

Guideline

Clinical and related waste

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1. Introduction

Clinical and related waste must be handled, stored, packaged, labelled and transported appropriately to minimise the potential for contact with the waste and to reduce the risk to the environment from accidental release. This guideline describes the management of clinical or related waste in Queensland, in reference to the Waste Reduction and Recycling Regulation 2011 (WRR Reg).

2. What is clinical and related waste?

2.1 Clinical waste

Clinical waste means waste that has the potential to cause disease, including, for example, the following—

- (a) animal waste
- (b) discarded sharps
- (c) human tissue waste
- (d) laboratory waste.

Animal waste

Animal waste means any discarded materials, including carcasses, body parts, blood or bedding, originating from animals contaminated with an agent infectious to humans or from animals inoculated during research, production of biologicals or pharmaceutical testing with infectious agents¹.

Teeth, hair/fur, claws/hooves or bone fragments are not considered to be animal body parts for the purpose of managing clinical and related waste under the Regulation.

Dead animals at the side of the road or animals put down due to old age or injury do not have to be disposed of as clinical waste. They can be disposed of through local government collection services (if pick-ups are provided) or given to the owner if requested.

Biological refers to preparations that are made from living organisms and their products, which are used in diagnosing, immunising or treating humans or animals. This includes but is not limited to serums, vaccines, antigens and antivenins.

Discarded sharps

A sharp is an object or device having with sharp points, protuberances or cutting edges that are capable of causing a penetrating injury to humans. This waste includes used hypodermic, intravenous or other medical needles, Pasteur pipettes, disposable dental picks and drill bits, scalpel blades, lancets, scissors, glass slides and broken laboratory glass.

In order for an item to be defined as a sharp, it does not have to have been in contact with human blood, body fluids or an infectious agent. However, the area of sharps generation can influence how the waste is managed for disposal. For instance, a hypodermic needle that has been used to give a patient a tetanus injection would be disposed of in a yellow coloured sharps container for clinical waste. However, a sharp generated from an oncology ward which had been used to inject cytotoxic drugs would be disposed of as cytotoxic waste and a sharp which had contained radioactive material would be disposed of as radioactive waste.

Human tissue waste

Human tissue waste means the following—

- tissue, blood, blood products and other body fluids that are removed from a person during surgery, an autopsy or another medical procedure
- tissue, blood, blood products and other body fluids that are removed from a person during post-operative care or treatment
- specimens of tissue, blood, blood products and other body fluids and containers in which the specimens are kept
- discarded material saturated with, or containing, free-flowing blood and other body fluids.

¹ More information on infectious agents is given in the section on human tissue waste.

Human tissue waste includes discarded waste human blood or its components (serum and plasma), containers of free-flowing blood or blood components, or material heavily contaminated with blood or blood components (whether free-flowing or dried). Tissue does not include human body parts, teeth, hair, nail, gums and bone.

Waste human blood and its components, including expired stocks from blood banks, is considered to be clinical waste and must be managed according to the legislative requirements for clinical waste.

Human body fluids such as saliva, mucus, pleural fluid, cerebrospinal fluid, pericardial fluid and any other fluid that is visibly contaminated with blood, and all body fluids generated from circumstances where there is potential for the presence of infectious agents, are included in this category. Urine, faeces and vomitus are not generally included as clinical waste, unless they originate from a person with a known infectious disease or are visibly contaminated with blood.

However, waste items that may be slightly contaminated with dried blood should not be considered to be clinical waste by generating premises. This may include a light blood smear on a disposable gown or a spot of blood on cotton wool from a blood test.

Blocks of tissue that have been fixed for cytological and/or histological examination in paraffin or a similar embedding material that prevents material leaching into the environment may be discarded as general waste. The chemical fixatives used are likely to destroy any potential pathogens in the tissue block.

If managed appropriately, sanitary hygiene waste is not considered to be clinical waste, unless it has been generated in an isolation area or by a person known to have an infectious disease. Further information on managing sanitary hygiene waste is provided in section 7 of this guideline. Individual premises can, however, still develop their own infection control policies for this waste.

Laboratory waste

Laboratory waste means a specimen or culture discarded in the course of dental, medical or veterinary practice or research. This includes wastes contaminated by genetically manipulated material or imported biological material. Laboratory waste also includes cultures and stocks of infectious agents.

