Department of Environment

Hazardous Waste Pathways

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1. Introduction

1.1 Background

GHD has been engaged by the Hazardous Waste Section of the Department of Environment to produce a description of key pathways taken by hazardous wastes in Australia, from arising to fate. There are variable approaches to hazardous waste management in Australia as different jurisdictions (State and Territory Governments) control the management, treatment and disposal of hazardous waste materials. The Commonwealth Government under the *Hazardous Waste (Regulation of Exports and Imports) Act* 1989 (Hazardous Waste Act) aims to regulate the export and import of hazardous waste so that humans and the environment are protected from possible harmful effects of the waste material.

The objectives of the Act in relation to hazardous waste include:

- Processing of export, import and transit permit applications under the Act
- Ensuring compliance and enforcement of the Act
- Preparing, implementing and amending legislation relating to the international movements of hazardous waste to, from or through Australia
- Formulating and implementing policies relating to the international movements of hazardous waste to, from or through Australia
- Participating in International forums such as the Basel Convention and Organisation for Economic Cooperation and Development (OECD) which deal with the international movements of hazardous waste
- Consulting, preparing and providing information to stakeholders on the Act and the permit process.

The Act considers environmental responsibilities both within and outside of Australia.

Waste can be classified as hazardous based on material or source; such as waste containing materials that are themselves considered to be hazardous (e.g arsenic) or waste generated from sources that are known to produce hazardous wastes (eg metal galvinising).

Properties or characteristics of liquids, gas and solid wastes that can be classified as hazardous include substances that can be::

- Explosive
- Flammable
- Spontaneously combust
- Corrosive
- Toxic
- Radioactive
- Infectious
- Ecotoxic.

Waste is classified by the Environment Protection Authority (EPA) Victoria into three categories according to the hazard they pose. Category A waste is banned from landfills; it must be reused, recycled or treated before it can be disposed of. Category B waste, which poses a high hazard, and Category C waste, which represents the lowest hazard and can be disposed of at approved

landfills. This waste classification is also used by New South Wales, other Australian states and territories use alternative classifications and categories for hazardous waste.

The National Environment Protection (Movement of Controlled Waste between States and Territories) Measure 2004 (NEPM) provides a national regulatory framework for management of hazardous waste materials in Australia. It includes handling of controlled waste material, tracking of waste movements, and licensing for those generating, storing, transporting, treating and disposing of waste.

1.2 Scope and limitations

The scope of work for the report is to describe major pathways for hazardous waste in Australia. The purpose of the data will be to publish this material in a user friendly interface on the Department's website to assist the general public with understanding waste types, pathways and options.

The report provides a summary of:

- Description of waste type, name and alternatives and derivatives
- Acceptable re-use, recovery, treatment or disposal paths options
- Details of the types of facilities that can manage, treat or contain the waste
- Details on export options or paths.

1.3 Assumptions

The following assumptions have been applied to the development of the Hazardous Waste Pathways report.

- The NEPM 75 list has been used to classify hazardous waste types.
- The NEPM list of wastes was consolidated into 15 waste categories that align with common chemical and treatment characteristics.
- The pathways have been prepared on the basis that the Department will use this data to develop into a functional public web interface so the general public can access this information.
- GHD has intentionally avoided reference to specific sites or companies in terms of pathways and treatment to avoid issues with competitive disadvantage for specific companies and facilities, but also to maintain longer term currency of the information as the status of sites and companies will change on an ongoing basis.
- There are many waste practices in Australia that are not considered best practice – GHD has attempted to outline best practice approaches but minimise reference to practices that may be applied that are not adequate for commercial or regulatory reasons.

2. Methodology

The following methodology was used for the development of hazardous waste pathways:

2.1 Hazardous Waste Background Review

GHD carried out a preliminary review of background information on waste types and contaminants components. This consisted of desktop analysis of international best practice and guidelines to define and classify hazardous waste across Australia.

2.2 Hazardous Waste Classification

Based on the brief provided by the Department of Environment, waste classification for the report has been based on the National Environmental Protection (Movement of Controlled Waste between States and Territories) Measure (NEPM) list which lists 75 waste types.

GHD has grouped the NEPM list into broader categories to simplify the identification and classification of hazardous waste by the general public, waste producers, transporters and treatment and disposal facilities. This grouping into 15 common categories represents the approach applied in other groupings such as the Victoria EPA and in the Tasmania Controlled Waste Strategy. It also aims to facilitate waste management and selection of treatment processes.

2.3 Hazardous Waste Handling Transport and Tracking

Where relevant, GHD has made reference to specific waste handling, transport and tracking requirements, however as these vary across state and territories, the detail provided will refer back to state or territory hazardous/controlled waste regulation and requirements.

2.4 Hazardous Waste Treatment

GHD has carried out a review of the best available technologies for treatment of hazardous waste internationally and has based this benchmark on the European Union Hazardous Waste Framework Directive (Directive 2006/13/EC) Annex IIA and Annex IIB, which provides a comprehensive approach to best practice waste treatment processes. Many other guides or references to treatment including those in Australia and other states refer to the standards applied in this directive.

3. Hazardous Waste Production

Hazardous Waste in Australia is produced by a diverse range of waste generators from ordinary households (e.g. paint, asbestos, chemicals, e-waste, medical waste) to small commercial operations (e.g. resins, solvents, lead acid batteries, tyres), institutions and organisations such as hospitals and quarantine facilities (e.g. sharps, pharmaceuticals, body fluids, quarantine ship waste) as well as industrial waste generators (e.g. contaminated soil, zinc compounds, oils). The diversity of origin and types of waste make hazardous waste management and regulation in Australia very challenging. Combined with the fact that most state and territories have an alternative approach to classification and regulation also creates further challenges.

The table below provides a list of primary hazardous waste (by density) generated in Australia. These nine waste types make up approximately 92% of Australian hazardous waste generation.

Primary Hazardous Waste Generation in Australia - 2012

Y code or supplementary code	Waste name	Tonnes generated	% of total hazardous waste generation
Y18	Residues arising from industrial waste disposal operations	1,725,091	26%
6	Soils contaminated with residues of substances in Basel Y-codes 19-45	1,541,227	23%
4	Putrescible/ organic waste	777,147	12%
Y36	Asbestos (dust and fibres)	477,257	7%
8	Tyres	415,411	6%
Y9	Waste oils/water, hydrocarbons/water mixtures, emulsion	411,107	6%
Y8	Waste mineral oils unfit for their originally intended use	345,605	5%
Y35	Basic solutions or bases in solid form	335,371	5%
Y23	Zinc compounds	144,462	2%

Source: Blue Environment 2012

4. Hazardous Waste Pathways

This section provides an overview of hazardous waste identification, classification and pathways as summarised in Figure 1.

