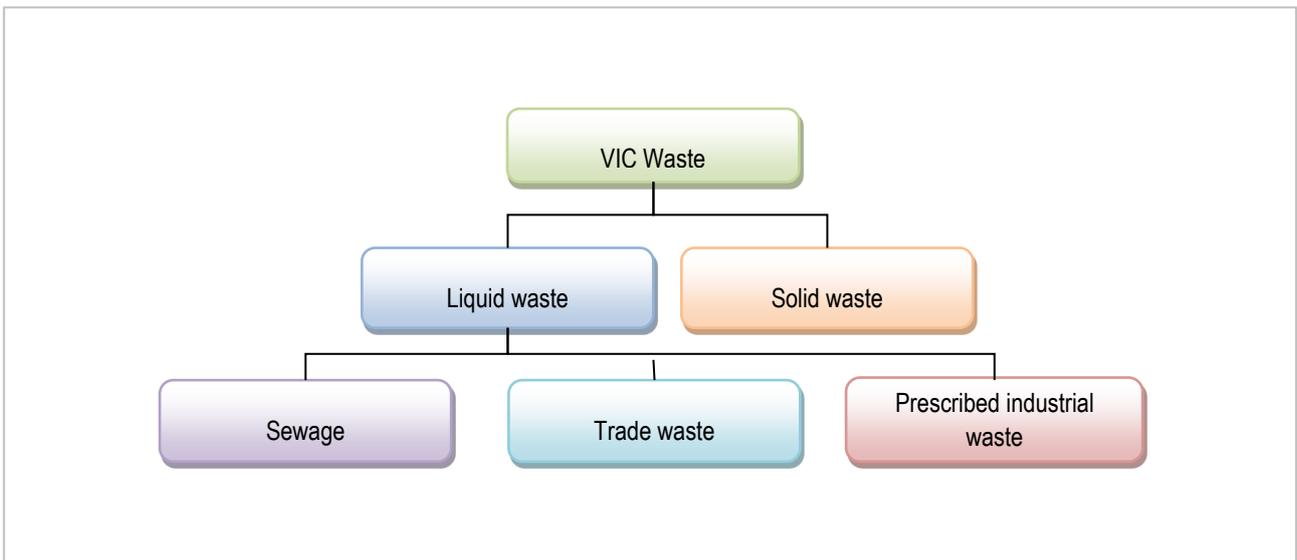


Figure 2-7 Victoria liquid waste classification tree

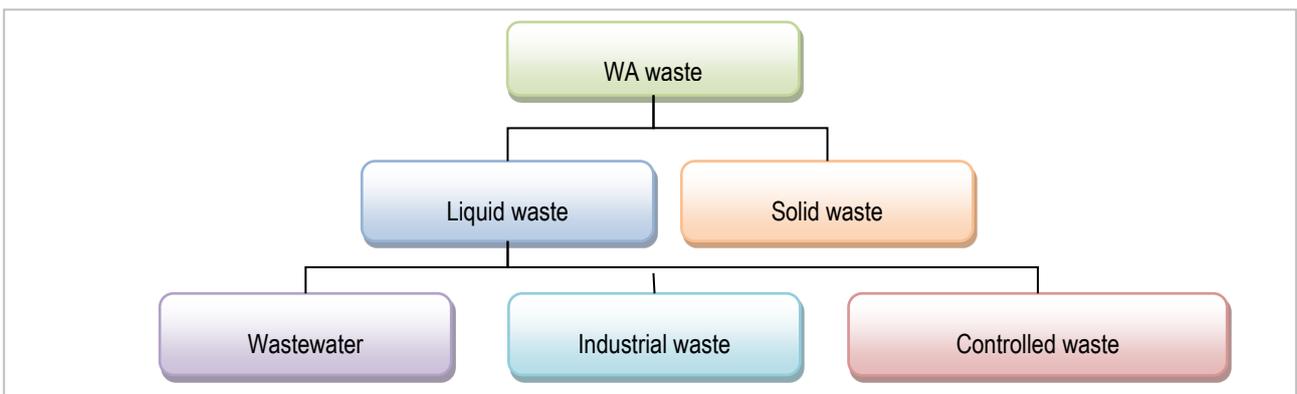


Figure 2-8 Western Australia liquid waste classification tree

## 2.5 Definitions

Whilst there are numerous variations for the common terms regarding liquid waste management, the definitions that follow have been adopted for the purposes of this report.

- **Hazardous liquid waste:** are considered to be any liquid-state waste that falls under the *National Environment Protection (movement of controlled wastes between States and Territories) Measure* (the NEPM) categories, as listed in Appendix 1. This range of liquid wastes covers the majority of liquids that are *not* disposed to the sewerage system from secondary or tertiary industrial premises.
- **Household liquid waste (hazardous and non-hazardous):** are considered to be all liquid wastes that are disposed of into household bins and via household chemical collection programs and are not disposed to the sewerage system during use or otherwise.
- **Sewage:** means any human excreta or domestic waterborne waste (e.g. liquid food waste), whether untreated or partially treated, but does not include trade waste.
- **Sewerage system:** the network of pipes used to deliver *both* sewage and trade waste to the sewage treatment plant.
- **Trade waste:** is any discharge to sewer from industrial and commercial premises that is not sewage. For the purposes of this report trade waste refers only to the volumes of liquids that are disposed to sewer and does not include 'hazardous liquid wastes' as defined above. Note, any liquids discharged to sewer *from* a hazardous waste treatment facility are considered trade waste.

# 3 KEY LIQUID WASTE PATHWAYS

## 3.1 Liquid waste pathways

The key pathways for liquid waste across Australia are illustrated below in Figure 3-9. From left to right Figure 3-9 illustrates the following: the generators, what they generate, where the waste is moved to and where it is treated, and the management option that is applied to the liquids post treatment (i.e. recycling, energy recovery, or disposal).

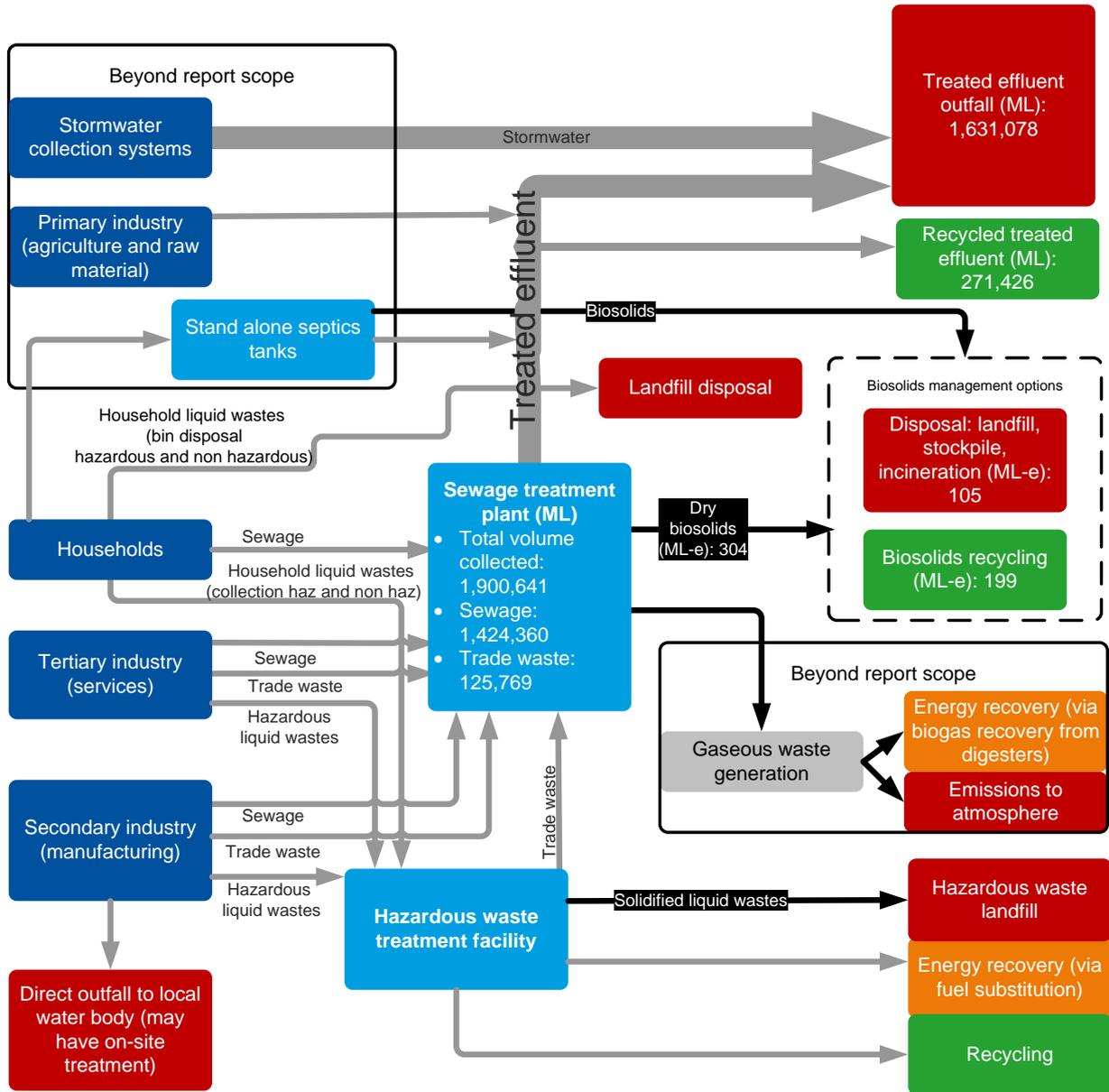


Figure 3-9 Main liquid waste management pathways in Australia and estimated volumes (where available)

Legend: Blue = generators, Light blue = treatment, Green = recycling, Orange = energy recovery, Red = disposal

Note: Volumes listed to not include primary production, or rural water services.

Common to solid waste and liquid waste are the steps that form these pathways, namely, generation, movement, treatment and/or solidification, and reuse, recycling, energy recovery and disposal. These steps are common across the nation and therefore will be discussed generically. For each of the jurisdictions the volumes of waste managed in each of the key management pathways are detailed in Section 4.

### 3.1.1 Generation

Key generators of liquid waste are illustrated in Figure 3-9. The three principal liquid waste sources within the scope of this report are:

- Households
- Services industry (tertiary industries)
- The manufacturing industry (secondary industry).

#### Households

From households, the main liquid waste is sewage. Households also generate some other volumes of liquid waste (both hazardous and non hazardous).

Hazardous waste liquids are generated when disposing of household chemicals. Household chemical collection programs running in Victoria and NSW collect a broad range of household liquid chemicals, as well as some solid chemical or hazardous wastes. Commonly occurring liquids that are collected include: oils, paints, pesticides, and flammable liquids.

Liquids are also disposed of by households within solid food waste or as liquid food waste, such as milk. The liquid content of wasted solid food varies significantly; however, most food waste is putrescible and will generate liquid as it decomposes. This liquid will ultimately contribute to landfill leachate (where the food is sent to landfill). As solid food waste is considered a solid waste and is accounted for in W&R2011, the liquid content should not be allocated to liquid waste, to prevent double counting of the tonnage/volume.

Readily available data on the volumes of liquid food waste that is disposed 'down the sink' in Australia was not identified. The WRAP (Waste & Resources Action Programme) in the United Kingdom has published some data which gives some indication of the significance of the contribution of liquid food waste to the sewerage system volumes reported in this report. In 2009, WRAP published *Down the Drain, Quantification and exploration of food and drink waste disposed of to the sewer by households in the UK* which included the following:

*The key food groups disposed via the sink and sewer by UK households were found to be:*

- *drink*
- *dairy and eggs*
- *meals*
- *condiments, sauces, herbs & spices*
- *staple foods*
- *meat and fish and*
- *processed vegetables and salad.*<sup>1</sup>

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<sup>1</sup> *All other food and drink were grouped together in an 'other' category during this report. Drink was disposed in by far the greatest quantity of these groups, at 740,000 tonnes per annum, with dairy and eggs appearing in the next greatest quantity, including a large amount of milk.*

## Services industry

All of the service industry generates sewage and may have a trade waste discharge agreement with the local water authority to dispose of their trade wastes to the sewerage system. A portion of the service industry will also generate hazardous liquid wastes. Examples of service industries that generate hazardous industrial liquid wastes are hospitals, laboratories and vehicle servicing.

## Manufacturing industry

All of the manufacturing industry generates sewage and a significant portion of the industry will have trade waste agreements with the local water authorities to dispose of trade wastes to the sewerage system. A significant portion of the industry will also generate hazardous liquid wastes.

Trade waste generated by the services or manufacturing industry that is discharged to sewer is regulated by local water authorities under trade waste discharge agreements. The discharge agreement typically sets out contaminant types and a maximum contaminant loading that can be discharged per unit volume of discharge from the premises.

### 3.1.2 Movement

Liquid wastes within the scope of this report are collected and moved through the following collection and movement systems:

- Sewerage pipe network
- Commercial liquid waste transport vehicles
- Private transport to central collection sites (i.e. domestic liquid waste).

#### Sewerage pipe network

In most of Australia the sewerage network collects sewage and trade wastes and the collection of stormwater is managed via a separate collection and discharge system. In the late 19<sup>th</sup> and 20<sup>th</sup> century some combined stormwater and sewerage systems were built in Australia, however, these are gradually being replaced with separated systems.

#### Commercial liquid waste transport

Hazardous and non-hazardous liquid wastes are transported from industrial and commercial premises by privately owned liquid waste management companies. Non-hazardous liquid wastes are usually transported to a recycling facility or to a permitted sewerage system inlet.

In NSW, QLD, VIC, WA and SA, where the liquid waste is deemed to be hazardous waste by regulation, the transport ***within the jurisdiction's borders*** is controlled by a tracking system that tracks the movement of the wastes. The commercial transport of hazardous liquid wastes within jurisdiction's borders, mentioned above, is reasonably consistently regulated across the jurisdictions that have implemented hazardous waste tracking systems. There are, however, minor differences in the wastes types that each state tracks, as detailed in Appendix 2. The amount of information that is required by the various states tracking systems is significant.

A review of the tracking system forms (that generators, transporters, and receivers are required to use) found that the following information, relevant to this report, is gathered by most states:

1. *Generator details, including the generating industry type*

2. *The physical state of the waste (solid, liquid, or sludge)*
3. *Quantities, contaminant types*
4. *The destination for the waste and the proposed treatment or disposal activity for the waste.*

Where hazardous liquid wastes are transported **across state borders**, states that participate in the *National Environment Protection (movement of controlled wastes between States and Territories) Measure* (the NEPM) require that the movements are documented and controlled. The NEPM sets out a list of substances that require tracking and the information required regarding the generator, the transporter and the receiving facility. States and territories are then required to report data to the National Environment Protection Council. All states and territories participate in the NEPM and it can therefore be assumed that there is a consistent set of wastes being reported for cross border movements.