This waste includes cultures and stocks of infectious agents (as outlined above), and associated biologicals, cultures and stocks from medical, research or pathological laboratories, wastes from the production of biologicals, discarded live or attenuated vaccines or culture dishes, and devices used to transfer, inoculate or mix cultures.

Cultures and stocks refer to systems that are used to grow and maintain infectious agents in vitro. This includes, but is not limited to:

- nutrient agars, gels and broths
- human and primate cell lines
- impure animal cell lines.

Culture dishes and devices used to transfer, inoculate or mix cultures refers to items that have come into contact with high concentrations of infectious agents and may include:

- plastic or glass plates, flasks, vials, beakers, jars and tubes
- inoculation wires and loops
- stirring devices
- stoppers and plugs
- filtering devices
- materials used to clean and disinfect items.

2.2 Related waste

Related waste means waste that constitutes, or is contaminated with, chemicals, cytotoxic drugs, human body parts, pharmaceutical products or radioactive substances.

Chemical waste means waste generated from the use of chemicals in medical, dental, veterinary and laboratory procedures, including, for example, mercury, formalin and gluteraldehyde.

Cytotoxic drugs are drugs known to have carcinogenic, mutagenic or teratogenic potential. In Queensland, pharmaceutical products are restricted drugs under the Health (Drugs and Poisons) Regulation 1996.

A restricted drug means an S4 substance other than solasodine, and alkaloids and alkaloidal glycosides of plants of the genus solanum for human therapeutic use.

2.3 When waste is not clinical waste

Domestic premises—In the home environment the only category of clinical and related wastes requiring special treatment is sharps or other devices (hypodermic needles) used to penetrate the skin of humans or animals. All other clinical and related wastes can be disposed of through the domestic waste stream.

Emergency first-aid—Waste generated when administering emergency first-aid at accident scenes should be disposed of by using all reasonable precautions commensurate with the nature and circumstances of the situation.

Tattooists—If the waste does not contain free-flowing blood or body fluids, it is not clinical waste. This means that waste with a small amount of dried blood (e.g. cotton wool ball with a spot of dried blood) does not have to be disposed of as clinical waste. However, sharps are a clinical waste and must be managed accordingly.

Electrolysis—Electrolysis procedures used by beauticians to treat or remove body hair are not considered to generate clinical waste if the waste does not contain free-flowing blood or body fluids. Any sharps must be contained within a rigid-walled, puncture-resistant container prior to disposal. The container must then be given to an approved treatment facility via a registered transporter.

Ear piercing/body piercing—This practice is not considered to generate clinical waste, unless the waste contains free-flowing blood or body fluids. However, any sharps waste must be disposed of in the same manner as for tattooists, or go to an approved treatment facility via a registered transporter.

Waxing—Waxing procedures used by beauticians for removing body hair are not considered to generate clinical waste.

Public areas (e.g. shopping centres, parks, beaches, hotels, restaurants, railway and bus stations, airports, etc.)—Sanitary hygiene waste and sharps are not considered to be clinical waste if disposed of or discarded in a public toilet or public area.

Animal bathing and grooming—Animal bathing and grooming services (e.g. hydrobathing and hair and nail clipping) are not considered to generate clinical waste, even if the activity is conducted at a premises generating clinical waste (such as a veterinary clinic). However, correct management practices need to be followed. Particularly to manage waste water and any associated chemicals that may have been used.

Facilities having animals (e.g. pet shops, kennels, pounds, theme parks)—Waste generated from a pet shop, public aviary, aquarium or zoo is not considered to be clinical waste, unless the waste originated from an animal contaminated with an agent infectious to humans. This waste must then be managed as clinical waste.

Crime scenes—Waste from the clean-up of a crime scene generally does not need to be managed as clinical waste, unless the material is heavily contaminated with free-flowing blood or body fluids, or is known to contain infectious agents.

First aid rooms (e.g. in schools, offices, factories)—Clinical waste generated in the treatment of minor injuries (e.g. bandages, band-aids, cotton wool) is not clinical waste. However, any hypodermic needles must be placed in a rigid-walled, puncture resistant container, which can then be disposed in the general waste stream if allowed by the local government.