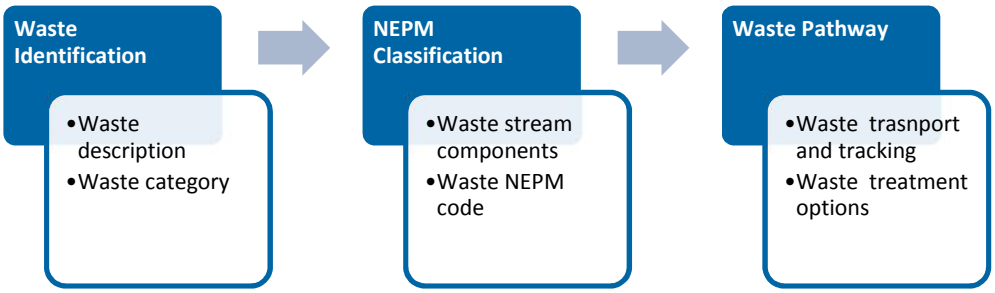

Figure 1 Waste Identification and Classification

4.1 Waste Description and Classification

Currently, there is a number of different waste classification systems used in each Australian jurisdiction. In 2011 the Department of Sustainability, Environment, Water, Population and Communities commissioned Hyder to undertake a comparison between the National Waste Classification System (develop early 1990s) and the waste classification systems used in each of the Australian jurisdictions (Hyder report).

For the purpose of this report, the waste list from the National Environmental Protection (Movement of controlled waste between States and Territories) Measure (NEPM) has been adopted as the basis for the development of the hazardous waste pathways, as shown in Table 1 below.

Table 1 NEPM 75 Waste Categories and Codes

Waste Code	Waste stream or wastes having as constituents:
A100	Waste resulting from surface treatment of metals and plastics
A110	Waste from heat treatment and tempering operations containing cyanides
A130	Cyanides (inorganic)
B100	Acidic solutions or acids in solid form
C100	Basic solutions or bases in solid form
D100	Metal carbonyls
D110	Inorganic fluorine compounds excluding calcium fluoride
D120	Mercury; mercury compounds
D130	Arsenic; arsenic compounds
D140	Chromium compounds (hexavalent and trivalent)
D150	Cadmium; cadmium compounds
D160	Beryllium; beryllium compounds
D170	Antimony; antimony compounds
D180	Thallium; thallium compounds
D190	Copper compounds
D200	Cobalt compounds
D210	Nickel compounds
D220	Lead; lead compounds
D230	Zinc compounds
D240	Selenium; selenium compounds
D250	Tellurium, tellurium compounds
D270	Vanadium compounds
D290	Barium compounds (excluding barium sulphate)
D300	Non-toxic salts

Waste Code	Waste stream or wastes having as constituents:
D310	Boron compounds
D330	Inorganic sulfides
D340	Perchlorates
D350	Chlorates
D360	Phosphorus compounds excluding mineral phosphates
E100	Waste containing peroxides other than hydrogen peroxide
F100	Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish
F110	Waste from the production, formulation and use of resins, latex, plasticisers, glues and adhesives
G100	Ethers
G110	Organic solvents excluding halogenated solvents
G150	Halogenated organic solvents
G160	Waste from the production, formulation and use of organic solvents
H100	Waste from the production, formulation and use of biocides and phytopharmaceuticals
H110	Organic phosphorus compounds
H170	Waste from the manufacture, formulation and use of wood-preserving chemicals
J100	Waste mineral oils unfit for their original intended use
J120	Waste oil/water, hydrocarbons/water mixtures or emulsions
J160	Waste tarry residues arising from refining, distillation, and any pyrolytic treatment
K100	Animal effluent and residues (abattoir effluent, poultry and fish processing waste)
K110	Grease trap waste
K130	Sewage sludge and residues including nightsoil and septic tank sludge
K140	Tannery wastes (including leather dust, ash, sludges and flours)
K190	Wool scouring waste
M100	Waste, substances and articles containing or contaminated with polychlorinated biphenyls (PCBs), polychlorinated naphthalenes (PCNs), polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)
M150	Phenols, phenol compounds including chlorophenols
M160	Organohalogen compounds - other than substances referred to in this list
M170	Polychlorinated dibenzo-furan (any congener)
M180	Polychlorinated dibenzo-p-dioxin (any congener)
M210	Cyanides (organic)
M220	Isocyanate compounds
M230	Triethylamine catalysts for setting foundry sands
M250	Surface active agents (surfactants), containing principally organic constituents and which may contain metals and inorganic materials
M260	Highly odorous organic chemicals (including mercaptans and acrylates)
N100	Containers and drums that are contaminated with residues of waste referred to in this Table
N100	Containers and drums that are contaminated with residues of substances referred to in this list
N120	Soils contaminated with a substance or waste referred to in this Table
N120	Soils contaminated with a substance or waste referred to in this Table
N140	Fire debris and fire washwaters
N150	Fly ash
N160	Encapsulated, chemically-fixed, solidified or polymerised wastes
N190	Filter cake
N205	Residues from industrial waste treatment/disposal operations.
N220	Asbestos
N230	Ceramic-based fibres with physico-chemical characteristics similar to those of asbestos

Waste Code	Waste stream or wastes having as constituents:
R100	Clinical and related wastes
R120	Waste pharmaceuticals, drugs and medicines
R140	Waste from the production and preparation of pharmaceutical products
T100	Waste chemical substances arising from research and development or teaching activities including those which are not identified and/or are new and whose effects on human health and/or the environment are not known
T120	Waste from the production, formulation and use of photographic chemicals and processing materials
T140	Tyres
T200	Waste of an explosive nature not subject to other legislation

4.2 Description of primary hazardous waste categories

There are 75 Waste classifications in Australia listed on the NEPM 75 list. GHD has broken these into 15 groups based on common chemical and treatment characteristics which are outlined below. Each waste group is summarised in terms of where the waste is generated, how it is commonly dealt with and other specific issues relating to management of the specific waste type.

4.2.1 Cyanides

Cyanide is a widely-used industrial chemical with significant chemical properties. It is used in the mining sector as a leaching agent for removing gold and silver from ore, and is also used in industrial processes such as steel hardening/metal finishing, plastics production, and manufacture of goods such as adhesives, computer electronics, fire retardants, cosmetics, dyes, nylon, paints and pharmaceuticals.

Cyanide wastes rarely require disposal. In gold and silver mining, the contaminated wastewater (tailings) is retained in dams whilst the cyanide decomposes naturally by exposure to sunlight and air. It can also be destroyed by means of neutralisation and oxidation.