Finally, where hazardous liquid wastes are **imported or exported overseas** for reuse, recycling, treatment or disposal, the waste movement is required to be reported under Australia's commitment to the Basel Convention. Imports or exports of liquid wastes require permitting, and discussions with Basel reporting staff within DSEWPaC indicated that there have been some volumes of liquids being imported to Australia for treatment. At the time of writing this data was not available and is not discussed further in this report. However, this data should be considered for inclusion in national reporting on liquid waste.

### 3.1.3 Treatment

The two principal places of liquid waste treatment with the scope of this study are:

- Sewage treatment plants
- Liquid waste treatment facilities (hazardous and non hazardous).

#### Sewage treatment plants

The National Water commission reports that in Australia in 2009–10 there were 554<sup>2</sup> sewage treatment plants operating to treat urban sewage and trade waste. Not all of the plants provide the same levels of treatment. The levels of sewage treatment are generally defined as primary, secondary, tertiary and/or advanced treatment.

The United Nations defines each of the levels of treatment as follows,

*Primary treatment: Treatment of wastewater by a physical and/or chemical process involving settlement of suspended solids, or other process in which the Biological Oxygen Demand (BOD<sub>5</sub>) of the incoming wastewater is reduced by at least 20% before discharge and the total suspended solids of the incoming wastewater are reduced by at least 50%.*

*Secondary treatment: Post-primary treatment of wastewater by a process generally involving biological or other treatment with a secondary settlement or other process, resulting in a Biological Oxygen Demand (BOD<sub>5</sub>) removal of at least 70% and a Chemical Oxygen Demand (COD<sub>3</sub>) removal of at least 75%.*

*Tertiary treatment of public wastewater: Treatment (additional to secondary treatment) of nitrogen and/or phosphorous and/or any other pollutant affecting the quality or a specific use of water: microbiological pollution, colour etc. For organic pollution the treatment efficiencies that define a tertiary treatment are the following: organic pollution removal of at least 95% for BOD and 85% for COD, and at least one of the following:*

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<sup>2</sup> National Water Commission National Performance Report 2009–10 Urban water utilities.

- *nitrogen removal of at least 70%*
- *phosphorus removal of at least 80%*
- *microbiological removal achieving a faecal coliform density less than 1000 in 100 ml<sup>3</sup>.*

Analysis of the *National Performance Report 2009–10 Urban water utilities* indicates that the average level of treatment for all of the waste water treated in Australian facilities is 36% secondary treatment and 64% tertiary treatment.

The 'outputs' of sewage treatment plants are, discussed below.

1. **Biosolids:** are formed from the treatment of tank bottom sludge from the sewage treatment plant process. The extent of dewatering and/or drying of biosolids varies from facility to facility. This in turn affects the amount of liquid in biosolids. The liquid waste content in biosolids represents a potentially significant interface of liquid and solid waste data sets.
2. **Treated effluent outfall:** which involves the disposal of treated effluent to the ocean or a local water body.
3. **Recycled effluent:** which involves the recycling of sewage that is treated to a suitable standard for the intended use, for example recycled effluent used in irrigation.
4. **Gaseous waste generation:** is the generation of gaseous emissions from treatment lagoons and sewage sludge digestion. Capturing and recovery energy from methane generated from the digestion of sludge is part of many of Australia's treatment facilities, The Clean Energy Council reports around 40MW of installed capacity for methane recovery across Australia's sewage treatment plants.<sup>4</sup>

## Liquid waste treatment facilities (hazardous and non-hazardous)

Liquid waste treatment facilities are located in most states, except the ACT, the Northern Territory and Tasmania which have limited facilities (apart from the sewerage network) and export the bulk of liquid wastes generated within the state to other states for treatment. This may explain why these states do not have an intra-state waste tracking system, as the wastes are transported interstate and reported under the NEPM.

Unlike the sewerage network and treatment system, the liquid waste treatment facilities are privately owned and operated and there is great variation in the services provided from facility to facility.

Some facilities specialise in the treatment of one type of commonly occurring liquid waste that is ubiquitous and is readily reused or recycled (e.g. waste oils and lubricants).

The common, often large, hazardous waste treatment facilities are able to receive an extensive and complex range of liquid, solid and 'sludge state' wastes. These types of facilities are the main treatment facilities for hazardous liquid wastes in Australia, and are the focus of the liquid waste treatment facilities for this report (as indicated by Figure 3-9).

The NEPM categories for the grouping of controlled wastes (see Appendix 1) provide a useful illustration of the range of waste types or contaminant types that are commonly treated at liquid

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<sup>3</sup> United Nations, Wastewater Treatment, Website:

[http://www.un.org/esa/sustdev/natlinfo/indicators/methodology\\_sheets/freshwater/waste\\_water\\_treatment.pdf](http://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/freshwater/waste_water_treatment.pdf)

<sup>4</sup> Clean Energy Council Power Plant Report 31/08/2010.

<https://www.cleanenergycouncil.org.au/cec/resourcecentre/reports.html>

waste treatment facilities. Clearly, these NEPM categories refer to both solid and liquid waste types. The complete 73 NEPM categories are consolidated in the NEPM annual report to 15 main categories which are more targeted to liquid wastes and are more useful for this reports analysis. The categories are as follows:

- A Plating & heat treatment
- B Acids
- C Alkalis
- D Inorganic chemicals
- E Reactive chemicals
- F Paints, resins, inks, organic sludges
- G Organic solvents
- H Pesticides
- J Oils
- K Putrescible/organic waste
- L Industrial washwater
- M Organic chemicals
- N Soil/sludge
- R Clinical & pharmaceutical
- T Misc.

**Note:** This grouping of 15 waste types provides the most consistent grouping of wastes, including liquid wastes, that is used by the jurisdictions. All states report their **inter**-state waste movements using these categories and several of the states **intra**-state tracking and reporting systems use these categories (or categories based on these categories). For the purposes of this report, where data is available, all hazardous liquid waste generation, import, export, recycling, energy recovery, and disposal will be grouped by these categories. Refer to Appendix 2 for an analysis of each of the states intra-state tracking wastes against the 15 main NEPM waste categories.

In the simplest of terms, hazardous liquid waste facilities manage this range of liquid wastes received by:

- treatment of the particular hazard characteristic/s to enable recycling, energy recovery or disposal to sewer or
- chemically immobilising the hazardous component of the liquid waste (often by the addition of a binding agent such as lime) to solidify the waste and enable disposal to a hazardous solid waste landfill.

Hazardous waste treatment facilities are one of the main interfaces between solid and liquid waste and one of the areas of greatest risk of 'double counting' waste generation, in each of the states. For example, the volumes/tonnages of hazardous liquid waste generation may be counted via the intra or interstate tracking system/s when the liquid is transported to the treatment facility and then be counted again as the solidified waste is sent to a hazardous waste landfill. Similarly, liquids counted when sent to a treatment facility would be double counted

when they are treated and disposed to sewer, if they are not removed from the total sewerage system volume.

**Note:** Industry consultation and review of intra-state waste tracking systems found that the issue of defining a liquid or solid waste is complex. Wastes are often in a partial liquid state, commonly referred to as 'sludges' which are a significant 'grey area' between liquid and solid waste classifications and represent a significant area of potential overlap or confusion in liquid and solid waste data accounting. Hazardous waste facilities receive significant amounts of 'sludge' wastes for treatment. During treatment, sludges are normally separated into the liquid and solid components which are then managed into recycling, energy recovery, or disposal to sewer or landfill. Because sludges are typically separated into solid and liquid wastes during treatment, the solid and liquid waste components should be reported appropriately within solid and liquid waste data. However, sludge state wastes remain an area of uncertainty and potential data overlap between solid and liquid waste reporting for the following reasons:

- Wastes classified by the generator as sludges are difficult to allocate accurately to solid or liquid waste generation data.
- Where sludge state wastes are disposed directly to landfill, there will be counting of some liquid waste within the solid waste data.

## 3.1.4 Pathways

**To enable a discussion regarding the pathways of liquid reuse, recycling, and energy recovery, it is necessary to first define each of these pathways.**

It is also important to note that, where adopting the definitions of re-use and recycling, scenarios such as the collection of waste oils which are refined and then sent for another use is defined as recycling, as the oils are processed before being used again as an oil.

### Reuse

The recent Hyder report for the DSEWPaC, titled *Waste and Recycling in Australia 2011* defined reuse as:

*Re-use involves recovering value from a discarded resource in its original state without reprocessing or remanufacture*

The reuse of liquids (i.e. without any form of treatment) does occur. For example, liquid waste from an industrial process taken directly, without treatment, for reuse in another industrial process. However, many of these liquids will not enter the 'waste market place' and limited or no data is likely to be available on the amount to liquids reused.

### Recycling

The recent Hyder report for the DSEWPaC, titled *Waste and Recycling in Australia 2011* defined recycling as:

*A set of processes (including biological) that converts solid waste into useful materials or products, net of contaminants/residuals disposed.*

The recycling of sewage liquid waste occurs through the recycling of treated effluent.

The recycling of biosolids into agriculture, composting, or forestry industries is significant. Biosolids have both a liquid and solid content. Analysis of the data published by the Australian and New Zealand Biosolids Partnership (2010), *Biosolids Management National Survey*, indicates that the *average* level of recycling of biosolids was around 65%.

Recycling of liquids from the liquid waste treatment facilities is another common occurrence of liquids recycling. Waste oil and grease trap recycling are common examples of liquid waste recycling.

### Energy recovery

The recent Hyder report for the DSEWPaC, titled *Waste and Recycling in Australia 2011* defined energy recovery as:

*Solid wastes that are combusted (or the combustion of methane collected from the waste) as a fuel for an industrial process and/or electricity generation. Energy recovery tonnages are net of any residual wastes that are then recycled or disposed.*

The equivalent definition for liquid waste would be:

*Liquid wastes that are combusted (or the combustion of methane collected from the waste) as a fuel for an industrial process and/or electricity generation. Energy recovery tonnages are net of any residual wastes that are then recycled or disposed.*

The combustion of wastes to recover the embodied energy value is a fundamentally different form of recovery compared to reuse or recycling of wastes. Energy recovery destroys the materials in the recovery process and does not allow any further reuse or recycling and

therefore requires its own category of definition and accounting. This logic is supported by energy recovery having a specific place in the waste hierarchy.

Definitions of reuse, recycling and energy recovery should not be confused with the processes or technologies that enables recovery. For example, anaerobic digestion is a process that enables energy recovery (from the tonnage of the waste material that is combusted), recycling (from the tonnage of the waste material that is composted) and disposal (from the tonnage of waste materials that is sent to landfill).

Energy recovery occurs from liquid waste by:

- The substitution of fuels in industrial processes, such as cement kilns
- The burning of methane generated from sewage treatment facility sludge digestion.

The burning of methane (and other gases) from sludge digestion is the only option, apart from disposal to the atmosphere, for the gaseous waste generated from sewage digestion. The recovery of the methane represents a recovered volume/mass that needs to be accounted for in the liquid waste treatment process.

### 3.1.5 Disposal

The disposal of liquid wastes occurs principally via the pathways that are outlined below.

- **Treated effluent outfall:** which involves the disposal of treated effluent to the ocean or a local water body.
- **Biosolids disposal to landfill:** Some biosolids that are not suitable for recycling are disposed to landfill, or stockpiles.
- **Kerbside bin collection disposal (generally not permitted):** Landfill audits have historically identified the disposal of household liquid wastes in the kerbside bins disposed to landfill. The volumes of these wastes are not likely to be significant, relative to the total volumes of liquid waste that move through society, however, the toxicity risk could be significant, with potential long term implications for receiving landfills. In response to this, several states run targeted programs to collect these chemicals (e.g. Detox Your Home in Victoria and the House Chemical Cleanout Program in NSW). This pathway is illustrated above in Figure 3-9.

It is possible that some household chemicals are disposed 'down the toilet' or into the stormwater drainage network. No evidence or data was identified for these, likely illegal, disposal pathways.

- **Disposal to hazardous waste landfill:** As discussed earlier it is common practice for liquid waste treatment companies to 'immobilise' hazardous wastes. This process effectively solidifies the liquid wastes being treated. This process is commonly used to enable disposal of liquid wastes that have contaminants that cannot be readily destroyed such as inorganics (metals).
- **Direct outfall to local water body:** Some industrial facilities have outfalls to local water bodies. This outfall may simply be managing stormwater collected from across the industrial premises or it may be a specific liquid waste from an industrial process on-site. For both cases, the requirements are generally that only 'clean' waste water be discharged to ensure that the quality of the local water body is not affected. No readily available data was identified for this management pathway and it is not assessed further in this report.

## 4 DATA COLLATION AND ASSESSMENT

In this section, data is presented for each of the states, broken down into the following groups:

- Sewerage system data. This section includes data for sewage and trade wastes.
- Hazardous liquid waste data. This includes hazardous waste data, as defined by this report, and household chemicals data for waste liquids disposed via household chemical collections and in kerbside bins.
- State's data assessment. This section includes an assessment of the particular state's liquid waste data and liquid waste management framework.
- Key findings and recommendations. This section is included in each of the jurisdictions. however, **the key findings and recommendations are made generically and relate to all jurisdictions**. Once the finding or recommendation is made it not repeated for the other jurisdictions. Section 5 includes a summary of all findings.

### 4.1.1 Sewerage system data

The rates of generation, and recycling, are sourced from:

- Australian Government (2010) *National Performance Report 2009-2010 Urban Water Utilities, National Water Commission*. The National Performance Report provides information annually on sewage, trade waste, total collected sewage, discharged treated effluent and recycled treated effluent. The information collected in 2009-2010 was gathered from 79 utilities across all jurisdictions. Within this data set there are data gaps evident, where individual utilities have not provided data for each key pathway. Note, the sewerage system data does not report on rural water services (specifically it does not report data from the *National Performance Report 2009–10 Rural water service providers*).
- Australian and New Zealand Biosolids Partnership (2010), *Biosolids Management National Survey*, <http://www.biosolids.com.au/bs-australia.php> .

There was no consolidated national data identified regarding the volume of effluent disposal, however, some water authorities were found to report data on effluent disposal. To estimate the national volume of effluent discharged to outfall, the following method has been applied<sup>5</sup>:

$$\begin{aligned} \text{Disposal (treated effluent outfall) (ML)} &= \\ \text{Total Sewage Collected (ML)} &- \text{Total Effluent Recycled (ML)} - \text{Total Dry Biosolids Recycled (ML-e)} \\ \text{For example, the national disposal (treated effluent outfall (ML)) of } &1,631,078 = \\ 1,900,641 \text{ ML} &- 271,426 \text{ ML} - 199 \text{ ML} \end{aligned}$$

This assumes the following:

- Where biosolids are dewatered, all of the liquids content of the biosolids is disposed back into the sewage waste treatment system after sludge dewatering contributing to effluent outfall volumes.

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<sup>5</sup> Some treatment processes, such as the addition of lime, can increase the total solids in the biosolids stream by direct addition which could affect the accuracy of the equation.

- That a mass of 1 tonne Biosolids (dry) has a volume equivalent of 1 kL.
- Volume lost to gaseous emissions are not included (i.e. this is an estimated volume balance and gas emissions are not considered).