Medical practitioners, dentists and vets—General waste such as tongue depressors, cotton wool balls, tissues, bandages, band-aids, protective bibs, gloves, overalls, disposable sheets, and shoe protectors with no free flowing blood, are not classed as clinical waste and can go into the general waste stream.

Laboratories—Waste from laboratories that do not conduct testing of blood, body fluids or tissue from humans or animals is not clinical waste.

3. Segregation of waste

A person who operates premises at which clinical or related waste is generated must ensure the waste is segregated into—

- (a) the following categories of clinical waste—
 - a. animal waste
 - b. discarded sharps
 - c. human tissue waste
 - d. laboratory and associated waste directly resulting from the processing of specimens
- (b) the following categories of related waste—
 - a. chemical waste
 - b. waste constituted by, or contaminated with, cytotoxic drugs
 - c. human body parts

- d. pharmaceutical waste
- e. radioactive waste
- (c) general waste.

Not segregating waste is an offence under the WRR Reg, with a maximum penalty of \$11,385² (100 penalty units) for a corporation.

4. Storage

The WRR Reg has specific requirements for storing clinical and related waste before it is transported off-site for treatment. These requirements have been introduced to prevent harm to humans, avoid contamination of soil and surface waters, and to assist in ensuring correct disposal.

Clinical and related waste must be:

- bagged and stored in rigid-walled, leak-proof secondary containers, preferably in a bunded area with an impervious surface (e.g. concrete)
- stored in bags and containers with the appropriate colours and labels
- kept so as not to cause environmental nuisance (e.g. by refrigerating potentially odorous materials)
- kept in an area not accessible to unauthorised people or animals.

Operators of premises generating and storing their own clinical waste do not require an environmental authority for regulated waste storage under the *Environmental Protection Act 1994*. However, operators of premises storing clinical waste received from generators off-site must obtain an environmental authority if the operation meets the regulated waste storage activity definition (see item 56 of schedule 2 of the Environmental Protection Regulation 2008).

4.1 Containers and identification

Clinical or related waste must be packaged, labelled, handled and transported appropriately to minimise the potential for contact with the waste and reduce the risk to the environment from accidental releases. Schedule 7A of the WRR Reg contains requirements (known as the design rules) for waste containers and waste transport vehicles.

The table below summarises the design rules for waste containers from Schedule 7A of the WRR Reg. Under s. 41Y(2) of the WRR Reg it is an offence for a person who operates premises at which clinical or related waste is generated not to ensure all bags and other containers used at the establishment comply with the design rules.

Table 1: Clinical and related waste design rules

Waste	Container	Symbol colour	Symbol	Identification
CLINICAL	Yellow	Black	Biohazard symbol 	Clinical waste
CYTOTOXIC	Purple	White	Cell in telophase 	Cytotoxic waste- incinerate at 1100 °C
RADIOACTIVE	Red	Black	Radioactive symbol 	Radioactive waste

² As at 1 July 2014.

Sharps

Sharps produced by premises generating clinical or related waste must be placed into a rigid-walled, puncture-resistant container that meets the relevant Australian Standard for the type of container, and is the appropriate colour for the type of sharp.

For example, if the sharps waste is contaminated with a cytotoxic drug, the container should be purple. If it is contaminated with blood, the container should be yellow. If the sharps waste is contaminated with blood and a cytotoxic drug, the container used should be the colour of the highest level waste present—this being the cytotoxic drug (the container should be purple). Sharps discarded in other areas (e.g. public toilets, hotels, shopping centres, restaurants, parks or skin penetration premises) must be placed into rigid-walled containers and should be disposed of in accordance with local government requirements.

Once the sharps container has been sealed and secured, it can be placed directly into a secondary container for transportation. There is no requirement to first place the sharps container into a plastic bag before disposal into a secondary container, as they are already contained.

Clinical waste

Clinical waste must be placed in yellow bags and containers identified with the biohazard symbol and the words '**CLINICAL WASTE**' marked prominently and permanently in black.



Cytotoxic waste

Cytotoxic wastes require careful handling and containment. All cytotoxic waste must be placed into purple bags and containers that are identified with the cell in telophase symbol and the wording '**CYTOTOXIC WASTE**' in white.



Radioactive waste

Radioactive waste must be placed into red bags and containers that are marked with the radiation warning symbol and the words '**RADIOACTIVE WASTE**' in black. The *Radiation Safety Act 1999* contains requirements for the management of radioactive substances.