4.2.2 Acids and Alkaline Bases

Acids and bases have a pH less than or equal to 2 or greater than or equal to 12.5 and are highly corrosive. Acids are commonly used in mining and heavy industry but also a broad range of other sectors such as medical and photographic use. The most common are sulphuric acid, nitric acid and hydrochloric acid (H_2SO_4, HNO_3 and HCl). Alkaline waste waters occur in various kinds of construction, cleaning and industrial activities.

Acids and bases will often require neutralisation or treatment prior to re-use or disposal. Neutralisation and disposal to landfill, transport to a wastewater treatment plant, or on-site management, immobilisation/solidification, incineration. Acids and alkalis can be used for other waste treatments, for example neutralisation, precipitation and oil/water separation (emulsion breaking). Silver can be recovered from photographic chemicals.

4.2.3 Inorganic Chemicals

Inorganic chemicals comprise batteries and a broad range of compounds commonly used in industry. They consist of compounds containing mineral or non-biological origins. Many inorganic chemicals have commercial value and can be recycled or recovered.

Current practices include on-site management through recycling and other forms of re-use at major industrial sites (for example hydro-metallurgical metal salts recovery and pyro-metallurgical metals recovery).

4.2.4 Reactive Chemicals

Reactive chemical waste includes materials that are unstable or undergo rapid or violent chemical reaction when exposed to air, water or other material, generate toxic gases or vapours when mixed with water or when exposed to pH conditions between 2 and 12.5 (as in the case with cyanide or sulphide containing materials), forms potentially explosive mixtures with water, are capable of detonation or explosive reaction when heated or subjected to shock. Examples include acetyl chloride, chromic acid, cyanides, hypochlorides, organic peroxides, perchlorates, permanganates, sulphides, some plating materials and bleaches. Waste generators include Quarry and mine operations (explosives) and Industrial waste water treatment plants - organic peroxides used as chemical additives.

Under carefully controlled conditions, specialised disposal companies employ some waste oxidant streams (hypochlorite and peroxide) in the treatment of heavy metal wastes. They can also be safely disposed to sewer under controlled conditions.

4.2.5 Paints, Lacquers, Varnish, Resins, Inks Adhesives

Paints, lacquers, varnish, resins, inks and adhesives comprise of a broad range of domestic and industrial wastes that contain a wide range of toxic and hazardous compounds. They require special handling management or disposal. There is a broad range of re-use, recycling and recovery options for these wastes in addition to disposal. Waste generators include domestic premises generating small quantities and in small containers. This would also include commercial operators such as painting contractors, carpet cleaners, dry-cleaners as well as manufacturing industries making paints and adhesives, and those using these materials

Collected contaminated containers are often left to dry out, and then cleaned (dry) and baled for scrap. Larger quantities of liquid residues are recovered into waste oil fuels. There are enterprising operators in the paints and coatings industry who produce low cost primer and undercoat by blending compatible paint residues.

4.2.6 Organic Solvents, Solvents Residues

Organic solvents and solvent residues are generally toxic and highly flammable. They consist of a range of products used broadly in domestic, commercial and industrial applications such as paint thinners and dry cleaning fluids. They require special treatment or disposal to minimise contamination and/or health risks.

Organic solvents and solvent residues are either processed on-site by generators, stockpiled awaiting further management (such as re-use by blending into waste oils for use as fuel), or transported for treatment and recovery processes.

4.2.7 Pesticides

Pesticides are commonly used by households, government and industry and include herbicides, fungicides, insecticides, fumigants, bactericides, rodenticides, baits, lures and repellents to control and/or destroy pests.

Care should be undertaken in the management and disposal of pesticides by rinsing containers (some containers can be re-used, refilled, returned or recycled). The ‘Drum-muster’ program operates successfully, requiring triple rinsing of pesticide/herbicide containers prior to depositing at a council collection point for crushing and recycling.

4.2.8 Oils, Hydrocarbons, Emulsions

Oils, hydrocarbons and emulsions are common wastes from the automotive, commercial and industrial uses.

Most of this waste stream can be recovered and/or recycled to avoid the requirement for disposal. Most waste oils are converted to energy as fuel to kilns.

4.2.9 Putrescible/Organic Wastes

Putrescible organic wastes consist of a broad range of organic waste material being predominantly animal waste, food waste, grease trap waste and sewage. This waste can cause serious health and environmental issues if not treated appropriately. Primary waste generators include food processors and sewage treatment plants. Commercial and domestic grease trap waste mostly water contaminated with oils and fats, and organic solids is also produced.

Most of this is waste is sent to sewage treatment plants or to landfill and some waste is used for land farming, irrigation or spreading.

4.2.10 Organic Chemicals

Organic chemicals consist of a broad range of organic compounds that contain carbon. This waste is generated by electrical equipment and the mining sector containing PCBs, electricity generators and distributors. It consists of harmful chemicals derived from industrial processes.

Specific treatment processes are required to treat much of this waste stream due to the toxicity and danger to health from exposure. A number of specialist treatment facilities exist to safely treat these wastes.

4.2.11 Solids/Sludges Requiring Special Handling

Solids and sludges requiring special handling consist of a broad range of wastes including contaminated soils, asbestos, contaminated containers, fly ash and filter cake. Contamination and toxicity levels vary significantly and there are a broad range of treatment options.

Based on the characteristics of waste materials they can be sent to landfill

4.2.12 Clinical and Pharmaceutical Wastes

Materials generated by the health care industry and other clinical settings, which have the potential to cause infection, injury or public offence e.g. anatomical waste and body fluids, sharps, cytotoxics, waste pharmaceuticals and chemical waste.

Clinical waste is sent to landfill, liquid wastes such as body fluids and cytotoxic wastes and body parts, are handled appropriately by discharge to sewer, transfer to destruction facilities, and cremation. Opportunities for re-use and resource recovery of clinical and related waste are particularly limited, due to the potential for infection.

4.2.13 Miscellaneous

Miscellaneous wastes comprise a range of chemical wastes derived from various activities including industrial or treatment processes. These wastes require special handling and treatment.

4.2.14 Tyres

Waste tyres are generated predominantly from domestic vehicle use, road transport, mining and heavy industry. Approximately 48 million end of life tyres require management and disposal in Australia each year.

Waste tyres in Australia should be sent to appropriately licensed recycling or disposal facilities. Only a small percentage (10-20%) of tyres is recycled each year, most are sent to landfill, stockpiled or illegally dumped.

4.3 Waste Tracking

Most hazardous waste must be monitored from its production to its final disposal. Producers, waste collectors, transporters, treatment and disposal facilities must comply with data management and tracking of waste in accordance with Schedule B of the NPEM, which supports national consistency in tracking controlled waste. The NEPM is designed to ensure that controlled wastes movements between states and territories are properly identified, transported and handled, in an environmentally sound manner and that they reach a licensed or approved facility for treatment, recycling, storage and/or disposal. Figure 2 below summaries the waste tracking procedure for hazardous waste.