## 4.1.2 Hazardous liquid waste data

The available data is presented for the following:

- Rates of hazardous liquid waste generation for each jurisdiction
- The amount of liquid waste imported to the state and exported from the state, based on the *NEPC Report on the implementation of the Movement of Controlled Waste between States and Territories NEPM, 2009 – 2010*
- The amount of liquid waste treated, recycled, sent for energy recovery, disposed to trade waste, and disposed to landfill as solidified wastes.

As the tables that follow in the hazardous liquid waste section illustrate, a complete set of data to populate this section of the report was not readily available for any jurisdiction. **Therefore, this section of the report should be viewed as the 'first attempt' to bring together hazardous liquid waste data and presents a format only that could be used to report data should it become available.**

The data that is **currently presented cannot be considered as an accurate estimate** for the following reasons:

- The NEPC report data on imports and exports has solid and liquid waste data combined
- There are reporting period mis-matches that are noted in the data reported

For several states in this section hazardous waste data are estimated and the results illustrate the data incompleteness and inaccuracy noted above.

For example *NSW hazardous waste generation is assumed to = volume treated - volume imported + volume exported*. For this example, several negative generation values are generated (shown in yellow, page 28) which may be the result of a high portion of solid waste being reported within the NEPM *import* data resulting in a negative liquid waste generation estimate.

In relation to data for the household chemicals, data was only identified for the states of NSW and Victoria. For the other jurisdictions no collation or assessment is made of this pathway.

## 4.2 Australian Capital Territory (ACT)

### 4.2.1 ACT sewerage system 2009–10 data collation

The table below summarises the sewerage system data.

Liquid Waste Type	Generation (ML)	Recycling (ML)	Disposal (treated effluent outfall) (ML)	Energy Recovery (MWhrs)
Trade Wastes Volume (2009–10)	not available	not available	not available	not available
Sewage Including Residential and Non Residential (2009–10)	31,836	within total	within total	within total
Total Sewage Collected (inc trade waste and sewage (2009–10)	31,836	31,019	817	0

	Generation (ML equiv)	Recycling (ML equiv)	Disposal (incineration, landfill) (ML equiv)
Dry Biosolids (2009–10)	13	0	13

#### Notes:

- Total effluent outfall = generation - recycling – recycled dry biosolid mass. All biosolids are incinerated in ACT.
- Assume 1 tonne equals 1kL of effluent
- Energy recovery MWhrs assumes operation time is 241 days (or 5784 hrs) per year for installed MW capacity.

#### Sources:

- Australian Government (2010), *National Performance Report 2009-2010 Urban Water Utilities*, National Water Commission
- Australian and New Zealand Biosolids Partnership (2010), *Biosolids Management National Survey* <http://www.biosolids.com.au/bs-australia.php>
- Clean Energy Council Power Plant Report 31/08/2010.

## 4.2.2 ACT hazardous liquid waste 2009–10 data collation

The table below summarises the estimated volumes of hazardous liquid wastes.

NEPM Category	Description	State Generation Volume (kL)	NEPM Volume Exported (kL)	NEPM Volume Imported (kL)	Volume Treated (kL)	Volume Recycled (kL)	Volume to Energy Recovery (kL)	Volume Disposed to Trade Waste	Volume Disposed to Landfill
A	Plating & heat treatment	Unavailable	0	0	0	Unavailable	Unavailable	Unavailable	0
B	Acids	Unavailable	3	0	0	Unavailable	Unavailable	Unavailable	0
C	Alkalis	Unavailable	4	0	0	Unavailable	Unavailable	Unavailable	0
D	Inorganic chemicals	Unavailable	101	0	0	Unavailable	Unavailable	Unavailable	0
E	Reactive chemicals	Unavailable	0	0	0	Unavailable	Unavailable	Unavailable	0
F	Paints, resins, inks, organic sludges	Unavailable	70	0	0	60	Unavailable	Unavailable	0
G	Organic solvents	Unavailable	42	0	0	Unavailable	Unavailable	Unavailable	0
H	Pesticides	Unavailable	0	0	0	Unavailable	Unavailable	Unavailable	0
J	Oils	Unavailable	1292	181	181	3,500	Unavailable	Unavailable	0
K	Putrescible/organic waste	Unavailable	5000	0	0	Unavailable	Unavailable	Unavailable	0
L	Industrial washwater	Unavailable	0	0	0	Unavailable	Unavailable	Unavailable	0
M	Organic chemicals	Unavailable	123	517	0	Unavailable	Unavailable	Unavailable	0
N	Soil/sludge	Unavailable	24464	1675	0	Unavailable	Unavailable	Unavailable	0
R	Clinical & pharmaceutical	Unavailable	110	261	0	Unavailable	Unavailable	Unavailable	0
T	Misc	Unavailable	1622	0	0	Unavailable	Unavailable	Unavailable	0
		Unavailable	32831	2635	0	3560	Unavailable	Unavailable	0

Notes: Assume 1 tonne equals 1kL. Assume that because no treatment facilities in ACT what is exported is also what is generated. NEPM data will include some liquid and some solid waste data

Sources: NEPC *Report on the implementation of the Movement of Controlled Waste between States and Territories NEPM, 2009 – 2010.*

Data provided by ACT staff.

### 4.2.3 ACT data assessment

- 1 Data was not available for trade waste in ACT which is indicative of the lack of medium and heavy industries within the ACT.
- 2 Biosolids data for the ACT appears complete, with all biosolids incinerated.
- 3 The ACT does not have any significant liquid waste treatment facilities and therefore almost all hazardous liquid waste generated in the ACT is transported to an appropriately licensed interstate (mainly NSW) facility. All movements are recorded in accordance with the controlled waste NEPM and a separate ACT waste tracking system was not identified.
- 4 It could be assumed that the hazardous liquids generation is the total exported as almost no treatment occurs in the jurisdiction. However, because the published NEPM data contains some solid waste data this assumption cannot be made. Waste generators are required to declare the physical state of the waste being transported (under the NEPM), therefore it should be possible to publish the amount of liquid and solid wastes being moved interstate separately.
- 5 No data is available regarding the fate of liquid wastes sent for treatment interstate, however, the NEPM does require that the interstate receiver of the wastes declare the fate of the wastes received. It follows that each state should be able to provide information on the fate of wastes received from interstate, at least to the point of delivery to a treatment facility or landfill.
- 6 No hazardous waste landfill operates in the ACT. Therefore the disposal of solidified liquid wastes within ACT can be assumed to be zero.
- 7 Consultation with ACT government staff found that no annual household chemical collection program was operation. However, information found at ([http://www.environment.act.gov.au/\\_\\_data/assets/pdf\\_file/0016/144115/Household\\_Chemicals.pdf](http://www.environment.act.gov.au/__data/assets/pdf_file/0016/144115/Household_Chemicals.pdf)) indicates that in the ACT small amounts of household chemical can be collected free of charge from the generating house.

### 4.2.4 Key findings and recommendations

- 1 NEPM annual reporting could include a breakdown of the liquid waste and solid waste portions for waste being exported interstate.
- 2 The jurisdictions that receive liquid wastes (under the NEPM) could publish the fate of the wastes received as a part of their liquid waste management reporting.

## 4.3 New South Wales

### 4.3.1 NSW sewerage system 2009–10 data collation

The table below summarises the sewerage system data.

Liquid Waste Type	Generation (ML)	Recycling (ML)	Disposal (treated effluent outfall) (ML)(MWhrs)	Energy Recovery (MWhrs)
Trade Wastes Volume (2009–10)	32,582	within total	within total	within total
Sewage Including Residential and Non Residential (2009–10)	608,841	within total	within total	within total
Total Sewage Collected (inc trade waste and sewage (2009–10)	641,423	62,391	578,969	45,520

	Generation (ML equiv)	Recycling (ML equiv)	Disposal (incineration, landfill) (ML equiv)
Dry Biosolids (2009–10)	85	63	21

#### Notes:

- Total effluent outfall = generation - recycling – recycled dry biosolid mass
- Assume 1 tonne equals 1kL of effluent
- Energy recovery MWhrs assumes operation time is 241 days (or 5784 hrs) per year for installed MW capacity.

#### Sources:

- Australian Government (2010), *National Performance Report 2009-2010 Urban Water Utilities*, National Water Commission
- Australian and New Zealand Biosolids Partnership (2010) *Biosolids Management National Survey*, <http://www.biosolids.com.au/bs-australia.php>
- Clean Energy Council Power Plant Report 31/08/2010.

## 4.3.2 NSW hazardous liquid Waste 2009–10 data collation

The table below summarises the estimated volumes of hazardous liquid wastes.

NEPM Category	Description	State Generation Volume (kL)*	NEPM Volume Exported (kL)	NEPM Volume Imported (kL)	Volume Treated (kL)(2010-2011 data)**	Volume Recycled (kL)	Volume to Energy Recovery (kL)	Volume Disposed to Trade Waste (kL)	Volume Disposed to Landfill (kL)
A	Plating & heat treatment	26	3	8	32	Unavailable	Unavailable	Unavailable	Unavailable
B	Acids	16,453	285	9,853	26,021	Unavailable	Unavailable	Unavailable	Unavailable
C	Alkalis	7,138	551	607	7,194	Unavailable	Unavailable	Unavailable	Unavailable
D	Inorganic chemicals	- 25,786	14,531	40,840	523	Unavailable	Unavailable	Unavailable	Unavailable
E	Reactive chemicals	2	0	0	2	Unavailable	Unavailable	Unavailable	Unavailable
F	Paints, resins, inks, organic sludges	19,728	3,461	636	16,904	Unavailable	Unavailable	Unavailable	Unavailable
G	Organic solvents	6,477	2,301	586	4,762	Unavailable	Unavailable	Unavailable	Unavailable
H	Pesticides	1,557	93	7	1,470	Unavailable	Unavailable	Unavailable	Unavailable
J	Oils	105,212	6,408	6,626	105,431	Unavailable	Unavailable	Unavailable	Unavailable
K	Putrescible/organic waste	6,813	6,996	9,105	8,922	Unavailable	Unavailable	Unavailable	Unavailable
L	Industrial washwater	Unavailable	72	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
M	Organic chemicals	11,162	926	1,814	12,051	Unavailable	Unavailable	Unavailable	Unavailable
N	Soil/sludge	- 2,917	2,506	25,210	9,786	Unavailable	Unavailable	Unavailable	Unavailable
R	Clinical & pharmaceutical	10,467	9,487	381	1,360	Unavailable	Unavailable	Unavailable	Unavailable
T	Misc	- 589	2	1,631	1,040	Unavailable	Unavailable	Unavailable	Unavailable
	Totals:	145,815	47,621	97,304	195,498	Unavailable	Unavailable	Unavailable	Unavailable

Notes: Assume 1 tonne equals 1kL. NEPM data will include some liquid and some solid waste data. Code J and K are Not required to be tracked if transported solely within NSW for recovery so these figures will be an underestimate.

\*Generation assumed to = volume treated - volume imported + volume exported.

\*\* Treatment volumes data provided by NSW. NSW provided data time period 10-11, note mis-match with NEPM period. Liquids transported to a transfer station and then to a treatment facility may be double counted.

Sources: NEPC Report on the implementation of the Movement of Controlled Waste between States and Territories NEPM, 2009 – 2010.

### 4.3.3 NSW Household Chemical CleanOut program

The *Household Chemical CleanOut Program Annual Report 2008–2009* provides details of this program designed to recover household chemical waste that would otherwise be stockpiled or disposed of into the household bin or to sewer.

The Household Chemical CleanOut program has:

- been running in NSW since 2003
- held 301 collections
- serviced 112,420 households
- collected over 3,940 tonne household hazardous materials.

In 2008–2009 the program:

- held 96 collections
- served 26,898 households participants
- 1,058 tonne of hazardous materials were recycled or disposed.

The program reporting details the extensive range of materials and the amounts of each that are collected, however, does not define which are solid or liquid. Data for the materials collected by this program should be accounted for in the trackable waste data provided by NSW. The exception to this may be waste oils, which are not tracked when moved *within* NSW when sent for recycling.

Specific reporting of data regarding the fate of the collected chemicals by the CleanOut program was not identified.

### 4.3.4 NSW data assessment

- 1 NSW data availability for the sewerage systems is good and reconciles well.
- 2 NSW biosolids data appears complete.
- 3 *Hazardous liquid waste generation figures estimated (in the table above) are not accurate as the NEPM data used in the calculation include some solid wastes. This may explain the negative generation figures generated for several waste types.*
- 4 NSW operate a waste tracking system for hazardous liquid wastes (trackable liquid wastes) moved within the state. The system tracks the majority of NEPM categories (with the notable exception of waste oils which NSW exempt if being recycled).
- 5 The internal tracking system records the physical state, the facility receiving, and the proposed treatment or management. Whilst public reporting of these intra-state movements was not identified, it appears that the tracking system collects a good level of information which could be used to complete this report's missing information.
- 6 From consultation with industry, it is understood that the liquids treated will be recycled, sent to sewer, sent for energy recovery, or solidified and sent to landfill. However, data regarding volumes for each of these pathways for each of the waste types was not readily available.
- 7 Consultation with industry suggests that NSW may have treatment facility annual reporting data that details specific treatment facility operations and the 'mass balance' of the liquids received and the fate of these liquids received. This information could be used to complement tracking system data to complete the data set and build a more complete

understanding of the fate of liquid waste once received by a treatment facility. This reporting may already occur, however, public reports were not found.

- 8 NSW tracks the tonnages of solidified wastes from treatment facilities that are sent to landfill. These tonnages represent an important interface between liquid and solid waste disposal data.

These volume equivalents have not been identified as the volume of hazardous liquid wastes disposed in the solid waste stream (for NSW and other jurisdictions) because not all of the tonnage is the liquid waste. The solidified wastes are made up of the liquid volume, binding agents, and sometimes other solid wastes (such as soils), so to allocate this tonnage to liquid waste counted within the solid waste data would be inaccurate.

- 9 NSW operate a household chemical collection program that provides some data on the amount of liquid and solid hazardous wastes collected from households. However, without primary research into the total consumption of hazardous liquid waste being served by the program it is not possible to estimate the amounts of hazardous liquid wastes that are being disposed to the solid waste stream or to sewer.

### 4.3.5 Key findings and recommendations

- 1 Intra-state waste tracking data (where it is available), could be combined with NEPM interstate data to enable reporting of the levels of liquid hazardous waste generation, movement, treatment, recycling, energy recovery and landfill.

If the above is achieved, DSEWPaC and the states and territories will be able to report on the levels of liquid waste that are in Australia's total hazardous waste volumes/tonnes.

- 2 Waste treatment needs to be counted separately to recycling figures as a significant proportion of the materials received at treatment facilities are disposed to sewer, or landfill. (No states were found to be reporting treatment as recycling.)
- 3 DSEWPaC and the states and territories could investigate the site specific information that is available on the fate of materials received by hazardous waste treatment facilities. Where available, this information could be used to complement tracking system data weaknesses or non compliance and enable reporting on the levels of hazardous waste recycling, energy recovery, disposal to sewer, and volume disposed to landfill as solidified waste.
- 4 Data was not available to estimate the levels of household chemicals that are being generated. Additional research is required to estimate consumption volumes of common household chemicals to enable estimates of generation to be made. Once an estimation of generation is made, it will be possible to estimate the volumes of household chemicals being disposed in bins and to the sewer vs. what is recovered by collection programs.