The lid of the secondary container should be capable of being secured once the waste has been deposited. Once sealed, neither the primary nor secondary container should be opened on-site, unless for the purposes of conducting a waste assessment or audit.

5. Transportation

5.1 Internal/on-site movement

Internal or on-site movement is the movement of containerised clinical or related waste from its source to the storage, treatment or collection point. Waste should be moved around premises in rigid-walled, puncture resistant containers. A rigid-walled container is one that has hard, unbending sides and is resistant to splitting, breaking and puncturing.

The container must not allow liquids to leak or soak through. A mobile garbage bin is an example of a rigid-walled container suitable for the transportation of clinical or related waste. The movement of loose waste or waste carried in plastic bags should be avoided or, where necessary, limited to short distances, light waste loads and low risk wastes.

Good waste management practice involves minimising exposure to the waste. To facilitate this, all movement of wastes throughout the premises should be planned to avoid peak activity times, such as visiting hours, meal times and change of shifts.

Clinical or related wastes should not be moved through public areas or general staff thoroughfares.

Trolleys and bins should not be overfilled, to avoid potential spillage.

The practice of double-bagging waste should be carefully considered before it is used. Double-bagging means using two bags to contain one waste load. It potentially doubles the thickness of the plastic skin and gives added strength.

Double-bagging may be used in situations where heavy loads of waste are moved from generation areas to bins. However, care must be taken when placing a bag containing waste into an empty bag so that the contents are not spilled, or staff do not come in contact with the waste. The risks associated with this double handling may reduce

the value of double-bagging.

A summary of the recommendations for **on-site** movement of clinical waste include³:

- move waste in rigid-walled, leak-proof, puncture resistant containers
- avoid moving waste in plastic bags
- do not use waste disposal chutes
- minimise exposure to waste (e.g. avoid moving waste during visiting hours and meal times, or through public areas)
- avoid overfilling containers.

5.2 Waste disposal chutes

Many facilities are equipped with waste disposal chutes. These are generally hollow steel tunnels that allow movement of waste bags from waste generating areas to a collection point.

Waste chutes must not be used for moving clinical or related wastes because of the risk of the bag breaking and waste spilling. In such instances, staff collecting the waste at the bottom of the chute can run the risk of unnecessary exposure to infection. It is also likely that the waste chute may become contaminated.

5.3 Off-site transportation

Transporting wastes from a generating premise to a storage, treatment or disposal facility away from the premises is off-site transportation.

If clinical or related waste is transported on a commercial basis (i.e. for fee or reward) or in loads of than 250kg or more, an environmental authority is required under the *Environmental Protection Act 1994*. The transport of clinical waste triggers record keeping and reporting requirements. This is a requirement regardless of whether the waste is being transported by the person who generated the waste or by a commercial operator.

Even if a vehicle does not require licensing to undertake the activity, certain requirements are to be met to provide safe transportation of clinical or related waste.

All waste must be transported in rigid-walled, puncture resistant containers. The container used must have a lid that is capable of being secured during transportation. Plastic bags alone may not be strong enough to ensure the safe handling and transportation of these wastes.

It is important to ensure that any reusable containers are in good condition and are not split, cracked or damaged in any way.

It is preferable that any vehicle used for the transportation of clinical or related waste should be used solely for that purpose. The transport vehicle should be designed to protect the driver, public and environment from contact with the waste during transportation and in the event of an accident. The driver area should be separated from the waste transport area to minimise risk of exposure.

The vehicle should be easy to load, unload and clean.

The waste transport compartment should be fitted with container restraints or a method of securing containers. Restraining containers during transportation will ensure that containers do not fall during transporting and create risk of contact when unloading. It also prevents containers from being damaged.

A summary of the recommendations for moving waste **off-site** include:

- transport waste in rigid-walled, leak-proof, puncture resistant containers
- do not use plastic bags
- fit secure lids to containers
- ensure reusable containers are in good condition
- preferably use vehicles kept solely for transporting clinical waste
- keep the driver's area segregated
- use a vehicle that is easy to load and clean, and is fitted with a method of securing containers, to prevent containers falling in transit.

³ Note that some of these recommendations must be implemented as required by law.

6. Treatment and disposal

All clinical or related waste must be treated prior to disposal to landfill, except clinical waste that has been generated in a scheduled area. Untreated clinical waste generated in a scheduled area⁴ may be disposed of to landfill in that area, under supervised burial conditions.