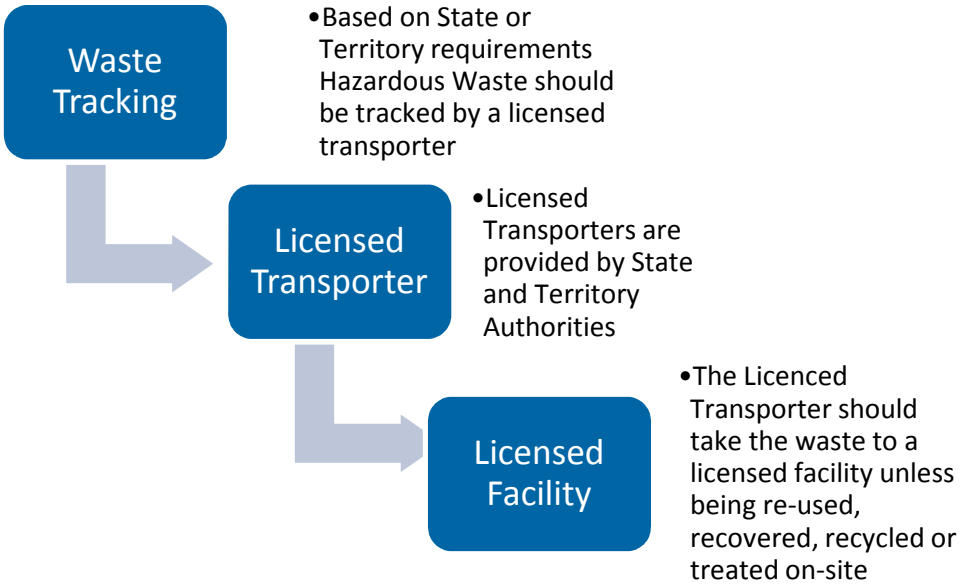

Figure 2. Waste Tracking Procedure

Each participating State or Territory should ensure that all controlled wastes transported in accordance with this Measure are accompanied by the information set out in part 1 and part 2 of Schedule B, and that part 3 of Schedule B is completed by a facility upon acceptance of the waste

Schedule B consists of three parts:

Part 1 Information to be provided by producers:

- Description of the waste(s) [Use proper shipping name/technical name if applicable for Dangerous Goods]
- The physical nature of the waste
- Waste code(s)
- Contaminant(s)

- UN Number(s)
- UN Code(s)
- Dangerous Goods Class(es) (UN Class(es)) [and Subsidiary Risk if applicable for Dangerous Goods]
- Packaging Group number
- Amount of waste(s)
- Waste origin code (ANZ Standard Industry Code)[1]
- Type of package (eg bulk) [and number of packages of each type if applicable for Dangerous Goods]
- Facility name
- Facility address
- Facility licence number
- State/Territory of destination
- Name of waste producer
- Address of waste source
- Producer's telephone number
- Emergency contact number in the event of accident or spillage
- Consignment authorisation number
- Producer identification number
- Date of dispatch.

Part 2 Information to be provided by transporters:

- Name of transporter(s)
- Address of transporter(s)
- Vehicle registration number(s)
- Name(s) of transit State(s)/Territory or Territories
- Transport licence number(s)
- Date of transport
- Type of transport eg train, truck.

Part 3 Information to be provided by facilities:

- Type of treatment at facility
- Date of receipt at facility
- Any discrepancies noted in information provided in parts 1 and 2 Schedule B should be reported as required by the relevant agency in the jurisdiction in which the facility is located.

[1] ANZSIC classification has four levels.

4.4 Hazardous Waste Treatment Processes

The European Union has established a legislative framework for the handling of waste. The Waste Framework Directive (WFD) or Directive defines waste, recovery and disposal treatments, and provides guidelines for the management of waste.

Treatment processes and codes for the report have been based on the EU Directive Annex IIA and Annex IIB.

EU Waste Directive Treatment Codes - Annex IIA

This Annex is intended to list disposal operations such as they occur in practice. In accordance with Article 4, waste must be disposed of without endangering human health and without the use of processes or methods likely to harm the environment.

Table 2 EU Waste Directive Disposal Treatment

Treatment Code	Waste Treatment
D1	Deposit into or on to land (eg landfill, etc.)
D2	Land treatment (eg biodegradation of liquid or sludgy discards in soils, etc.)
D3	Deep injection (eg injection of pumpable discards into wells, salt domes or naturally occurring repositories, etc.)
D4	Surface impoundment (e.g. placement of liquid or sludgy discards into pits, ponds or lagoons, etc.)
D5	Specially engineered landfill (eg placement into lined discrete cells which are capped and isolated from one another and the environment, etc.)
D6	Release into a water body except seas/oceans
D7	Release into seas/oceans including sea-bed insertion
D8	Biological treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D1 to D7 and D9 to D12
D9	Physico-chemical treatment not specified elsewhere in this Annex which results in final compounds or mixtures which are discarded by means of any of the operations numbered D 1 to D 8 and D 10 to D 12 (eg evaporation, drying, calcination, etc.)
D10	Incineration on land
D11	Incineration at sea
D12	Permanent storage (e.g. emplacement of containers in a mine, etc.)
D13	Blending or mixing prior to submission to any of the operations numbered D1 to D12
D14	Repackaging prior to submission to any of the operations numbered D1 to D13
D15	Storage pending any of the operations numbered D 1 to D 14 (excluding temporary storage, pending collection, on the site where it is produced)

EU Waste Directive Treatment Codes - Annex IIB

This Annex is intended to list recovery operations as they occur in practice. In accordance with Article 4, waste must be recovered without endangering human health and without the use of processes or methods likely to harm the environment.

Table 3 EU Waste Directive Recovery Treatment

Treatment Code	Waste Treatment
R1	Use principally as a fuel or other means to generate energy
R2	Solvent reclamation/regeneration

Treatment Code	Waste Treatment
R3	Recycling/reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes)
R4	Recycling/reclamation of metals and metal compounds
R5	Recycling/reclamation of other inorganic materials
R6	Regeneration of acids or bases
R7	Recovery of components used for pollution abatement
R8	Recovery of components from catalysts
R9	Oil re-refining or other reuses of oil
R10	Land treatment resulting in benefit to agriculture or ecological improvement
R11	Use of wastes obtained from any of the operations numbered R 1 to R 10
R12	Exchange of wastes for submission to any of the operations numbered R 1 to R 11
R13	Storage of wastes pending any of the operations numbered R 1 to R 12 (excluding temporary storage, pending collection, on the site where it is produced)

4.4.1 Disposal Processes

D1: Deposit into or onto land

Waste is permanently stored on authorised landfills, compacted and finally covered with top soil or impermeable material cover.