## 4.4 Northern Territory

### 4.4.1 NT sewerage system 2009–10 data collation

The table below summarises the sewerage system data.

Liquid Waste Type	Generation (ML)	Recycling (ML)	Disposal (treated effluent outfall) (ML)	Energy Recovery (MWhrs)
Trade Wastes Volume (2009–10)	1,232	within total	within total	inc in WA data
Sewage Including Residential and Non Residential (2009–10)	19,294	within total	within total	inc in WA data
Total Sewage Collected (inc trade waste and sewage (2009–10))	20,524	1,233	19,291	inc in WA data
	Generation (ML equiv)	Recycling (ML equiv)	Disposal (incineration, landfill, sea) (ML equiv)	
Dry Biosolids (2009–10)	inc in WA data	inc in WA data	inc in WA data	

#### Notes:

- Total effluent outfall = generation - recycling – recycled dry biosolid mass
- Assume 1 tonne equals 1kL of effluent
- Energy recovery MWhrs assumes operation time is 241 days (or 5784 hrs) per year for installed MW capacity.

#### Sources:

- Australian Government (2010), *National Performance Report 2009-2010 Urban Water Utilities*, National Water Commission
- Australian and New Zealand Biosolids Partnership (2010), *Biosolids Management National Survey*, <http://www.biosolids.com.au/bs-australia.php>
- Clean Energy Council Power Plant Report 31/08/2010.

## 4.4.2 NT hazardous liquid waste 2009–10 data collation

The table below summarises the estimated volumes of hazardous liquid wastes

NEPM Category	Description	State Generation Volume (kL)	NEPM Volume Exported (kL)	NEPM Volume Imported (kL)	Volume Treated (kL)	Volume Recycled (kL)	Volume to Energy Recovery (kL)	Volume Disposed to Trade Waste	Volume Disposed to Landfill
A	Plating & heat treatment	Unavailable	0	0	0	Unavailable	Unavailable	Unavailable	Unavailable
B	Acids	Unavailable	18	0	0	Unavailable	Unavailable	Unavailable	Unavailable
C	Alkalis	Unavailable	220	0	0	Unavailable	Unavailable	Unavailable	Unavailable
D	Inorganic chemicals	Unavailable	863	0	0	Unavailable	Unavailable	Unavailable	Unavailable
E	Reactive chemicals	Unavailable	0	0	0	Unavailable	Unavailable	Unavailable	Unavailable
F	Paints, resins, inks, organic sludges	Unavailable	12	0	0	Unavailable	Unavailable	Unavailable	Unavailable
G	Organic solvents	Unavailable	31	0	0	Unavailable	Unavailable	Unavailable	Unavailable
H	Pesticides	Unavailable	6	0	0	Unavailable	Unavailable	Unavailable	Unavailable
J	Oils	Unavailable	2265	0	0	Unavailable	Unavailable	Unavailable	Unavailable
K	Putrescible/organic waste	Unavailable	10	0	0	Unavailable	Unavailable	Unavailable	Unavailable
L	Industrial washwater	Unavailable	0	0	0	Unavailable	Unavailable	Unavailable	Unavailable
M	Organic chemicals	Unavailable	20	0	0	Unavailable	Unavailable	Unavailable	Unavailable
N	Soil/sludge	Unavailable	4	0	0	Unavailable	Unavailable	Unavailable	Unavailable
R	Clinical & pharmaceutical	Unavailable	118	0	0	Unavailable	Unavailable	Unavailable	Unavailable
T	Misc	Unavailable	273	0	0	Unavailable	Unavailable	Unavailable	Unavailable
	Totals:	Unavailable	3,840	0	0	Unavailable	Unavailable	Unavailable	Unavailable

Notes: Assume 1 tonne equals 1kL. NEPM data will include some liquid and some solid waste data.

Sources: NEPC *Report on the implementation of the Movement of Controlled Waste between States and Territories NEPM, 2009 – 2010*.

### 4.4.3 NT data assessment

- 1 NT data availability for the sewerage systems appears to reconcile well.
- 2 NT does not operate a waste tracking system for liquid wastes, however, NT report export data under the NEPM.
- 3 Biosolids data for the NT is reported with data for Western Australia. Consultation with the ANZBP noted that NT biosolids tonnages were very small and therefore reported within Western Australia's data, for data convenience.
- 4 Apart from the NEPM export data, no data was available on hazardous liquid waste.
- 5 During consultation, NT staff did make comment that annually 20,000 litres of waste oil was applied to a dirt race track surface. It was not clear if this is allowed as a reuse or is considered as waste disposal.
- 6 No household chemical collection data was identified.

## 4.5 Queensland

### 4.5.1 Queensland sewerage system 2009–10 data collation

The table below summarises the sewerage system data.

Liquid Waste Type	Generation (ML)	Recycling (ML)	Disposal (treated effluent outfall) (ML)	Energy Recovery (MWhrs)
Trade Wastes Volume (2009–10)	20,877	within total	within total	within total
Sewage Including Residential and Non Residential (2009–10)	205,820	within total	within total	within total
Total Sewage Collected (inc trade waste and sewage (2009–10))	235,245	57,072	178,112	26,086

	Generation (ML equiv)	Recycling (ML equiv)	Disposal (incineration, landfill) (ML equiv)
Dry Biosolids (2009–10)	68	61	7

Notes:

- Total effluent outfall = generation - recycling – recycled dry biosolid mass
- Assume 1 tonne equals 1kL of effluent
- Energy recovery MWhrs assumes operation time is 241 days (or 5784 hrs) per year for installed MW capacity.

Sources:

- Australian Government (2010), *National Performance Report 2009-2010 Urban Water Utilities*, National Water Commission
- Australian and New Zealand Biosolids Partnership (2010), *Biosolids Management National Survey*, <http://www.biosolids.com.au/bs-australia.php>
- Clean Energy Council Power Plant Report 31/08/2010, <https://www.cleanenergycouncil.org.au/cec/resourcecentre/reports.html>.

## 4.5.2 Queensland hazardous liquid waste 2009–10 data collation

The table below summarises the estimated volumes of hazardous liquid wastes.

NEPM Category	Description	State Generation Volume (kL) (2007-08)*	NEPM Volume Exported (kL)	NEPM Volume Imported (kL)	Volume Treated (kL)	Volume Recycled (kL)	Volume to Energy Recovery (kL)	Volume Disposed to Trade Waste	Volume Disposed to Landfill
A	Plating & heat treatment	2,434	12	3	2,425	Unavailable	Unavailable	Unavailable	Unavailable
B	Acids	14,476	108	73	14,441	Unavailable	Unavailable	Unavailable	Unavailable
C	Alkalis	25,540	0	211	25,751	Unavailable	Unavailable	Unavailable	Unavailable
D	Inorganic chemicals	15,630	18,794	35	- 3,129	Unavailable	Unavailable	Unavailable	Unavailable
E	Reactive chemicals	428	0	0	428	Unavailable	Unavailable	Unavailable	Unavailable
F	Paints, resins, inks, organic sludges	8,861	1,950	147	7,058	Unavailable	Unavailable	Unavailable	Unavailable
G	Organic solvents	2,813	128	22	2,707	Unavailable	Unavailable	Unavailable	Unavailable
H	Pesticides	3,173	650	71	2,593	Unavailable	Unavailable	Unavailable	Unavailable
J	Oils	137,284	5,058	4,039	136,265	Unavailable	Unavailable	Unavailable	Unavailable
K	Putrescible/organic waste	448,786	0	3,473	452,259	Unavailable	Unavailable	Unavailable	Unavailable
L	Industrial washwater	Unavailable	20	3	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
M	Organic chemicals	5,092	1,719	962	4,335	Unavailable	Unavailable	Unavailable	Unavailable
N	Soil/sludge	143,066	163	731	143,634	Unavailable	Unavailable	Unavailable	Unavailable
R	Clinical & pharmaceutical	30,038	261	9,132	38,909	Unavailable	Unavailable	Unavailable	Unavailable
T	Misc	43,994	46	0	43,948	Unavailable	Unavailable	Unavailable	Unavailable
	Totals:	881,615	28,909	18,900	871,606	Unavailable	Unavailable	Unavailable	Unavailable

Notes: Assume 1 tonne equals 1kL. All data included in table includes some liquid and some solid waste data. \*Data taken from *The State of Waste and Recycling in Queensland 2008 Technical Report*.

The reporting period does not match NEPM period of 2009-2010

Sources:

- NEPC *Report on the implementation of the Movement of Controlled Waste between States and Territories NEPM, 2009 – 2010*.
- *The State of Waste and Recycling in Queensland 2008*, Technical Report.

### 4.5.3 Queensland data assessment

- 1 QLD sewerage system data availability is good. However, total sewage data reports approximately 10,000 ML more sewage than the total of sewage and trade wastes.
- 2 QLD biosolids data appears to be complete.
- 3 QLD operate a hazardous waste tracking system for internal state waste movements. The waste types that are reported are reasonably aligned to the full NEPM list of controlled wastes. The level of information required by QLD tracking forms could enable a complete data set for liquid waste generation, recycling, energy recovery and disposal.
- 4 The *State of Waste and Recycling in Queensland 2008 Technical Report* provides useful information on the total amounts of trackable wastes, listed by the NEPM codes. However, it is important to note that this data includes solid and liquid waste data.
- 5 No household chemical collection data was identified.

### 4.5.4 Key findings and recommendations

- 1 The states and territories that operate a waste tracking system could publicly report hazardous liquid wastes generation by the 15 NEPM categories, as most tracking systems align well with these categories.
- 2 Where states report hazardous wastes, in particular, it would be useful to separate the quantities into amounts of solid, liquids or sludges. If the reporting is focused on solid wastes, as most state reporting currently is, it is recommended that only solid and perhaps sludge wastes tonnages be reported. Where sludges are included in reporting it should be noted that those tonnages contain both liquid and solid waste components.

## 4.6 South Australia

### 4.6.1 South Australia sewerage system 2009–10 data collation

The table below summarises the sewerage system data.

Liquid Waste Type	Generation (ML)	Recycling (ML)	Disposal (treated effluent outfall) (ML)	Energy Recovery (MWhrs)
Trade Wastes Volume (2009–10)	8,189	within total	within total	within total
Sewage Including Residential and Non Residential (2009–10)	76,917	within total	within total	within total
Total Sewage Collected (inc trade waste and sewage (2009–10))	88,672	24,883	63,765	31,523
	Generation (ML equiv)	Recycling (ML equiv)	Disposal (incineration, landfill) (ML equiv)	
Dry Biosolids (2009–10)	24	24	0	

#### Notes:

- Total effluent outfall = generation - recycling – recycled dry biosolid mass
- Assume 1 tonne equals 1kL of effluent
- Energy recovery MWhrs assumes operation time is 241 days (or 5784 hrs) per year for installed MW capacity.

#### Sources:

- Australian Government (2010), *National Performance Report 2009-2010 Urban Water Utilities*, National Water Commission
- Australian and New Zealand Biosolids Partnership (2010), *Biosolids Management National Survey*, <http://www.biosolids.com.au/bs-australia.php>
- Clean Energy Council Power Plant Report 31/08/2010.

## 4.6.2 South Australia hazardous liquid waste 2009–10 data collation

The table below summarises the estimated volumes of hazardous liquid wastes

NEPM Category	Description	State Generation Volume (kL)*	NEPM Volume Exported (kL)	NEPM Volume Imported (kL)	Volume Treated (kL)**	Volume Recycled (kL)	Volume to Energy Recovery (kL)	Volume Disposed to Trade Waste	Volume Disposed to Landfill
A	Plating & heat treatment	172	0	4	176	Unavailable	Unavailable	Unavailable	Unavailable
B	Acids	1,316	52	16	1,279	Unavailable	Unavailable	Unavailable	Unavailable
C	Alkalis	731	0	165	896	Unavailable	Unavailable	Unavailable	Unavailable
D	Inorganic chemicals	197	6,047	16,450	10,601	Unavailable	Unavailable	Unavailable	Unavailable
E	Reactive chemicals	9	0	3	11	Unavailable	Unavailable	Unavailable	Unavailable
F	Paints, resins, inks, organic sludges	2,236	160	1,569	3,645	Unavailable	Unavailable	Unavailable	Unavailable
G	Organic solvents	3,213	314	2,560	5,460	Unavailable	Unavailable	Unavailable	Unavailable
H	Pesticides	138	39	0	99	Unavailable	Unavailable	Unavailable	Unavailable
J	Oils	8,816	152	3,241	11,904	Unavailable	Unavailable	Unavailable	Unavailable
K	Putrescible/organic waste	0	2	10	8	Unavailable	Unavailable	Unavailable	Unavailable
L	Industrial washwater	Unavailable	0	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
M	Organic chemicals	69	184	20	- 94	Unavailable	Unavailable	Unavailable	Unavailable
N	Soil/sludge	57	19	251	289	Unavailable	Unavailable	Unavailable	Unavailable
R	Clinical & pharmaceutical	11,586	147	137	11,575	Unavailable	Unavailable	Unavailable	Unavailable
T	Misc	914	0	296	1,209	Unavailable	Unavailable	Unavailable	Unavailable
	Totals:	29,453	7,116	24,722	47,060	Unavailable	Unavailable	Unavailable	Unavailable

Notes: Assume 1 tonne equals 1kL. NEPM data will include some liquid and some solid waste data. \*State generation volumes provided by SA.

\*\* Volume treated = state generation – volume exported + volume imported.

Sources: NEPC Report on the implementation of the Movement of Controlled Waste between States and Territories NEPM, 2009 – 2010

### 4.6.3 South Australia data assessment

- 1 SA sewerage system data availability is good, however, total sewage data reports approximately 4,000 ML more sewage than the total of sewage and trade wastes.
- 2 SA biosolids data appears to be complete.
- 3 SA operates a hazardous waste tracking system for internal state waste movements. The waste types that are reported are closely aligned to the full NEPM list of controlled wastes. The level of information required by SA tracking forms could enable a complete data set for liquid waste generation, recycling, energy recovery and disposal.
- 4 No household chemical collection data was identified.

## 4.7 Tasmania

### 4.7.1 Tasmania sewerage system 2009–10 data collation

The table below summarises the sewerage system data.

Liquid Waste Type	Generation (ML)	Recycling (ML)	Disposal (treated effluent outfall) (ML)	Energy Recovery (MWhrs)
Trade Wastes Volume (2009–10)	unavailable	within total	within total	within total
Sewage Including Residential and Non Residential (2009–10)	unavailable	within total	within total	within total
Total Sewage Collected (inc trade waste and sewage (2009–10))	56,483	3,476	55,065	6,941
	Generation (ML equiv)	Recycling (ML equiv)	Disposal (incineration, landfill) (ML equiv)	
Dry Biosolids (2009–10)	8	4	4	

#### Notes:

- Total effluent outfall = generation - recycling – recycled dry biosolid mass.
- Assume 1 tonne equals 1kL of effluent
- Energy recovery MWhrs assumes operation time is 241 days (or 5784 hrs) per year for installed MW capacity.