Clinical or related waste can be treated by one of the following methods:

- incineration
- autoclaving and shredding
- chemical disinfection using hypochlorite, and shredding
- chemical disinfection using peroxide and lime, and shredding; or
- microwave disinfection and shredding.

Compaction is not a treatment mechanism. Compaction may be used to reduce the volume of waste held in storage prior to treatment or disposal. Compaction of human body parts, animal carcasses, cytotoxic waste, chemical waste, radioactive waste, pharmaceutical waste and sharps is not considered appropriate.

Landfill is a disposal mechanism.

Chemical waste such as formaldehyde and glutaraldehyde must be treated appropriately before being disposed of in landfill. Some chemicals are suitable for incineration, while others will need to be neutralised or fixed so that they cannot leach into the environment. An approved regulated waste treatment company will need to be engaged to perform these services.

Cytotoxic waste must be treated before it can be disposed of in landfill. Because of the potential risk associated with exposure to cytotoxic waste, the only appropriate treatment method that can currently be used is incineration.

Human body parts must be incinerated or treated by chemical disinfection processes using hydrogen peroxide and lime, and shredded before disposal to landfill. Hypochlorite, lime and bentonite are used to render the waste non-infectious, followed by a shredding process which makes the waste unrecognisable. Other treatment technologies such as autoclaving and chemical disinfection alone are not currently acceptable methods for treating human body parts.

Pharmaceutical waste must be incinerated before disposing to landfill.

Radioactive waste must be managed under the requirements of the *Radiation Safety Act 1999*. Under that Act, a person must not dispose of radioactive material unless⁵:

- the concentration or activity of a radionuclide in the material is not more than the maximum concentration or activity prescribed under a regulation; or
- the person is the holder of an approval to dispose of the material and disposes of it as required under the approval.

Part 5B of the WRR Reg outlines the treatment and disposal methods that must be used for the various categories of clinical or related wastes (see Table 2 below).

Table 2: Treatment and disposal methods (Schedule 7B of the WRR Reg)

Waste type	Incineration	Autoclaving and shredding	Chemical disinfection using hypochlorite and shredding	Chemical disinfection using peroxide, lime and shredding	Microwave and shredding	Compaction	Landfill
Chemical	✓ (if licensed)	✗	✗	✗	✗	✗	✗
Cytotoxic	✓	✗	✗	✗	✗	✗	✗
Human body parts	✓	✗	✗	✓	✗	✗	✗

⁴ Refer to section 6.3 for further information on scheduled areas.

⁵ *Radiation Safety Act 1999*, s. 26.

Waste type	Incineration	Autoclaving and shredding	Chemical disinfection using hypochlorite and shredding	Chemical disinfection using peroxide, lime and shredding	Microwave and shredding	Compaction	Landfill
Pharmaceutical	✓	✗	✗	✗	✗	✗	✗
Radioactive	✗	✗	✗	✗	✗	✗	✗
Treated clinical	-	-	-	-	-	✓	✓
Untreated clinical	✓	✓	✓	✓	✓	✓ other than animal carcasses and sharps	✗ other than in a scheduled area

This part of the *Waste Reduction and Recycling Act 2011* can be amended as new treatment options become available and are proven effective. Each method is described in greater detail to provide clinical or related waste generators with the necessary information to accurately assess the suitability of the treatment mechanisms available to them.

Any method used for the treatment of clinical or related waste in Queensland:

- should render the waste non-infectious
- should render the waste unrecognisable
- should achieve a significant volume and mass reduction
- must not result in unacceptable levels of hazardous or toxic by-products
- must be environmentally acceptable
- must be verifiable for the treated wastes
- must have automatic controls and fail-safe mechanisms built in; and
- must ensure the waste cannot bypass the treatment process.

Clinical and related wastes that have been treated through a registered treatment process to render them non-infectious and unrecognisable may be landfilled as limited regulated waste.

6.1 Treatment methods

Incineration

Incineration must be used for cytotoxic wastes and pharmaceutical wastes. This process is also suitable for the treatment of human body parts and clinical waste and, in some circumstances, may also be suitable for the destruction of chemical wastes. Incineration must not be used for the destruction of radioactive wastes.