D2: Land treatment

Land treatment consists of biodegradation of waste by spreading it on land, often followed by the incorporation of the waste into the soil. Land treatment is generally applied to non-hazardous biodegradation of liquid or sludgy wastes, e.g. disposal of dredging sludge.

D3: Deep Injection

Injection of pumpable discards into natural or artificial cavities (wells, salt domes) and porous formations of rock.

D4: Surface impoundment

The deposit of liquid or sludgy waste in natural or engineered ponds, pits or lagoons, e.g. management of tailings in mining operations; impoundment of dredging sludge, etc.

D5: Specially engineered landfill

Placement into lined discrete cells which are capped and isolated from one another and the environment. Hazardous waste requires landfilling to avoid in-ground leachate.

D6: Release into a water body except seas/oceans

Deposit of non-hazardous dredging sludge and other non-hazardous sludge in surface water including the bed and the subsoil.

D7: Release into seas/oceans including sea bed insertion

For example, discharge of fish processing waste and inert materials of natural origin.

D8: Biological treatment

Biological treatment includes activated sludge, aerated lagoons, composting, aerobic and anaerobic digestion. They are applied for the treatment of municipal waste, contaminated soil, sludge or mineral wastes, if followed by disposal.

D9: Physico-Chemical Treatments

Physico-chemical treatments are used in practice in a very broad sense to treat liquid, sludgy and solid wastes, such as neutral aqueous inorganics, acids, alkalis, oils, contaminated containers, cyanides, organic sludges, reactive chemicals.

Physico-chemical processes include: dewatering, filtration, precipitation, sedimentation, acid neutralization, alkali treatment, chromic acid treatment, distillation, immobilisation and stabilisation.

D10: Incineration on Land

Combustion of organic substances contained waste materials to be converted into ash, flue gas and heat. Incinerators are used to burn hazardous waste primarily for waste destruction/treatment purposes and for potential energy or material recovery. Incineration destroys toxic organic components in hazardous waste and reduces the volume of the waste. Incineration is not suitable for metal-bearing hazardous wastes, as metals will not combust. Types of waste incinerators include: rotary kilns, fluidized bed units among others.

D11: Incineration at Sea

This operation is prohibited by international conventions.

D12: Permanent Storage

Permanent storage includes emplacement of containers in a mine, landfills for the underground storage of waste.

D13: Blending or Mixing

Basic sorting activities prior to submission to any of the operations numbered D1 to D12; such as. crushing and shredding of waste in order to reduce the volume for transport or land filling. They are also used to achieve certain waste physical and chemical characteristics such as homogenisation, conditioning and solidification.

D14: Repackaging

Transfer and compaction of waste prior to submission to any of the operations numbered D 1 to D 13. Due to the disaggregated nature of some types of waste, it is sometimes necessary to compact them to make them easier to use in the following process. Pressure machinery is used to pack the waste into a certain physical form.

D15: Storage

Temporary storage pending any of the operations numbered D 1 to D 14. Does not apply to storage of waste prior collection at the site where it is produced.

4.4.2 Recovery Processes

R1: Waste Recovery as a Fuel

Liquid waste fuel can be produced from hazardous wastes such as waste oils, waste solvents not suitable for regeneration, and distillation bottoms (residue from distillation),

and tyres. Waste oils normally need pre-treatment to remove sediments and water. Examples of combustion plants that may use waste as fuel are the combustion plants for the marine engines, cement kilns, blast furnaces in iron and steel production, brick kilns in the production of ceramics, lime kilns and asphalt production.

R2: Solvent Reclamation/Regeneration

Solvent regeneration facilities separate contaminants from waste solvents to regenerate the solvent to its original quality or to a lower grade product. The processes used for solvent recovery are distillation, filtration, evaporation, centrifugation and stripping.

R3: Recycling/reclamation

Recycling or reclamation of organic wastes which are not used as solvents, e.g. recycling of waste paper and board, reprocessing and recycling of plastic waste, composting of biowaste and green waste, fermentation of biodegradable waste for biogas production.

R4: Recycling/reclamation of metals and metal compounds

Recycling of scrap and production waste in steelworks; shredding and reprocessing, thermal treatment of cables or oil-contaminated metals; battery recycling; and electrolytic recovery of silver from photo chemicals.

R5: Recycling/reclamation of other inorganic materials

Reprocessing of construction and demolition waste; reprocessing and recycling of glass waste; use as secondary raw material in cement kilns; asphalt mixing plants; and use for underground stowage in mines.

R6: Regeneration of acids or bases

Re-concentration of spent acids; and the thermal decomposition of spent sulphuric acid for use as feedstock in sulphuric acid production.

R7: Recovery of components used for pollution abatement

Regeneration of activated carbon from water purification and flue gas treatment, mainly by thermal treatment; and the regeneration of resins by solvent washing.

R8: Recovery of components from catalysts

Regeneration of catalysts to be reused as catalysts; and the recovery of catalyst components, mainly of metal components, e.g. recycling of precious metals from catalytic converters in vehicle exhausts.

R9: Oil re-refining or other reuses of oil

Re-refining into base oils which can be used to manufacture lubricating products; use to generate fuel which can be used as a substitute for coal, diesel and light fuel.

R10: Landspreading

Land treatment resulting in benefit to agriculture or ecological improvement. Use of sewage sludge; the spreading on land of compost from the treatment of separately collected bio waste; the use of and mineral wastes as fertilisers in compliance with national legislation; landscape restoration, e.g. as final landfill cover; restoration of old disused quarries.

R11: Use of residuals

Use of wastes obtained from any of the operations numbered R 1 to R 10.

Energy recovery of sorting residues; shredder light fraction; distillation sludge from oil-refining; and the use of slag from co-incineration for underground stowage.

R12: Exchange of wastes for submission to any of the operations numbered R 1 to R 11

Basic sorting activities; mixing of waste from different generators before it is sent to a recovery facility; transfer and compaction of waste; shredding of wood waste prior to energy recovery.

R13: Storage of wastes pending any of the operations numbered R 1 to R 12 (excluding temporary storage, pending collection, on the site where it is produced)

Interim storage of waste prior to recovery.

4.5 Hazardous Waste Treatment in Australia

Hazardous waste classification and treatment options are shown in Appendix A. The most commonly used disposal treatments in Australia are physico-chemical treatments (D9), repackaging or mixing (D14) and storage (D15). These are pre-treatment operations, which must be followed by one of the recovery or disposal operations, e.g landfill (D1).

Recovery processes such as waste recovery as a fuel (R1), solvent reclamation/regeneration (R2), recycling/reclamation of organic waste (R3) are the main recovery treatment options practiced in Australia.