#### Sources:

- Office of the Tasmanian Economic Regulator (2011), *Tasmanian Water and Sewerage State of the Industry Report 2009–10*
- Australian and New Zealand Biosolids Partnership (2010) *Biosolids Management National Survey*  
<http://www.biosolids.com.au/bs-australia.php>
- Clean Energy Council Power Plant Report 31/08/2010.

## 4.7.2 Tasmania hazardous liquid waste 2009–10 data collation

The table below summarises the estimated volumes of hazardous liquid wastes

NEPM Category	Description	State Generation Volume (kL)	NEPM Volume Exported (kL)	NEPM Volume Imported (kL)	Volume Treated (kL)	Volume Recycled (kL)	Volume to Energy Recovery (kL)	Volume Disposed to Trade Waste	Volume Disposed to Landfill
A	Plating & heat treatment	Unavailable	0	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
B	Acids	Unavailable	8	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
C	Alkalis	Unavailable	0	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
D	Inorganic chemicals	Unavailable	8,733	5	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
E	Reactive chemicals	Unavailable	0	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
F	Paints, resins, inks, organic sludges	Unavailable	4	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
G	Organic solvents	Unavailable	737	15	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
H	Pesticides	Unavailable	4	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
J	Oils	Unavailable	240	128	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
K	Putrescible/organic waste	Unavailable	24	16	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
L	Industrial washwater	Unavailable	0	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
M	Organic chemicals	Unavailable	46	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
N	Soil/sludge	Unavailable	23	169	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
R	Clinical & pharmaceutical	Unavailable	53	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
T	Misc	Unavailable	11	0	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable
	Totals:	Unavailable	9,884	333	Unavailable	Unavailable	Unavailable	Unavailable	Unavailable

Notes: Assume 1 tonne equals 1kL. NEPM data will include some liquid and some solid waste data.

Sources: NEPC *Report on the implementation of the Movement of Controlled Waste between States and Territories NEPM, 2009 – 2010*

### 4.7.3 Tasmania data assessment

- 1 Tasmania's sewerage system data availability appears limited. However, some data was found in the report Office of the Tasmanian Economic Regulator (2011), *Tasmanian Water and Sewerage State of the Industry Report 2009-10* on total sewerage generation and rates of sewage recycling.
- 2 Tasmania's biosolids data appears to be complete.
- 3 Tasmania does not operate a hazardous waste tracking system for internal state waste movements, although, a tracking system is currently under development.
- 4 No household chemical collection data was identified.
- 5 Consultation with Tasmanian EPA staff indicated that limited treatment facilities are available in Tasmania for hazardous wastes. It could therefore be assumed that the exported quantities are close to the rates of generation, however, given that some treatment may be happening in Tasmania this assumption was not made.

## 4.8 Victoria

### 4.8.1 Victoria sewerage system 2009–10 data collation

The table below summarises the sewerage system data.

Liquid Waste Type	Generation (ML)	Recycling (ML)	Disposal (treated effluent outfall) (ML)	Energy Recovery (MWhrs)
Trade Wastes Volume (2009–10)	56,375	within total	within total	within total
Sewage Including Residential and Non Residential (2009–10)	351,475	within total	within total	within total
Total Sewage Collected (inc trade waste and sewage (2009–10))	689,765	79,292	610,449	117,126
	Generation (ML equiv)	Recycling (ML equiv)	Disposal (incineration, landfill) (ML equiv)	
Dry Biosolids (2009–10)	93	25	69	

#### Notes:

- Total effluent outfall = generation - recycling – recycled dry biosolid mass
- Assume 1 tonne equals 1kL of effluent
- Energy recovery MWhrs assumes operation time is 241 days (or 5784 hrs) per year for installed MW capacity.

#### Sources:

- Australian Government (2010), *National Performance Report 2009-2010 Urban Water Utilities*, National Water Commission
- Australian and New Zealand Biosolids Partnership (2010) *Biosolids Management National Survey*, <http://www.biosolids.com.au/bs-australia.php>
- Clean Energy Council Power Plant Report 31/08/2010.

## 4.8.2 Victoria hazardous liquid waste 2009–10 data collation

The table below summarises the estimated volumes of hazardous liquid wastes

NEPM Category	Description	State Generation Volume (kL) (2010)*	NEPM Volume Exported (kL)	NEPM Volume Imported (kL)	Volume Treated (kL)	Volume Recycled (kL)	Volume to Energy Recovery (kL)	Volume Disposed to Trade Waste	Volume Disposed to Landfill
A	Plating & heat treatment	6	11	0	- 5	Unavailable	Unavailable	Unavailable	Unavailable
B	Acids	15,920	9,774	986	7,132	Unavailable	Unavailable	Unavailable	Unavailable
C	Alkalis	8,734	610	402	8,526	Unavailable	Unavailable	Unavailable	Unavailable
D	Inorganic chemicals	2,098	28,732	25,808	- 826	Unavailable	Unavailable	Unavailable	Unavailable
E	Reactive chemicals	38	3	0	35	Unavailable	Unavailable	Unavailable	Unavailable
F	Paints, resins, inks, organic sludges	19,977	201	3,673	23,449	Unavailable	Unavailable	Unavailable	Unavailable
G	Organic solvents	8,751	2,275	3,072	9,548	Unavailable	Unavailable	Unavailable	Unavailable
H	Pesticides	181	86	770	865	Unavailable	Unavailable	Unavailable	Unavailable
J	Oils	105,056	2,356	4,306	107,006	Unavailable	Unavailable	Unavailable	Unavailable
K	Putrescible/organic waste	162,642	4,105	3,558	162,095	Unavailable	Unavailable	Unavailable	Unavailable
L	Industrial washwater	47,005	0	89	47,094	Unavailable	Unavailable	Unavailable	Unavailable
M	Organic chemicals	1,671	587	289	1,373	Unavailable	Unavailable	Unavailable	Unavailable
N	Soil/sludge	3,269	728	432	2,973	Unavailable	Unavailable	Unavailable	Unavailable
R	Clinical & pharmaceutical	165	14	366	517	Unavailable	Unavailable	Unavailable	Unavailable
T	Misc	3,010	0	59	3,069	Unavailable	Unavailable	Unavailable	Unavailable
	Totals:	378,523	49,481	43,810	372,853	Unavailable	Unavailable	Unavailable	Unavailable

Notes: Assume 1 tonne equals 1kL. NEPM data will include some liquid and some solid waste data. \* Provided by EPA Victoria, note calendar year not 09-10 financial year.

Sources: NEPC Report on the implementation of the Movement of Controlled Waste between States and Territories NEPM, 2009 – 2010.

### 4.8.3 Victorian Detox Your Home program

Since 1994 Victoria has been running Detox Your Home (DYH) to facilitate the collection and treatment, recycling, or disposal of household chemicals.

Similar to the NSW program, DYH collects a wide range of household materials. Reporting gives an indication of the volumes of liquid waste collected, however, some materials grouping could include both liquid and/or solids.

All material volumes collected by the program and transported would be reported in the Victorian prescribed industrial waste (PIW) tracking system (TransCert), discussed below.

A recent review of the program found that in the 2010 calendar year around 205 tonnes (or 205 kL) of wastes were collected from mobile collections and around 570 tonnes (507 kL) were collected from permanent drop off facilities.

### 4.8.4 Victorian data assessment

- 1 Victoria's sewerage system data appears incomplete. Based on the data published in Australian Government (2010) *National Performance Report 2009-2010 Urban Water Utilities*, around 190,000 ML of sewage is not allocated to either sewage or trade waste generation sources.
- 2 Victoria's biosolids data appears to be complete.
- 3 Victoria operates a hazardous waste tracking system for internal state waste movements. The waste types that are reported are more extensive than those listed in the full NEPM list of controlled wastes and requires reporting on more waste codes than any other jurisdiction. The tracking system reflects a highly regulated hazardous waste stream in Victoria and this may have developed as a result of limitations in hazardous waste landfill capacity in Victoria. The level of information required for the Victorian internal waste tracking forms could enable a complete data set for liquid waste generation, recycling, energy recovery and disposal to be collated.
- 4 Additional data provided by EPA Victoria give some indication of the significance of hazardous liquid waste volumes in solid hazardous waste disposed to landfill. The data showed that in Victoria in 2010, waste treaters disposed approximately 37kT of hazardous solid wastes to landfill and that the total hazardous waste to landfill in Victoria was approximately 400kT. This 37kT represents 9% of the total (400kT) hazardous waste tonnage. However, for the reasons outlined in NSW data assessment (point 8), this should not be assumed to be the percentage of liquid wastes in hazardous waste tonnage to landfill. It could be the upper limit, however, further investigation is required.
- 5 Victoria operate a successful household chemical collection program that provides some data on the amount of liquid and solid hazardous wastes collected from households. However, without primary research into the total consumption of hazardous liquid waste by the population being served by the program it is not possible to estimate the amounts of hazardous liquid wastes that are being disposed to the solid waste stream or to sewer.

## 4.8.5 Key findings and recommendations

- 1 The extent of hazardous liquid waste disposed with total hazardous solid waste could be significant. For example in Victoria data on wastes sent to hazardous waste landfill indicates that upto 10% of total prescribed industrial wastes sent to landfill could be liquid waste that has been treated to enable legal disposal. Further detailed data collation and assessment for hazardous liquid waste management is required to provide an accurate estimate of the extent of liquid waste in solid waste and vice versa.

## 4.9 Western Australia

### 4.9.1 Western Australia sewerage system 2009–10 data collation

The table below summarises the sewerage system data.

Liquid Waste Type	Generation (ML)	Recycling (ML)	Disposal (treated effluent outfall) (ML)	Energy Recovery (MWhrs)
Trade Wastes Volume (2009–10)	6,515	within total	within total	within total
Sewage Including Residential and Non Residential (2009–10)	130,177	within total	within total	within total
Total Sewage Collected (inc trade waste and sewage (2009–10))	136,692	12,060	124,610	10,411
	Generation (ML equiv)	Recycling (ML equiv)	Disposal (incineration, landfill, sea) (ML equiv)	
Dry Biosolids (2009–10)	26	22	4	

#### Notes:

- Total effluent outfall = generation - recycling – recycled dry biosolid mass
- Assume 1 tonne equals 1kL of effluent
- Energy recovery MWhrs assumes operation time is 241 days (or 5784 hrs) per year for installed MW capacity.

#### Sources:

- Australian Government (2010), *National Performance Report 2009-2010 Urban Water Utilities*, National Water Commission,
- Australian and New Zealand Biosolids Partnership (2010), *Biosolids Management National Survey*, <http://www.biosolids.com.au/bs-australia.php>, and
- Clean Energy Council Power Plant Report 31/08/2010

## 4.9.2 Western Australia hazardous liquid waste 2009–10 data collation

The table below summarises the estimated volumes of hazardous liquid wastes

NEPM Category	Description	State Generation Volume (kL)*	NEPM Volume Exported (kL)	NEPM Volume Imported (kL)	Volume Treated (kL)**	Volume Recycled (kL)	Volume to Energy Recovery (kL)	Volume Disposed to Trade Waste	Volume Disposed to Landfill
A	Plating & heat treatment	131	0	10	141	Unavailable	Unavailable	Unavailable	Unavailable
B	Acids	2,732	680	0	2,052	Unavailable	Unavailable	Unavailable	Unavailable
C	Alkalis	30,168	0	0	30,168	Unavailable	Unavailable	Unavailable	Unavailable
D	Inorganic chemicals	121	5,333	0	- 5,212	Unavailable	Unavailable	Unavailable	Unavailable
E	Reactive chemicals	0	0	0	-	Unavailable	Unavailable	Unavailable	Unavailable
F	Paints, resins, inks, organic sludges	955	184	16	787	Unavailable	Unavailable	Unavailable	Unavailable
G	Organic solvents	0	472	60	- 412	Unavailable	Unavailable	Unavailable	Unavailable
H	Pesticides	76	19	50	108	Unavailable	Unavailable	Unavailable	Unavailable
J	Oils	83,680	959	336	83,057	Unavailable	Unavailable	Unavailable	Unavailable
K	Putrescible/organic waste	213,934	9	0	213,925	Unavailable	Unavailable	Unavailable	Unavailable
L	Industrial washwater	60,989	0	0	60,989	Unavailable	Unavailable	Unavailable	Unavailable
M	Organic chemicals	7,613	15	17	7,615	Unavailable	Unavailable	Unavailable	Unavailable
N	Soil/sludge	196,798	392	0	196,406	Unavailable	Unavailable	Unavailable	Unavailable
R	Clinical & pharmaceutical	5	86	0	- 81	Unavailable	Unavailable	Unavailable	Unavailable
T	Misc	11	31	0	- 21	Unavailable	Unavailable	Unavailable	Unavailable
	<b>Totals:</b>	<b>597,212</b>	<b>8,179</b>	<b>489</b>	<b>589,522</b>	<b>Unavailable</b>	<b>Unavailable</b>	<b>Unavailable</b>	<b>Unavailable</b>

Notes: Assume 1 tonne equals 1kL. NEPM data will include some liquid and some solid waste data. \* Data provide by WA staff. Assume data provided is primary generation only and does not include 'double counting' from waste movements after first waste movement. \*\* Assume volume treated = generation - export + imports.

Sources: NEPC Report on the implementation of the Movement of Controlled Waste between States and Territories NEPM, 2009 – 2010.

### 4.9.3 Western Australia data assessment

- 1 WA sewerage system data availability appears to be good and the sewerage system volumes reconcile.
- 2 WA biosolids data appears to be complete, however, also includes NT data.
- 3 WA operate a hazardous waste tracking system for internal state waste movements. The waste types that are reported are somewhat aligned to the full NEPM list of controlled wastes. However, the system of waste codes is not aligned, making comparison of the tracking system against the NEPM category difficult. It appears that WA do not track internal movements for a significant number (around 20%) of the NEPM full list of controlled wastes.
- 4 The level of information required by WA tracking forms could enable a complete data set for liquid waste generation, recycling, energy recovery and disposal to be reported.
- 5 No household chemical collection data was identified. However this statement was found on the website of Wastenet (<http://www.wastenet.net.au/information/streams/hhcw>):

*A typical Australian household produces many types of hazardous waste, making Household Hazardous Waste (HHW) an important waste stream in its own right. Approximately 15,000 tonnes of HHW is generated in the Perth metropolitan area annually. While this figure is far less than the quantities generated by certain industries, it is also much more dispersed and is more likely to be inappropriately stored or disposed of. There is currently no comprehensive management strategy for the disposal or recovery of HHW in Western Australia.*

WasteNet is managed by the WA Municipal Waste Advisory Council, a standing committee of the WA Local Government Association with delegated authority to represent the Association in all matters relating to solid waste management. Wastenet do not explain how this figure of 15,000 kL-e of household hazardous wastes was derived therefore it cannot be verified as accurate. However, **if this figure is accurate** it could indicate that significant volumes of household liquid wastes are not being captured by the current collection programs.