Incineration involves the high temperature (thermal) destruction of wastes. Strict controls are placed on the operation of clinical or related waste incinerators to ensure that there is minimal environmental impact from their use. The process renders the waste unrecognisable. However, the resultant ash requires disposal at a regulated waste disposal facility.

The type of waste incinerator most suited to the destruction of clinical or related wastes is one that consists of both a primary and a secondary chamber, with appropriate air emission controls.

In order to achieve destruction of cytotoxic wastes, the incineration process must be capable of reaching a temperature of at least 1100°C in the secondary chamber, with a retention time of at least one second.

Incinerators that accept cytotoxic waste and pharmaceutical wastes must hold a development approval and environmental authority for environmentally relevant activity (ERA) 61(3)(b). A facility that holds a development approval and environmental authority for ERA 61(3)(a) is also able to accept clinical waste.

Incineration processes that are capable of reaching 900°C in the primary chamber are suitable for the treatment of clinical wastes, but must not be used for cytotoxic wastes. These incinerators may also be referred to as Class 3 incinerators. Incinerators that accept clinical wastes only (not cytotoxic, human body parts or pharmaceutical waste) must hold a development approval and environmental authority for ERA 61 and be registered with the administering authority.

Autoclave (steam sterilisation)

The autoclave process is suitable for the treatment of clinical wastes (excluding animal carcasses). It is currently not an acceptable practice for the treatment of cytotoxic wastes, chemical wastes, radioactive wastes, pharmaceutical wastes or human body parts.

In order to treat clinical waste effectively, the autoclave process relies on the time/temperature/pressure relationship. Full penetration of the waste load is required to achieve effective treatment. Autoclaves for the treatment of clinical wastes differ from those used for sterilising equipment.

Autoclaves suitable for the treatment of clinical wastes must be capable of reaching a minimum temperature of 140°C for a minimum period of 30 minutes. The minimum temperature **must** be achieved throughout the entire waste load in the chamber for treatment, prior to the commencement of the 30-minute period. Due to difficulty in the steam penetrating sharps and to promote effective treatment, sharps must be treated for 40 minutes in order for the process to be effective.

As the autoclave process does not render the waste totally unrecognisable, it must be used in conjunction with a shredding process. Shredding may be undertaken before or after autoclaving. If the waste is shredded prior to treatment, the system should be fully enclosed to ensure worker exposure to aerosols and waste is minimised. Integrity of sharps containers is not maintained during the autoclave process, so shredding should be used to render the sharps unable to puncture or penetrate the skin.

A development approval and environmental authority is required for ERA 61(3) for autoclaves receiving and treating regulated wastes.

Chemical disinfection (sodium hypochlorite and shredding)

This form of chemical disinfection process uses hypochlorite and shredding. Currently, this chemical disinfection process is only suitable to treat clinical waste (excluding animal carcasses). The process must not be used for the treatment of cytotoxic wastes, pharmaceutical wastes, radioactive wastes, human body parts or chemical wastes.

The process should be fully automated with sensors preventing the operation of the equipment if parameters fall outside the predetermined limits of operation (e.g. chemical dosage, contact time, etc.). Through a series of stages, the waste is to be shredded and soaked in disinfectant fluid, with greater than 15 minutes contact time. Once de-watered the waste can be disposed to landfill as limited regulated waste (meaning it can be disposed of to a general waste landfill without the landfill requiring a regulated waste disposal facility approval).

Any chemical disinfection system must hold a development approval and environmental authority for an ERA 58 for receiving and treating regulated wastes. Other chemical treatment processes are available. One treatment system involves shredding and the use of a chemical known as Stericid. The process involves the simultaneous shredding and chemical (cold process) disinfection of clinical waste to render it suitable for disposal as limited regulated waste. The process is suitable for the treatment of clinical waste (excluding animal carcasses). It must not be used to treat human body parts, cytotoxic wastes, pharmaceutical wastes, radioactive wastes or chemical wastes.

Chemical disinfection (hydrogen peroxide, lime and shredding)

This chemical disinfection system is suitable for the treatment of clinical wastes and human body parts. It must not be used for the treatment of cytotoxic wastes, pharmaceutical wastes, radioactive wastes or chemical wastes.