5. Waste Treatment Guidelines

As there are no current guidelines for waste treatment in Australia other than those applied by specific state and territories, we have based the Guidelines for waste treatment operations on the European Commission Reference Document on Best Available Techniques (BAT) for the Waste Treatment Industries (BREF).

This section provides BAT guidelines for the pre-treatment and post-treatment processes and facilities. The following steps should be followed by waste treatment plants: acceptance, storage, treatment, storage of residues and emissions.

5.1 Pre-acceptance Procedures

Pre-acceptance testing prior to waste transport to the facility is required to determine the type of waste and check that the facility is licenced to appropriately treat or dispose of the waste. Waste identification or samples for testing need to be provided before the transport of waste to the facility.

5.2 Acceptance Procedures

After completing all pre-acceptance testing the waste is then transported to the facility. Hazardous wastes must be tracked and controlled waste carriers must hold the appropriate licences. The acceptance procedures are defined by the treatment facilities and may include physical inspection when they arrive at the site, identification, sampling and analysis and definition of treatment programme.

5.3 Storage and Handling Procedures

Storing liquid hazardous waste requires extra care. It should be stored under cover and in a bunded and secure area that contains any leaks or spills and prevents wastes from coming in contact with the ground or escaping to the environment via stormwater drains or gutters. Liquids may be stored in tanks and/or containers (e.g. glass containers, drums, big containers), storage cells, storage buildings and outside storage (e.g. waste waters).

The basic Australian Standards' requirements for bunding of hazardous liquid wastes are:

- Bunds should be impervious and preferentially constructed of concrete, bricks or stones
- Bunds should be designed to contain 110% of the volume of the largest vessel within the bund
- Vessels should be at least 1 m from the bund walls
- Bund walls should preferably be between 0.5 to 1.5 m in height.

Hazardous waste must be assessed and classified before transferring to a treatment or disposal facility. When sending hazardous waste for treatment or disposal, the following must take place:

- Follow waste tracking rules
- The transporter is appropriately licensed
- The waste is being sent to and accepted by an approved or licensed.

Storage and handling requirements of hazardous waste are outlined in the Australian Dangerous Goods Code and in the following Australian Standards:

- AS/NZS 3833-2007: The storage and handling of mixed classes of dangerous goods.

- AS 1940-2004: The storage and handling of flammable and combustible liquids
- AS 3780-2008: The storage and handling of corrosive substances
- AS 4326-2008: The storage and handling of oxidising agents.

6. Hazardous Waste Export

Hazardous wastes can be exported from Australia but require a Hazardous Waste Export permit from the Australian Commonwealth Government.

Hazardous waste can be exported under the Basel Convention and the OECD control system.

Generally, a hazardous waste export license will only be granted if the waste that is being exported is for recovery or recycling. In exceptional circumstances, hazardous waste may be exported for disposal, if no licensed disposal options exist in Australia and specific criteria are met.

Primary waste exported from Australia for recycling or recovery include:

- Brass or Lead Dross
- Spent Catalyst
- Nickel-Cadmium Batteries
- Aluminium Ashes and Residues
- Used Lead Acid Batteries (ULABs)
- Electronic Scrap
- Zinc Ashes and Residues

7. References

- Environment Protection Authority Victoria website. www.epa.vic.gov.au
- The National Environment Protection (Movement of Controlled Waste between States and Territories) Measure 2004 (NEPM)
- European Union Hazardous Waste Framework Directive (Directive 2006/13/EC) Annex IIA and Annex IIB
- Blue Environment 2012
- European Commission Reference Document on Best Available Techniques (BAT) for the Waste Treatment Industries (BREF)

Appendices

Appendix A - Hazardous Waste Classification and Treatment Options in Australia

Type	Category	Description	Waste Code	Waste stream or wastes having as constituents:	Description	Treatment Code*
A	Cyanides	Cyanide is a widely-used industrial chemical with significant chemical properties which consist of the salts of hydrocyanic acid and are extremely toxic. It is used in the mining sector as a leaching agent for removing gold and silver from ore, and is also used in industrial processes such as steel hardening/metal finishing, plastics production, and manufacture of goods such as adhesives, computer electronics, fire retardants, cosmetics, dyes, nylon, paints and pharmaceuticals. A130 'Cyanides (inorganic)' include residues and other contaminated materials from the mining and minerals processing industries.	A110	Waste from heat treatment and tempering operations containing cyanides		D9, D14, D15
			A130	Cyanides (inorganic)	Complexed cyanides (inorganic), Inorganic isocyanates	D9
			M210	Cyanides (organic)	Cyanide waste from heat treatment & tempering	D9
B	Acids	Acids and bases have a pH less than or equal to 2 or greater than or equal to 12.5 and are highly corrosive. Acids are commonly used in mining and heavy industry but also a broad range of other sectors such as medical and photographic use. The most common are sulfuric acid, nitric acid and hydrochloric acid (H_2SO_4, HNO_3 and HCl).	B100	Acidic solutions or acids in solid form	Sulfuric acid, Hydrochloric acid, Nitric acid, Phosphoric acid, Chromic acid, sodium dichromate, Hydrofluoric acid, Sulfuric/hydrochloric acid mixtures, Mixed acids (inorganic), Organic acids, Pickle liquor, Acids nos	D9, D13, D14, D15, R1, R3, R13
C	Alkaline Wastes	Alkaline waste waters occur in various kinds of construction, cleaning and industrial activities. They have a high pH level and will often require neutralisation or treatment prior to re-use or disposal.	C100	Basic solutions or bases in solid form	Alkaline cleaners, potash, caustic soda, Ammonium hydroxide, Waste lime & cement (no metallic constituents), Caustic neutralised waste (metallic constituents), Other alkaline waste (inorganic and organic)	D9, D13, D14, D15, R1, R3, R13
D	Inorganic Chemicals	Inorganic chemicals comprise batteries and a broad range of compounds commonly used in industry. They consist of compounds containing mineral or non-biological origins. Many inorganic chemicals have commercial value and can be recycled or recovered.	D100	Metal carbonyls	Metal carbonyls	D9, D14, D15, R13
			D110	Inorganic fluorine compounds excluding calcium fluoride	Inorganic fluorine compounds	D9, D14, D15
			D120	Mercury; mercury compounds	Fluorescent lamps, Equipment & articles containing mercury nos, Mercury & mercury compounds	D9, D14, R13
			D130	Arsenic; arsenic compounds	Arsenic & arsenic compounds	D9, D14, D15
			D140	Chromium compounds (hexavalent and trivalent)	Chromium compounds (hexavalent & trivalent)	D9, D14, D15
			D150	Cadmium; cadmium compounds	NiCad batteries, Cadmium & cadmium compounds	D9, D14, D15
			D160	Beryllium; beryllium compounds	Beryllium & beryllium compounds	D9, D14, D15
			D170	Antimony; antimony compounds	Antimony & antimony compounds	D9, D14, D15
			D180	Thallium; thallium compounds	Thallium & thallium compounds	D14, D15
			D190	Copper compounds	Copper compounds	D9, D14, D15
			D200	Cobalt compounds	Cobalt & cobalt compounds	D9
			D210	Nickel compounds	Spent catalysts (nickel), Nickel compounds nos	D9, D14, D15
			D220	Lead; lead compounds	Lead acid batteries, Grit blast waste, Lead & lead compounds nos	D9, D14, R13
			D230	Zinc compounds	Zinc ash/dust, galvaniser's ash, Zinc compounds	D9, D14, R13
			D240	Selenium; selenium compounds	Selenium & selenium compounds	D9, D14, D15, R13
			D250	Tellurium, tellurium compounds	Tellurium & tellurium compounds	
			D270	Vanadium compounds	Vanadium compounds, n.o.s.	
			D290	Barium compounds (excluding barium sulphate)	Barium & barium compounds	D9, D14, D15, R13
			D300	Non toxic salts	Aluminium dross, aluminium smelter waste, salt slag, non-metallic product, non-toxic salts nos	D9, D14, D15, R13
			D310	Boron compounds	Boron & boron compounds	D9, D14, D15, R13
			D330	Inorganic sulfides	Inorganic sulfur containing compounds	D9, D14, D15, R13
			D340	Perchlorates	Perchlorates	
			D350	Chlorates	Chlorates	
			D360	Phosphorus compounds excluding mineral phosphates	Phosphorus & phosphorus compounds (inorganic)	D9, D14, D15, R13