### 4.9.4 Key findings and recommendations

- 1 No jurisdictions apart from WA report on the internal movement of NEPM Category L Industrial wash waters.

## 4.10 National Pollutant Inventory data

The **National Pollutant Inventory (NPI)** reports on the total rates of *transfers and emissions* for NPI controlled substances. The NPI provides useful data for the total estimated transfers and emissions from the 'Water Supply, Sewerage and Drainage Services' (refer to <http://www.npi.gov.au/npidata/action/load/browse-search/criteria/browse-type/Industry/year/2010>).

Whilst the NPI provides useful data on the NPI listed substances, the volumes/tonnes that the NPI lists form only a part of the total volumes/tonnages of liquid waste that are transferred or emitted.

The commonly occurring NPI substances **transferred** from the Water Supply, Sewerage and Drainage Services are reported to be:

- Total Phosphorus
- Total Nitrogen
- Ammonia (total)
- Chlorine & compounds
- Fluoride compounds.

Appendix 3 includes the complete data set of transfers from the Water Supply, Sewerage and Drainage Services. The data includes substances that have mandatory and voluntary reporting requirements. The NPI website notes that

*If waste is transported to a destination for containment or destruction, reporting is mandatory. Containment destinations include landfill, tailings storage facilities, underground injection or other long term purpose built waste storage structure. It also includes the transport or movement of substances contained in waste to a sewerage system. Reporting may be voluntary if transfers are to a destination for reuse, recycling, reprocessing, purification, partial purification, immobilisation, remediation or energy recovery.*

The commonly occurring NPI substances **emitted** from the Water Supply, Sewerage and Drainage Services are reported to be:

- Ammonia (total)
- Chlorine & compounds
- Phosphorus
- Nitrogen
- Fluoride compounds.

Appendix 4 details the complete data set of emission from the Water Supply, Sewerage and Drainage Services. As the data indicates emissions to air, land, and water occur from this sector. The majority of the emission are to water and would be part of the treated effluent outfall that is noted in section 3. The emissions data is 'end of pipe' and readily available data to understand the primary generators of the NPI substances was not identified.

### 4.10.1 Key finding

The NPI system provides good levels of data for transfers and emissions of specific contaminants at the 'end of pipe' (for example when they are discharged by the water authorities). However, the NPI data could not be readily tracked back 'upstream' to the primary generator of the substance that disposed the waste into the sewerage system.

# 5 FINDINGS AND RECOMMENDATIONS

The following section provides a summary of the findings and recommendations that are made throughout the report.

## 5.1 Liquid waste classifications and definitions

- 1 Liquid waste classifications and definitions were found to be consistent nationally for sewage and trade waste. Nationally, hazardous liquid wastes have a range of definitions, however, the hazardous or potentially hazardous nature of these wastes is common to all jurisdiction's definitions.

## 5.2 Key liquid waste pathways

- 2 The key liquid waste management pathways (from generation through to recovery or disposal) were found to be consistently followed by the states and territories.
- 3 The NEPM grouping of 15 waste types provides the most consistent grouping of wastes, including liquid wastes, that is used by the jurisdictions. All states report their inter-state waste movements using these categories and several of the states intra-state tracking and reporting systems use these categories (or categories based on these categories). It is therefore recommended that where data is available, all hazardous liquid waste generation, import, export, recycling, energy recovery, and disposal will be grouped by these categories.
- 4 The issue of defining a liquid or solid waste is complex. Wastes are often in a partial liquid state, commonly referred to as 'sludges' which are a significant 'grey area' between liquid and solid waste classifications and represent a significant area of potential overlap or confusion in liquid and solid waste data accounting. Hazardous waste facilities receive significant amounts of 'sludge' wastes for treatment. During treatment, sludges are normally separated into the liquid and solid components which are then managed into recycling, energy recovery, or disposal to sewer or landfill. Because sludges are typically separated into solid and liquid wastes during treatment, the solid and liquid waste components should be reported appropriately within solid and liquid waste data. However, sludge state wastes remain an area of uncertainty and potential data overlap between solid and liquid waste reporting for the following reasons:
  - Wastes classified by the generator as sludges are difficult to allocate accurately to solid or liquid waste generation data.
  - Where sludge state wastes are disposed directly to landfill, there will be counting of some liquid waste within the solid waste data.

## 5.3 Sewage and trade waste

- 5 For most jurisdictions the total sewerage system volumes equate to a reasonable degree to the amounts of trade waste and sewage generation. The exceptions to this are Victoria and Tasmania who had large percentages of the sewage treated that was not allocated to sewage or trade waste volumes.
- 6 The *National Performance Report 2009-2010 Urban Water Utilities*, National Water Commission, provides an excellent public information resource for the management of sewage and trade waste nationally. Solid waste generation and management public reporting does not currently report nationally to a same level of detail as the NPR and

valuable information and learning may be shared from development and reporting of the NPR in the development of any national solid waste reporting systems.

- 7 The Australian and New Zealand Biosolids Partnership (2010), *Biosolids Management National Survey* provides useful information regarding the generation and management of biosolids. For all states, apart for the Northern Territory, the data availability for biosolids generation and management is good.
- 8 The report found that biosolids are possibly the most significant area of potential 'double counting' between solid and liquid waste data accounting. The Hyder WRIA 2011 report includes data on the rates of solid waste generation, recovery and disposal. W&R2011 excluded data on liquid waste and included data on biosolids. This report does not recommend that liquid waste be included in the scope of WRIA 2011, however, this report does recommend that where liquid waste reporting is going to occur in parallel to solid waste reporting, that biosolids be excluded from the scope of solid waste reporting and be included in liquid waste reporting (regardless of their physical state, wet or dry).

## 5.4 Hazardous liquid waste

- 9 NEPM annual reporting could include a breakdown of the liquid waste and solid waste portions for waste being exported interstate.
- 10 The jurisdictions that receive liquid wastes (under the NEPM) could publish the fate of the wastes received as a part of their liquid waste management reporting.
- 11 No jurisdictions apart from WA report on the internal movement of NEPM Category L Industrial wash waters.
- 12 Intra-state waste tracking data (where it is available), could be combined with NEPM interstate data to enable reporting of the levels of liquid hazardous waste generation, movement, treatment, recycling, energy recovery and landfill.

If the above is achieved, DSEWPaC and the states and territories will be able to report on the levels of liquid waste that are in Australia's total hazardous waste volumes/tonnes.

- 13 Waste treatment data needs to be counted separately to recycling data because a significant proportion of the materials received at treatment facilities are disposed to sewer, or landfill and not recycled. Note, no states were found to report liquid waste treatment as liquid waste recycling.
- 14 DSEWPaC and the states and territories could investigate the site specific information that is available on the fate of materials received by hazardous waste treatment facilities. Where available, this information could be used to complement tracking system data weaknesses or non compliance and enable reporting on the levels of hazardous waste recycling, energy recovery, disposal to sewer, and volume disposed to landfill as solidified waste.
- 15 Data was not available to estimate the levels of liquid household waste chemicals that are being generated. Additional research is required to estimate consumption volumes of common household liquid chemicals to enable estimates of liquid waste generation to be made. Once such an estimate of generation is made, it will be possible to estimate the volumes of household chemicals being disposed in bins and to the sewer versus what is recovered by collection programs.
- 16 Where states report hazardous wastes, in particular, it would be useful to separate the quantities into amounts of solid, liquid or sludges. If the reporting is focused on solid wastes, as most state reporting currently is, that only solid and perhaps sludge waste tonnages be reported. Where sludges are included in reporting it should be noted that those tonnages contain both liquid and solid waste components.

- 17 The extent of hazardous liquid waste disposed with total hazardous solid waste could be significant. For example in Victoria data on wastes sent to hazardous waste landfill indicates that up to 10% of total prescribed industrial wastes sent to landfill could be liquid waste that has been treated to enable legal disposal. Further detailed data collation and assessment for hazardous liquid waste management is required to provide an accurate estimate of the extent of liquid waste in solid waste and vice versa.
- 18 The NPI system provides good levels of data for transfers and emissions of specific contaminants at the 'end of pipe' (for example when they are discharged by the water authorities). However, the NPI data could not be readily tracked back 'upstream' to the primary generator of the substance that disposed the waste into the sewerage system.

## 6 REFERENCES

Australian Government (2010), *National Performance Report 2009-2010 Urban Water Utilities*, National Water Commission.

Australian and New Zealand Biosolids Partnership (2010), *Biosolids Management National Survey*, <http://www.biosolids.com.au/bs-australia.php>

Office of the Tasmanian Economic Regulator (2011), *Tasmanian Water and Sewerage State of the Industry Report 2009-10*.

Clean Energy Council Power Plant Report 31/08/2010, <https://www.cleanenergycouncil.org.au/cec/resourcecentre/reports.html>

Household Chemical CleanOut Program Annual Report 2008–2009

NEPC *Report on the implementation of the Movement of Controlled Waste between States and Territories NEPM, 2009–2010*

Department of Environment and Resource Management, *The State of Waste and Recycling in Queensland 2008, Technical Report*.

WA Department of Environment and Conservation *GUIDELINE FOR CONTROLLED WASTE GENERATORS*

EPA Victoria, *INDUSTRIAL WASTE RESOURCE GUIDELINES WASTE CODES*

SA EPA, *Waste Guidelines Waste transport certificate* Updated October 2010

QLD DERM, *Information sheet Waste Management Generators – Waste Tracking*

NSW DECCW *Wastes that must be tracked*

(AA004173 – Liquid Waste Assessment Workbook (all report data workings included))

## APPENDIX 1

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# NATIONAL ENVIRONMENT PROTECTION (MOVEMENT OF CONTROLLED WASTES BETWEEN STATES AND TERRITORIES) MEASURE SCHEDULE A, TABLE 1

Introduction: the *National Environment Protection (movement of controlled wastes between States and Territories) Measure* (the NEPM) requires that the movements (interstate) of the substances listed in this appendix are documented and controlled. The NEPM sets out 73 substances that require tracking and the information required regarding the generator, the transporter and the receiving facility. States and territories are then required to report data to the National Environment Protection Council. All states and territories participate in the NEPM and it can therefore be assumed that there is a consistent set of wastes being reported for cross border movements.

## WASTE STREAM OR WASTES HAVING AS CONSTITUENTS:

1. Acidic solutions or acids in solid form
2. Animal effluent and residues (abattoir effluent, poultry and fish processing waste)
3. Antimony, antimony compounds
4. Arsenic, arsenic compounds
5. Asbestos
6. Barium compounds (excluding barium sulphate)
7. Basic solutions or bases in solid form
8. Beryllium, beryllium compounds
9. Boron compounds
10. Cadmium, cadmium compounds
11. Ceramic-based fibres with physico-chemical characteristics similar to those of asbestos
12. Chlorates
13. Chromium compounds (hexavalent and trivalent)
14. Clinical and related wastes
15. Cobalt compounds
16. Containers which are contaminated with residues of substances referred to in this list
17. Copper compounds
18. Cyanides (inorganic)
19. Cyanides (organic)
20. Encapsulated, chemically-fixed, solidified or polymerised wastes
21. Ethers
22. Filter cake
23. Fire debris and fire washwaters
24. Fly ash
25. Grease trap waste
26. Halogenated organic solvents
27. Highly odorous organic chemicals (including mercaptans and acrylates)
28. Inorganic fluorine compounds excluding calcium fluoride
29. Inorganic sulfides
30. Isocyanate compounds
31. Lead, lead compounds
32. Mercury, mercury compounds
33. Metal carbonyls
34. Nickel compounds

35. Non toxic salts
36. Organic phosphorus compounds
37. Organic solvents excluding halogenated solvents
38. Organohalogen compounds - other than substances referred to in this list
39. Perchlorates
40. Phenols, phenol compounds including chlorophenols
41. Phosphorus compounds excluding mineral phosphates
42. Polychlorinated dibenzo-furan (any congener)
43. Polychlorinated dibenzo-p-dioxin (any congener)
44. Residues from industrial waste treatment/disposal operations.
45. Selenium, selenium compounds
46. Sewage sludge and residues including nightsoil and septic tank sludge
47. Soils contaminated with a controlled waste
48. Surface active agents (surfactants), containing principally organic constituents and which may contain metals and inorganic materials
49. Tannery wastes (including leather dust, ash, sludges and flours)
50. Tellurium, tellurium compounds
51. Thallium, thallium compounds
52. Triethylamine catalysts for setting foundry sands
53. Tyres
54. Vanadium compounds
55. 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
56. Waste containing peroxides other than hydrogen peroxide
57. Waste from heat treatment and tempering operations containing cyanides
58. Waste from the manufacture, formulation and use of wood-preserving chemicals
59. Waste from the production, formulation and use of biocides and phytopharmaceuticals
60. Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish
61. Waste from the production, formulation and use of organic solvents
62. Waste from the production, formulation and use of photographic chemicals and processing materials
63. Waste from the production, formulation and use of resins, latex, plasticisers, glues and adhesives
64. Waste from the production and preparation of pharmaceutical products
65. Waste mineral oils unfit for their original intended use
66. Waste oil/water, hydrocarbons/water mixtures or emulsions

67. Waste pharmaceuticals, drugs and medicines
68. Waste resulting from surface treatment of metals and plastics
69. Waste tarry residues arising from refining, distillation, and any pyrolytic treatment
70. Waste, substances and articles containing or contaminated with polychlorinated biphenyls (PCBs), polychlorinated naphthalenes (PCNs), polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)
71. Waste of an explosive nature not subject to other legislation
72. Wool scouring waste
73. Zinc compounds

## APPENDIX 2

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# ANALYSIS OF STATES HAZARDOUS WASTE TRACKING SYSTEMS AGAINST THE CATEGORIES OF THE NATIONAL ENVIRONMENT PROTECTION (MOVEMENT OF CONTROLLED WASTES BETWEEN STATES AND TERRITORIES) MEASURE

Introduction: the table presented in this appendix compares the waste codes that are tracked for the states internal waste tracking system with the list of 73 NEPM waste categories, listed in Appendix 1.

**COLOR LEGEND:**

Waste not tracked for internal movements

Additional waste code to NEPM full list

Difference in waste code or definition.