Type	Category	Description	Waste Code	Waste stream or wastes having as constituents:	Description	Treatment Code*
E	Reactive Chemicals	Reactive chemical waste includes materials that are unstable or undergo rapid or violent chemical reaction when exposed to air, water or other material, generate toxic gases or vapours when mixed with water or when exposed to pH conditions between 2 and 12.5 (as in the case with cyanide or sulfide containing materials), forms potentially explosive mixtures with water, are capable of detonation or explosive reaction when heated or subjected to shock. Examples include acetyl chloride, chromic acid, cyanides, hypochlorides, organic peroxides, perchlorates, permanganates, sulfides, some plating materials and bleaches.	E100	Waste containing peroxides other than hydrogen peroxide	Oxidising agents	D9, D14, D15, R13
			T200	Waste of an explosive nature not subject to other legislation	Explosive waste not subject to other legislation	D14, D15
F	Paints, Lacquers, Varnish, Resins, Inks Adhesives	Paints, lacquers, varnish, resins, inks and adhesives comprise of a broad range of domestic and industrial wastes that contain a wide range of toxic and hazardous compounds. They require special handling management or disposal. There are a broad range of re-use, recycling and recovery options for these wastes in addition to disposal	F100	Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish	Paints, inks, etc. (aqueous non-flammable vapours), Paints, inks, etc. (aqueous, flammable vapours) Paints, inks, etc. (solvent combustible FP<60.5°C) Paints, inks, etc. (solvent combustible FP>60.5°C) Paint residues nos	D9, D14, D15, R1, R2
			F110	Waste from the production, formulation and use of resins, latex, plasticisers, glues and adhesives	Adhesives, glues, etc. (aqueous non-flammable vapours) Adhesives, glues, etc. (aqueous flammable vapours) Adhesives, glues, etc. (solvent combustible FP<60.5°C) Adhesives, glues, etc. (solvent combustible FP>60.5°C) Uncured adhesives or resins nos Cured adhesives or resins nos Adhesives, glues, etc. nos	D9, D14, D15, R1, R2, R3, R13
G	Organic Solvents, Solvents Residues	Organic solvents and solvent residues are generally toxic and highly flammable. They consist of a range of products used broadly in domestic, commercial and industrial applications such as paint thinners and dry cleaning fluids. They require special treatment or disposal to minimization contamination and/or health risks.	G100	Ethers	Ethers	D14, D15, R1, R13
			G110	Organic solvents excluding halogenated solvents	Kensal (non-chlorinated), Non-halogen organic solvents (flammable FP<60.5°C), Non-halogen organic solvents (combustible FP>60.5°C)	D14, D15, R1, R13
			G150	Halogenated organic solvents	Klenasol 75/25, Perchloroethylene (tetrachloroethylene) (liquid), Dry cleaning sludge (containing perchloroethylene), Trichloroethylene, Halogen organic solvents (flammable FP < 60.5°C), Halogen organic solvents (combustible FP>60.5°C), Halogen organic solvents (non- combustible/non-flammable vapours), Halogenated organic solvents nos	D14, D15, R1, R13
			G160	Waste from the production, formulation and use of organic solvents	Waste from production & formulation of organic solvents, Solvent recovery residues, Organic solvents & solvent residues nos	D14, D15, R1, R13
H	Pesticides	The ‘Drum-muster’ program operates successfully, requiring triple rinsing of pesticide/herbicide containers prior to depositing at a council collection point for crushing and recycling.	H100	Waste from the production, formulation and use of biocides and phytopharmaceuticals	Inorganic & organo-metallic pesticides, Nitrogen containing pesticides, Organochlorine pesticides, Sulfur containing pesticides, Biological pesticides, Mixed pesticide residue	D9, D14, D15, R1, R13
			H110	Organic phosphorus compounds	Organo phosphorus pesticides, Organic phosphorus compounds	D9, D14, D15, R1, R13
			H170	Waste from the manufacture, formulation and use of wood-preserving chemicals	Copper-Chrome-Arsenic (CCA), Organic wood preserving compounds, Other inorganic wood preserving compounds	D9, D14, D15, R13

Type	Category	Description	Waste Code	Waste stream or wastes having as constituents:	Description	Treatment Code*
J	Oils, Hydrocarbons, Emulsions	Oils, hydrocarbons and emulsions are common wastes from the automotive, commercial and industrial uses. Most of this waste stream can be recovered and/or recycled to avoid the requirement for disposal.	J100	Waste mineral oils unfit for their original intended use	Mineral oils unfit for their original intended use, Oil filters, Transformer fluids (excluding PCB's) , Waste hydrocarbons	D9, D10, D14, D15, R1, R2, R3, R9, R13
			J120	Waste oil/water, hydrocarbons/water mixtures or emulsions	Vehicle washwaters, Boiler blowdown sludge, Cooling tower washwaters, Textile effluent & residues nos, industrial plant washwaters, Ethylene glycol-water (antifreeze), Oil/hydrocarbon (<50%) mixed with water , Oil/hydrocarbon (>50%) mixed with water, Other (cutting oils, soluble oils), Oil/hydrocarbon mixed with water nos	D9, D10, D14, D15, R1, R2, R3, R9, R13
			J160	Waste tarry residues arising from refining, distillation and any pyrolytic treatment	Tars & tarry residues	D9, D14, D15, R1, R9, R13
K	Putrescible/Organic Wastes	Putrescible organic wastes consist of a broad range of organic waste material being predominantly animal waste, food waste, grease trap waste and sewage. This waste can cause serious health and environmental issues if not treated appropriately.	K100	Animal effluent and residues (abattoir effluent, poultry and fish processing waste)	Abattoir effluent, Animal effluent & residues (poultry & seafood), Animal oils & derivatives (e.g. tallow), Food processing effluent nos	D9, D13, D15, R3, R9, R13, R16
			K110	Grease trap waste	Grease interceptor trap waste - domestic, Grease interceptor trap waste industrial	D9, D14, D15, R3, R9, R13
			K130	Sewage sludge and residues including nightsoil and septic tank sludge	Bacterial sludge (septic tank), Night soil, Sewerage sludge & residues	
			K140	Tannery wastes (including leather dust, ash, sludges and flours)	Tannery wastes containing chromium, Tannery wastes (no chromium)	D9, D15, R1, R3, R13
			K190	Wool scouring waste	Wool scouring waste	D9, D15, R1, R3, R13
M	Organic Chemicals	Organic chemicals consist of a broad range of organic compounds that contain carbon. Most of this waste consists of harmful chemicals derived from industrial processes. Specific treatment processes are required to treat much of this waste stream due to the toxicity and danger to health from exposure.	M100	Waste, substances and articles containing or contaminated with polychlorinated biphenyls (PCBs), polychlorinated naphthalenes (PCNs), polychlorinated terphenyls (PCTs) and/or polybrominated biphenyls (PBBs)	Oil, solvents & materials contaminated with PCB, Equipment containing PCBs, Polychlorinated biphenyls (PCBs) nos, Equipment containing PCNs, PCTs and PBBs, PCNs, PCTs and PBBs	D14, D15, R13
			M150	Phenols, phenol compounds including chlorophenols	Phenols & phenol compounds incl. chlorophenols	D14, D15, R1, R13
			M160	Organohalogen compounds - other than substances referred to in this list	Hexachlorobenzene (HCB), Refrigerants, Halogenated organic compounds nos	D14, D15, R1, R13
			M170	Polychlorinated dibenzo-furan (any congener)	Polychlorinated dibenzo-furans (any congener)	
			M180	Polychlorinated dibenzo-p-dioxin (any congener)	Polychlorinated dibenzo-p-dioxins (any congener)	
			M220	Isocyanate compounds	Isocyanates (organic)	D14, D15, R1, R13
			M230	Triethylamine catalysts for setting foundry sands	Triethylamine catalyst for setting foundry sands	D14, D15, R1, R13
			M250	Surface active agents (surfactants), containing principally organic constituents and which may contain metals and inorganic materials	Surfactants	D14, D15, R1, R13
			M260	Highly odorous organic chemicals (including mercaptans and acrylates)	Odorous organic compounds including mercaptans, acrylate, Methacrylates (excluding solid inert polymeric material), Organic sulfur compounds nos	D14, D15, R1, R13

Type	Category	Description	Waste Code	Waste stream or wastes having as constituents:	Description	Treatment Code*
N	Solids/Sludges Requiring Special Handling	Solids and sludges requiring special handling consist of a broad range of wastes including contaminated soils, asbestos, contaminated containers, fly ash and filter cake. Contamination and toxicity levels vary significantly and there are a broad range of treatment options.	N100	Containers and drums that are contaminated with residues of waste referred to in this Table	Drums containing waste which must be tracked, Other containers containing waste which must be tracked, Aerosol cans	D9, D15, R1, R4, R13
			N100	Containers and drums that are contaminated with residues of substances referred to in this list		
			N120	Soils contaminated with a substance or waste referred to in this Table	Contaminated soil, Contaminated demolition waste	D9, D14, D15, R3, R13, R15,
			N120	Soils contaminated with a substance or waste referred to in this Table		
			N140	Fire debris and fire washwaters	Fire washwaters	D9, D14, D15, R1, R2, R3, R13
			N150	Fly ash	Fly ash	D9, D14, D15, R3, R4, R5, R13,
			N160	Encapsulated, chemically-fixed, solidified or polymerised wastes	Encapsulated waste, Chemically fixed waste, Solidified or polymerised waste	D9, D14, D15, R13
			N190	Filter cake	Filter cake	D9, D14, D15, R1, R4, R9, R13
			N220	Asbestos	Asbestos	D1, D14, D15
			N230	Ceramic-based fibres with physico-chemical characteristics similar to those of asbestos	Ceramic fibres with asbestos-like properties	D9, D14, D15
R	Clinical and Pharmaceutical Wastes	Materials generated by the health care industry and other clinical settings, which have the potential to cause infection, injury or public offence e.g. anatomical waste and body fluids, sharps, cytotoxics, waste pharmaceuticals and chemical waste. Opportunities for re-use and resource recovery of clinical and related waste are particularly limited, due to the potential for infection.	R100	Clinical and related wastes	Human tissue, bulk body fluids or blood, laboratory specimens or cultures, animal tissue, sharps, pathogenic substances.	D9, D10, D14, D15
			R120	Waste pharmaceuticals, drugs and medicines	Pharmaceuticals and residues	D9, D10, D14, D15, R1, R13
			R140	Waste from the production and preparation of pharmaceutical products		D9, D10, D14, D15, R1, R13
T	Miscellaneous	Miscellaneous wastes comprise a range of chemical wastes derived from various activities including industrial or treatment processes. These wastes require special handling and treatment.	T100	Waste chemical substances arising from research and development or teaching activities including those which are not identified and/or are new and whose effects on human health and/or the environment are not known.	Waste chemicals from R&D or teaching, Waste from domestic chemical collections	D9, D10, D14, D15, R13
			T120	Waste from the production, formulation and use of photographic chemicals and processing materials	Photographic waste containing silver, Photographic waste (no silver), Photographic waste nos	D9, D14, D15, R4, R13
			T190	Residues from industrial waste treatment/disposal operations.		D9, D14, D15, R4, R13
			A100	Waste resulting from surface treatment of metals and plastics	Waste from metals & plastics treatment	D9, D14, D15, R4, R13
	Tyres	Waste tyres are generated predominantly from domestic vehicle use, road transport mining and heavy industry. Waste tyres in Australia should be sent to appropriately licensed recycling or disposal facilities.	T140	Tyres	Used tyres	R1

**Treatment Codes: Recovery (R), Disposal (D)*
nos: not otherwise specified

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