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW		NT	QLD		SA		TAS	VIC		WA
		NA	code	description	NA	code	description	code	description	NA	code	description	description (codes don't align to NEPM so not included)
<b>A Plating &amp; heat treatment</b>	<b>Waste resulting from surface treatment of metals and plastics</b>		A100	Waste resulting from surface treatment of metals and plastics		A100	Waste from surface treatment of metals and plastics	A100	Waste resulting from surface treatment of metals and plastics		A100 "	Cyanide-containing wastes.	Waste resulting from surface treatment of metals and plastics
	<b>Waste from heat treatment and tempering operations containing cyanides</b>		A110	Waste from heat treatment and tempering operations containing cyanides		A110	Waste from heat treatment and tempering operations that use cyanides	A110	Waste from heat treatment and tempering operations containing cyanides				
	<b>Cyanides (inorganic)</b>		A130	Cyanides (inorganic)		A130	Cyanides (inorganic)	A130	Cyanides (inorganic)				Inorganic Cyanide
<b>B Acids</b>	<b>Acidic solutions or acids in solid form</b>		B100	Acidic solutions or acids in solid form		B100	Acidic solutions or acids in solid form	B100	Acidic solutions or acids in solid form		B100 "	Acids in a solid form or acidic solutions with pH value of 4 or less.	Acids
<b>C Alkalis</b>	<b>Basic solutions or bases in solid form</b>		C100	Basic solutions or bases in solid form		C100	Basic (alkaline) solutions or bases (alkalis) in solid form	C100	Basic solutions or bases in solid form		C100 "	Alkaline solids or alkaline solutions with pH value of 9 or more.	Alkalis
<b>D Inorganic chemicals</b>	<b>Metal carbonyls</b>		D100	Metal carbonyls		D100	Metal carbonyls	D100	Metal carbonyls		D100 "	Metal carbonyls.	Metal carbonyls
	<b>Inorganic fluorine compounds excluding calcium fluoride</b>		D110	Inorganic fluorine compounds excluding calcium fluoride		D110	Inorganic fluorine compounds other than calcium fluoride	D110	Inorganic fluorine compounds excluding calcium fluoride		D110 "	Inorganic fluorine compounds (excluding calcium fluoride).	Fluorine compounds (excluding)
	<b>Mercury, mercury compounds</b>		D120	Mercury, mercury compounds		D120	Mercury, mercury compounds	D120	Mercury, mercury compounds		D120 "	Mercury and mercury compounds.	Mercury
	<b>Arsenic, arsenic compounds</b>		D130	Arsenic, arsenic compounds		D130	Arsenic, arsenic compounds	D130	Arsenic, arsenic compounds		D130 "	Arsenic and arsenic compounds.	Arsenic or arsenic compounds

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
	<b>Chromium compounds (hexavalent and trivalent)</b>		D140 Chromium compounds (hexavalent and trivalent)		D140 Chromium compounds (hexavalent and trivalent)	D140 Chromium compounds (hexavalent and trivalent)		D140 " Chromium compounds (hexavalent and trivalent).	Chromium
	<b>Cadmium, cadmium compounds</b>		D150 Cadmium, cadmium compounds		D150 Cadmium, cadmium compounds	D150 Cadmium, cadmium compounds		D150 " Cadmium and cadmium compounds.	Cadmium or cadmium compound
	<b>Beryllium, beryllium compounds</b>		D160 Beryllium, beryllium compounds		D160 Beryllium, beryllium compounds	D160 Beryllium, beryllium compounds		D160 " Beryllium and beryllium compounds.	Beryllium, beryllium compounds
	<b>Antimony, antimony compounds</b>		D170 Antimony, antimony compounds		D170 Antimony, antimony compounds	D170 Antimony, antimony compounds		D170 " Antimony and antimony compounds.	Antimony or antimony compound
	<b>Thallium, thallium compounds</b>		D180 Thallium, thallium compounds		D180 Thallium, thallium compounds	D180 Thallium, thallium compounds		D180 " Thallium and thallium compounds.	
	<b>Copper compounds</b>		D190 Copper compounds		D190 Copper compounds	D190 Copper compounds		D190 " Copper compounds.	Copper compounds
	<b>Cobalt compounds</b>		D200 Cobalt compounds			D200 Cobalt compounds		D200 " Cobalt and cobalt compounds.	
	<b>Nickel compounds</b>		D210 Nickel compounds		D210 Nickel compounds	D210 Nickel compounds		D210 " Nickel compounds.	Nickel compounds
	<b>Lead, lead compounds</b>		D220 Lead, lead compounds		D220 Lead, lead compounds	D220 Lead, lead compounds		D220 " Lead and lead compounds.	Lead, lead compounds
	<b>Zinc compounds</b>		D230 Zinc compounds		D230 Zinc compounds	D230 Zinc compounds		D230 " Zinc compounds.	Zinc compounds
	<b>Selenium, selenium compounds</b>		D240 Selenium, selenium compounds		D240 Selenium, selenium compounds	D240 Selenium, selenium compounds		D240 " Selenium and selenium compounds.	
	<b>Tellurium, tellurium compounds</b>		D250 Tellurium, tellurium compounds		D250 Tellurium, tellurium compounds	D250 Tellurium, tellurium compounds			
	<b>Vanadium compounds</b>		D270 Vanadium compounds		D270 Vanadium compounds	D270 Vanadium compounds			Vanadium compounds
	<b>Barium compounds (excluding barium sulphate)</b>		D290 Barium compounds (excluding barium sulphate)		D290 Barium compounds (excluding barium sulphate)	D290 Barium compounds (excluding barium sulphate)		D290 " Barium compounds.	Barium compounds (excluding b
	<b>Non toxic salts</b>		D300 Non toxic salts		D300 Non-toxic salts	D300 Non toxic salts		D300 " Non-toxic salts (e.g. sodium chloride, calcium chloride).	Non toxic salts
	<b>Boron compounds</b>		D310 Boron compounds		D310 Boron compounds	D310 Boron compounds		D310 " Boron compounds.	Boron

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
	Inorganic sulfides		D330 Inorganic sulfides		D330 Inorganic sulphides	D330 Inorganic sulfides		D330 " Inorganic sulfur-containing compounds.	Sulphides
	Perchlorates		D340 Perchlorates		D340 Perchlorates	D340 Perchlorates			Perchlorates
	Chlorates		D350 Chlorates		D350 Chlorates	D350 Chlorates			Chlorates
	Phosphorus compounds excluding mineral phosphates		D360 Phosphorus compounds excluding mineral phosphates		D360 Phosphorus compounds other than mineral phosphates	D360 Phosphorus compounds excluding mineral phosphates		D360 " Phosphorus compounds, excluding mineral phosphates.	Phosphorous compounds
								D390 " Inorganic chemicals, NOS.	
								D400 Smelter waste containing prescribed waste.	
								D261 " Waste from the production, formulation and use of photographic chemicals and processing materials (containing silver).	
								D141 " Tannery wastes containing chromium.	
								D121 " Equipment and articles containing mercury.	
E Reactive chemicals	Waste containing peroxides other than hydrogen peroxide		E100 Waste containing peroxides excluding hydrogen peroxide		E100 Waste containing peroxides other than hydrogen peroxide	E100 Waste containing peroxides other than hydrogen peroxide		E100 " Oxidising agents, including peroxides, NOS.	
	Waste of an explosive nature not subject to other legislation		T200 Waste of an explosive nature not subject to other legislation		E120 Waste of an explosive nature other than an explosive within the meaning of the Explosives Act 1999	E120 Waste of an explosive nature not subject to other legislation		E120 " Waste of an explosive nature not subject to other legislation, including azides.	Waste of an explosive nature not subject to other legislation
								E130 " Highly reactive chemicals, NOS.	

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
F Paints, resins, inks, organic sludges	Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish		F100 Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish		F100 Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers & varnish	F100 Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish		F100 " Aqueous-based wastes from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish.	Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish
	Waste from the production, formulation and use of resins, latex, plasticisers, glues and adhesives		F110 Waste from the production, formulation and use of resins, latex, plasticisers, glues and adhesives		F110 Waste from the production, formulation and use of resins, latex, plasticisers, glues and adhesives	F110 Waste from the production, formulation and use of resins, latex, plasticisers, glues and adhesives		F110 " Aqueous-based wastes from the production, formulation and use of resins, latex, plasticisers, glues and adhesives.	
								F120 " Solvent-based wastes from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish.	
								F130 " Solvent-based wastes from the production, formulation and use of resins, latex, plasticisers, glues and adhesives.	
G Organic solvents	Ethers		G100 Ethers		G100 Ethers	G100 Ethers		G100 " Ethers and highly flammable hydrocarbons, such as petrol and jet fuel.	Ethers
	Organic solvents excluding halogenated solvents		G110 Organic solvents excluding halogenated solvents		G110 Organic solvents other than halogenated solvents	G110 Organic solvents excluding halogenated solvents		G110 " Non-halogenated organic solvents.	Non-halogenated aliphatics
	Halogenated organic solvents		G150 Halogenated organic solvents		G150 Halogenated organic solvents	G150 Halogenated organic solvents		G150 " Halogenated organic solvents.	Halogenated aliphatics

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW		NT	QLD		SA		TAS	VIC		WA
	Waste from the production, formulation and use of organic solvents		G160	Waste from the production, formulation and use of organic solvents		G160	Waste from the production, formulation and use of organic solvents	G160	Waste from the production, formulation and use of organic solvents		G160 "	Wastes from the production, formulation and use of organic solvents, NOS.	
											G130 "	Dry-cleaning wastes containing organic solvents, such as perchloroethylene.	
													Halogenated aromatics
													Non-halogenated aromatics
													Organohalogen compounds other than substances referred to elsewhere in this schedule
H Pesticides	Waste from the production, formulation and use of biocides and phytopharmaceuticals		H100	Waste from the production, formulation and use of biocides and phytopharmaceuticals		H100	Waste from the production, formulation and use of biocides and phytopharmaceuticals	H100	Waste from the production, formulation and use of biocides and phytopharmaceuticals		H100 "	Waste from the production, formulation and use of biocides and phytopharmaceuticals, NOS.	Pesticide Concentrates
	Organic phosphorus compounds		H110	Organic phosphorus compounds		H110	Organic phosphorus compounds	H110	Organic phosphorus compounds		H110 "	Organophosphorus pesticides.	Organochlorine pesticides
	Waste from the manufacture, formulation and use of wood-preserving chemicals		H170	Waste from manufacture, formulation and use of wood-preserving chemicals		H170	Waste from manufacture, formulation and use of wood-preserving chemicals	H170	Waste from manufacture, formulation and use of wood-preserving chemicals		H170 "	Copper-chrome-arsenic (CCA).	Waste from the manufacture, formulation and use of wood preserving chemicals
											H160 "	Mixed pesticide residue.	Pesticide Solutions

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
J Oils	Waste mineral oils unfit for their original intended use		J100 Waste mineral oils unfit for their original intended use (NOTE: NSW has issued an exemption with oils are being sent for recycling)		J100 Mineral oils	J100 Waste mineral oils unfit for their original intended use		J100 " Waste oils unfit for their original intended use (lubricating, hydraulic).	Waste mineral oils unfit for their
	Waste oil/water, hydrocarbons/water mixtures or emulsions		J120 Waste oil/water, hydrocarbons/water mixtures or emulsions		J120 Oil and water mixtures or emulsions, or hydrocarbons and water mixtures or emulsions	J120 Waste oil/water, hydrocarbons/water mixtures or emulsions		J120 " Waste oils and water mixtures or emulsions, and hydrocarbon and water mixtures or emulsions.	Oil/water mixtures
	Waste tarry residues arising from refining, distillation, and any pyrolytic treatment		J160 Waste tarry residues arising from refining, distillation, and any pyrolytic treatment		J160 Tarry residues arising from refining, distillation, and any pyrolytic treatment	J160 Waste tarry residues arising from refining, distillation, and any pyrolytic treatment		J160 " Tarry residues arising from refining, distillation and any pyrolytic treatment.	Waste tarry residue arising from refining, distillation or pyrolytic treatment
								J110 " Waste hydrocarbons.	
								J130 " Triple interceptor waste and stormwater contaminated with oil or hydrocarbons.	Oil interceptor waste
								J140 " Transformer fluids (excluding PCBs).	
								J150 " Other (cutting oils, soluble oils).	
								J170 Used oil filters.	
K Putrescible/organic waste	Animal effluent and residues (abattoir effluent, poultry and fish processing waste)		K100 Animal effluent and residues (abattoir effluent, poultry and fish processing wastes)		K100 Animal effluent and residues (abattoir effluent, poultry and fish processing wastes)	K100 Animal effluent and residues (abattoir effluent, poultry and fish processing wastes)		K100 " Animal effluent and residues.	Animal wastes - smallgoods, tall
	Grease trap waste		K110 Grease trap waste		K110 Grease trap waste	K110 Grease trap waste		K120 " Grease interceptor trap effluent.	

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	
	Sewage sludge and residues including nightsoil and septic tank sludge		K130 Sewage sludge and residues including nightsoil and septic tank sludge		K130 Sewage sludge and residues including nightsoil and septic tank sludge	K130 Sewage sludge and residues including nightsoil and septic tank sludge			Sewage waste	
	Tannery wastes (including leather dust, ash, sludges and flours)		K140 Tannery wastes including leather dust, ash, sludges and flours		K140 Tannery wastes (including leather dust, ash, sludges and flours)	K140 Tannery wastes (including leather dust, ash, sludges and flours)		K140 "	Tannery wastes (not containing chromium) and wool scouring wastes.	Grease wastes - wastes resulting
	Wool scouring waste		K190 Wool scouring wastes		K190 Wool scouring wastes	K190 Wool scouring wastes		K140 "	Tannery wastes (not containing chromium) and wool scouring wastes.	
					K200 Liquid food processing waste			K200 "	Food and beverage processing wastes, including animal and vegetable oils and derivatives.	
										Vegetable oils and derivatives
L Industrial washwater	Note: No NEPM waste types refer to L category							L100 "	Car and truck wash waters.	Industrial wash waters
								L150 "	Industrial wash waters from cleaning, rinsing or washing operations, NOS.	
										Engine coolants

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
M Organic chemicals	Waste, substances and articles containing or contaminated with polychlorinated biphenyls (PCBs), polychlorinated naphthalenes (PCNs), polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)		M100 Waste substances and articles containing or contaminated with polychlorinated biphenyls, polychlorinated naphthalenes, polychlorinated terphenyls and/or polybrominated biphenyls		M100 Material containing polychlorinated biphenyls (PCBs), polychlorinated naphthalenes (PCNs), polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)	M100 Waste substances and articles containing or contaminated with polychlorinated biphenyls [(PCBs), polychlorinated naphthalenes (PCNs), polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)]		M100 Polychlorinated biphenyls (PCBs) (PCBs >50 mg per kg).	PCBs (polychlorinated biphenyls)
								M110 Waste substances and articles containing or contaminated with polychlorinated biphenyls (PCBs) ([PCBs] >50 mg per kg).	
								M120 Solvents, oils and materials contaminated with PCBs ([PCBs]	
	Phenols, phenol compounds including chlorophenols		M150 Phenols, phenol compounds including chlorophenols		M150 Phenols, phenol compounds including chlorophenols	M150 Phenols, phenol compounds including chlorophenols		M150 Phenol and phenol compounds, including halogenated phenols.	Phenols and phenol compounds
	Organohalogen compounds - other than substances referred to in this list		M160 Organo halogen compounds— other than substances referred to in this Table or Table 2		M160 Organohalogen compounds — other than another substance referred to in this table	M160 Organohalogen compounds – other than substances referred to in this list		M160 Halogenated organic chemicals, NOS.	
	Polychlorinated dibenzo-furan (any congener)		M170 Polychlorinated dibenzo-furan (any congener)		M170 Polychlorinated dibenzo-furan (any congener)	M170 Polychlorinated dibenzo-furan (any congener)			
	Polychlorinated dibenzo-p-dioxin (any congener)		M180 Polychlorinated dibenzo-p-dioxin (any congener)		M180 Polychlorinated dibenzo-p-dioxin (any congener)	M180 Polychlorinated dibenzo-p-dioxin (any congener)			

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
	<b>Cyanides (organic)</b>		M210 Cyanides (organic)		M210 Cyanides (organic)	M210 Cyanides (organic)			Organic Cyanide
	<b>Isocyanate compounds</b>		M220 Isocyanate compounds		M220 Isocyanate compounds	M220 Isocyanate compounds		M220 " Isocyanate compounds (organic).	Isocyanate compounds
	<b>Triethylamine catalysts for setting foundry sands</b>		M230 Triethylamine catalysts for setting foundry sands		M230 Triethylamine catalysts for setting foundry sands	M230 Triethylamine catalysts for setting foundry sands		M230 " Amines and other nitrogen compounds.	
	<b>Surface active agents (surfactants), containing principally organic constituents and which may contain metals and inorganic materials</b>		M250 Surface active agents (surfactants), containing principally organic constituents and which may contain metals and inorganic materials		M250 Surface active agents (surfactants), containing principally organic constituents and which may contain metals and inorganic materials	M250 Surface active agents (surfactants), containing principally organic constituents and which may contain metals and inorganic materials		M250 " Detergents and surface active agents (surfactants).	Surface acting agent (surfactants)
	<b>Highly odorous organic chemicals (including mercaptans and acrylates)</b>		M260 Highly odorous organic chemicals (including mercaptans and acrylates)		M260 Highly odorous organic chemicals (including mercaptans and acrylates)	M260 Highly odorous organic chemicals (including mercaptans and acrylates)		M260 " Highly odorous organic chemicals (including mercaptans and acrylates).	Highly odorous organic chemicals
								M130 " Non-halogenated organic chemicals (non solvent), NOS. Examples: glycol coolant, radiator fluid, brake fluid.	
<b>N Soil/sludge</b>	<b>Containers which are contaminated with residues of substances referred to in this list</b>		N100 Containers and drums that are contaminated with residues of substances referred to in this list			N100 Containers and drums which are contaminated with residues of substances referred to in this list		N100 Prescribed waste residues in rigid steel or plastic containers with an original volume less than 200 litres (hazardous substances to be specified).	Containers or drums contaminated
	<b>Asbestos</b>		N220 Asbestos		N220 Asbestos	N220 Asbestos		N220 " Asbestos.	Asbestos
	<b>Soils contaminated with a controlled waste</b>		N120 Soils contaminated with a substance or waste referred to in this Table			N120 Soils contaminated with a controlled waste			Contaminated soils (Class IV or

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW		NT	QLD		SA		TAS	VIC		WA
	Fire debris and fire wash waters		N140	Fire debris and fire wash waters		N140*	Fire debris and fire wash waters	N140	Fire debris and fire wash waters		N140 "	Fire debris and fire wash-waters that are contaminated with chemicals (must specify contaminants).	Fire debris and washwater (may
	Fly ash		N150	Fly ash		N150	Fly ash	N150	Fly ash		N150 "	Fly ash.	Fly ash
	Encapsulated, chemically-fixed, solidified or polymerised wastes		N160	Encapsulated, chemically-fixed, solidified or polymerised wastes		N160*	Encapsulated, chemically-fixed, solidified or polymerised wastes	N160	Encapsulated, chemically fixed, solidified or polymerised wastes		N170	Prescribed industrial wastes that are chemically fixed and/or encapsulated.	Encapsulated, chemically-fixed,
	Filter cake		N190	Filter cake		N190	Filter cake	N190	Filter cake		N190 "	Filter cake.	Filter cake
	Residues from industrial waste treatment/disposal operations.		N205	Residues from industrial waste treatment/disposal operations		N205	Residues from industrial waste treatment/disposal operations	N205	Residues from industrial waste treatment/disposal operations		N210 "	Residues from pollution control operations, NOS.	Residues from industrial waste treatment or disposal
	Ceramic-based fibres with physico-chemical characteristics similar to those of asbestos		N230	Ceramic-based fibres with physico-chemical characteristics similar to those of asbestos				N230	Ceramic-based fibres with physico-chemical characteristics similar to those of asbestos		N230 "	Ceramic-based fibres with physico-chemical characteristics similar to those of asbestos.	
											N105	Prescribed waste residues in rigid steel or plastic containers with an original volume greater than or equal to 200 litres (hazardous substances to be specified).	
											N110	Prescribed waste residues in bags or containers not specified under N100 and N105 (hazardous substances to be specified).	
											N119 "	Category A contaminated soil	

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW		NT	QLD		SA		TAS	VIC		WA
											N120 "	Category B contaminated soil	
											N121 "	Category C contaminated soil	
											N130 "	Spent catalysts (must specify contaminants).	
											N160	Prescribed industrial wastes that are immobilised in accordance with a classification issued by EPA.	
											N180	Prescribed industrial waste that are solidified or polymerised.	
											N200 "	Ion-exchange column residues.	
											N250	Absorbents contaminated with prescribed waste residues, such as rags contaminated with oils, hydrocarbons and organic solvents (must specify contaminants).	
											N260	Solid wastes contaminated with prescribed waste residues, NOS (must specify contaminants).	
													Industrial waste treatment plant sludges and residue
<b>R Clinical &amp; pharmaceutical</b>	<b>Clinical and related wastes</b>		R100	Clinical and related wastes		R100*	Clinical and related wastes	R100	Clinical and related wastes		R100 "	Clinical and related wastes, NOS (biomedical waste).	Clinical and related wastes (bio medical)

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW	NT	QLD	SA	TAS	VIC	WA
	Waste pharmaceuticals, drugs and medicines		R120 Waste pharmaceuticals, drugs and medicines		R120* Pharmaceuticals, drugs and medicines	R120 Waste pharmaceuticals, drugs and medicines		R120 " Waste from the use of pharmaceutical products, NOS.	
	Waste from the production and preparation of pharmaceutical products		R140 Waste from the production and preparation of pharmaceutical products		R140 Waste from the production and preparation of pharmaceutical products	R140 Waste from the production and preparation of pharmaceutical products		R140 " Waste from the production of pharmaceutical products and cosmetics, NOS.	Waste from the production or use of pharmaceutical product
			R150 Quarantine Waste (Additional waste code)					R110 " Pathogenic substances and quarantine wastes.	Clinical and related waste - bio medical waste, pathogen
								R130 " Cytotoxic substances.	
T Misc	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		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		T100 Chemical waste arising from a research and development or teaching activity, including new or unidentified material and material whose effects on human health or the environment are not known	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		T100 " Waste chemical substances arising from laboratories, research and development, or teaching activities.	Waste chemical substances arising from research and development or teaching activities including those which are not identified
	Waste from the production, formulation and use of photographic chemicals and processing materials		T120 Waste from the production, formulation and use of photographic chemicals and processing materials		T120 Waste from the production, formulation and use of photographic chemicals and processing materials	T120 Waste from the production, formulation and use of photographic chemicals and processing materials		T120 " Waste from the production, formulation and use of photographic chemicals and processing materials (which do not contain silver).	Photographic waste

NEPM 15 reporting categories	Full List of NEPM waste requiring reporting	ACT	NSW		NT	QLD		SA		TAS	VIC		WA
	Tyres		T140	Tyres (not reported for internal movements)		T140	Tyres	T140	Tyres				Waste Tyres
											T160	Foundry sands.	Oil based paints (all options)
											T130 "	Inert sludges or slurries, such as clay or ceramic suspensions, drilling mud, and pit water with negligible hydrocarbon contamination.	Water based and acrylic paints (
											T170 "	Waste chemicals in small quantities, NOS, such as collected household chemicals.	

**COLOR LEGEND:**

Waste not tracked for internal movements
Additional waste code to NEPM full list
Difference in waste code or definition.

## APPENDIX 3

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# NPI SUBSTANCE TRANSFERS BY TYPE SUMMARY 2009/10 DATA WITHIN AUSTRALIA - ALL SUBSTANCES FROM WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES

Source: <http://www.npi.gov.au/npidata/action/load/transfer-by-substance-result/criteria/anzsic-division/D/anzsic-sub-division/28/year/2010/destination/ALL/industry-source/28/source-type/INDUSTRY/subthreshold-data/Yes/substance-name/All>

Substance	Source	Mandatory Total (kg)	Voluntary Total (kg)
Ammonia (total)	Water Supply, Sewerage and Drainage Services [281]	45,892	1,413,107
Arsenic & compounds	Water Supply, Sewerage and Drainage Services [281]	174	42
Boron & compounds	Water Supply, Sewerage and Drainage Services [281]	1,282	
Cadmium & compounds	Water Supply, Sewerage and Drainage Services [281]	60	
Chlorine & compounds	Water Supply, Sewerage and Drainage Services [281]	791,251	43,566
Chromium (III) compounds	Water Supply, Sewerage and Drainage Services [281]	4	195
Copper & compounds	Water Supply, Sewerage and Drainage Services [281]	25,316	1,047
Fluoride compounds	Water Supply, Sewerage and Drainage Services [281]	34,805	8,387
Hydrogen sulfide	Water Supply, Sewerage and Drainage Services [281]	5,928	
Lead & compounds	Water Supply, Sewerage and Drainage Services [281]	2,690	
Manganese & compounds	Water Supply, Sewerage and Drainage Services [281]	4,083	
Mercury & compounds	Water Supply, Sewerage and Drainage Services [281]	52	17
Nickel & compounds	Water Supply, Sewerage and Drainage Services [281]	1,588	147
Selenium & compounds	Water Supply, Sewerage and Drainage Services [281]	5	
Sulfur dioxide	Water Supply, Sewerage and Drainage Services [281]		10,510
Sulfuric acid	Water Supply, Sewerage and Drainage Services [281]		13
Total Nitrogen	Water Supply, Sewerage and Drainage Services [281]	8,140,923	1,866,842
Total Phosphorus	Water Supply, Sewerage and Drainage Services [281]	2,503,395	968,671
Zinc and compounds	Water Supply, Sewerage and Drainage Services [281]	33,912	3,660

## APPENDIX 4

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# NPI SUBSTANCES EMISSIONS BY TYPE SUMMARY 2009/10 DATA WITHIN AUSTRALIA - ALL SUBSTANCES FROM WATER SUPPLY, SEWERAGE AND DRAINAGE SERVICES

Source: <http://www.npi.gov.au/npidata/action/load/emission-by-substance-result/criteria/anzsic-division/D/anzsic-sub-division/28/anzsic-group/281/year/2010/destination/ALL/industry-source/281/source-type/INDUSTRY/subthreshold-data/Yes/substance-name/All>

Substance	Source	Air (kg)	Land (kg)	Water (kg)	Total (kg)
Acetaldehyde	Water Supply, Sewerage and Drainage Services [281]			15,246	15,246
Acetic acid (ethanoic acid)	Water Supply, Sewerage and Drainage Services [281]		15	35	50
Acetone	Water Supply, Sewerage and Drainage Services [281]		179		179
Ammonia (total)	Water Supply, Sewerage and Drainage Services [281]	751,298	291,405	16,384,079	17,426,782
Arsenic & compounds	Water Supply, Sewerage and Drainage Services [281]	6	0	683	689
Beryllium & compounds	Water Supply, Sewerage and Drainage Services [281]	0	0	142	143
Boron & compounds	Water Supply, Sewerage and Drainage Services [281]		4,310	1,368,749	1,373,059
Cadmium & compounds	Water Supply, Sewerage and Drainage Services [281]	5	2	53	60
Carbon monoxide	Water Supply, Sewerage and Drainage Services [281]	1,046,573			1,046,573
Chlorine & compounds	Water Supply, Sewerage and Drainage Services [281]	46,999	69,017	255,734	371,750
Chloroform (trichloromethane)	Water Supply, Sewerage and Drainage Services [281]			1	1
Chlorophenols (di, tri, tetra)	Water Supply, Sewerage and Drainage Services [281]	1,811	60	701	2,572
Chromium (III) compounds	Water Supply, Sewerage and Drainage Services [281]	15	0	1,030	1,045
Chromium (VI) compounds	Water Supply, Sewerage and Drainage Services [281]	4			4

Cobalt & compounds	Water Supply, Sewerage and Drainage Services [281]	0			0
Copper & compounds	Water Supply, Sewerage and Drainage Services [281]	11	144	65,584	65,739
Dichloromethane	Water Supply, Sewerage and Drainage Services [281]			19	19
Ethanol	Water Supply, Sewerage and Drainage Services [281]	3,132			3,132
Fluoride compounds	Water Supply, Sewerage and Drainage Services [281]	3,296	67,148	1,004,898	1,075,342
Hydrochloric acid	Water Supply, Sewerage and Drainage Services [281]	16			16
Hydrogen sulfide	Water Supply, Sewerage and Drainage Services [281]	534,844	1	24,998	559,843
Lead & compounds	Water Supply, Sewerage and Drainage Services [281]	10	12	519	541
Magnesium oxide fume	Water Supply, Sewerage and Drainage Services [281]	14			14
Manganese & compounds	Water Supply, Sewerage and Drainage Services [281]	136	861	25,428	26,425
Mercury & compounds	Water Supply, Sewerage and Drainage Services [281]	4	1	47	52
Methanol	Water Supply, Sewerage and Drainage Services [281]			6	6
Nickel & compounds	Water Supply, Sewerage and Drainage Services [281]	47	216	4,450	4,713
Oxides of Nitrogen	Water Supply, Sewerage and Drainage Services [281]	609,420			609,420
Particulate Matter 10.0 um	Water Supply, Sewerage and Drainage Services [281]	15,133			15,133

Particulate Matter 2.5 um	Water Supply, Sewerage and Drainage Services [281]	13,351			13,351
Phenol	Water Supply, Sewerage and Drainage Services [281]	17	12	142	171
Polychlorinated dioxins and furans (TEQ)	Water Supply, Sewerage and Drainage Services [281]	0	0	0	0
Polycyclic aromatic hydrocarbons (B[a]P <sub>eq</sub> )	Water Supply, Sewerage and Drainage Services [281]	0	0	1	2
Selenium & compounds	Water Supply, Sewerage and Drainage Services [281]	0		2	2
Sulfur dioxide	Water Supply, Sewerage and Drainage Services [281]	116,000		2,846	118,847
Total Nitrogen	Water Supply, Sewerage and Drainage Services [281]			30,040,833	30,040,833
Total Phosphorus	Water Supply, Sewerage and Drainage Services [281]			7,602,721	7,602,721
Total Volatile Organic Compounds	Water Supply, Sewerage and Drainage Services [281]	140,392			140,392
Xylenes (individual or mixed isomers)	Water Supply, Sewerage and Drainage Services [281]	160			160
Zinc and compounds	Water Supply, Sewerage and Drainage Services [281]	1	622	43,739	44,362