This system is to be a fully automated process involving simultaneous shredding and hydrogen peroxide spraying of the waste. The spraying of disinfectant while shredding serves to destroy any airborne pathogens that may be released during shredding. After passing through a screen, the shredded waste is mixed with burnt lime. Bentonite is added at the end of the treatment process to absorb excess liquid from the waste. Immediately prior to discharge onto a conveyor belt, sodium silicate is added to the waste. This reacts with the free lime to form calcium silicate (cement).

The treated material, resembling paper maché, must then be stored for at least 48 hours in order for the temperature of the waste to rise to at least 70°C to complete the waste treatment process. The waste can then be disposed of to landfill as limited regulated waste (meaning it can be disposed of to a general waste landfill without the landfill requiring approval as a regulated waste disposal facility).

A development approval and environmental authority is required for ERA 58 for any chemical disinfection system receiving and treating regulated wastes.

Microwave disinfection and shredding

The microwave disinfection process uses a combination of pre-heated steam and microwave radiation to treat the waste. The treated waste, once shredded, resembles saturated papier-mache.

Microwave disinfection is suitable for the treatment of clinical waste (excluding animal carcasses). It must not be used for the treatment of cytotoxic waste, pharmaceutical waste, radioactive wastes, chemical waste or human body parts.

A development approval and environmental authority is required for ERA 61(3) for any microwave disinfection system receiving and treating regulated wastes.

6.2 Disposal methods

Compaction

Compaction is a process that uses pressure to reduce the volume of the waste. The intention of allowing treated and untreated clinical waste to be compacted is to facilitate the storage of waste prior to treatment or disposal.

A compaction unit must have appropriate environmental controls such as HEPA (high efficiency performance apparatus) filters and leachate collection devices. Compaction must be undertaken as an automated, enclosed process, which does not allow waste to escape from the unit.

Compaction must not be used for sharps; human and animal body parts; or chemical, cytotoxic or radioactive wastes. A compaction unit that is used for compacting general wastes is not suitable for use with untreated clinical waste.

A compaction unit may only be used on-site at a registered treatment facility in order to facilitate the storage of wastes prior to treatment, or after treatment has been completed. A generating premise should not use compaction unless the appropriate controls are in place. Some premises that generate clinical waste use 'compression' devices to remove air from the waste bags without compacting the waste in the bags. This is an acceptable practice, provided it is undertaken within a purpose-made unit and air is not forced out of the bags using manual compression.

This practice is only acceptable for clinical waste bags and must not be used for cytotoxic, chemical or radioactive waste.

Landfill

Landfill disposal of chemical wastes, cytotoxic wastes, human body parts, pharmaceutical wastes and radioactive wastes is not permitted.

Clinical wastes that have been treated through a registered treatment process to render them safe and unrecognisable may be landfilled as limited regulated waste.

Supervised burial of untreated clinical waste

Clinical waste generated in a scheduled area⁶ can be disposed to landfill without treatment. However, the following criteria must be met:

- the waste must have been generated in a scheduled area in order to qualify for disposal in a scheduled area landfill. Clinical waste generated outside a scheduled area must not be transported into a scheduled area or disposed of in a landfill
- the waste must be disposed of under supervised burial conditions.

Untreated clinical waste can be disposed of to landfill in scheduled areas. These are local government areas listed in Schedule 4 of the Environmental Protection Regulation 2008. A general waste disposal facility located within a scheduled area is able to accept up to five tonnes of untreated clinical waste per year.

The following conditions apply to the supervised burial of untreated clinical wastes:

- a local government representative should supervise the immediate burial of the waste
- the waste should be deposited at the lowest edge of the landfill working face or excavation
- the waste should be covered immediately with at least one metre of solid general waste or clean fill

⁶ Refer to section 6.3 for further information on scheduled areas.

- any compaction should only be on the cover material—not on the clinical waste directly
- the clinical waste disposal area should be at least two metres from the proposed or design edge of the landfill
- the location of the deposited waste should be marked on the landfill site map
- clinical waste should be at least two metres below the final surface of the landfill or excavation—it should not be disposed of in the final lift of the landfill
- the name and address of the generating premise(s), and the amount and type of waste deposited should be recorded; and
- a copy of this information should be given to the person depositing the waste for their records.

6.3 Scheduled areas

The WRR Reg uses the term ‘scheduled area’ to identify local government areas that may not have easy access to clinical waste transport or treatment options and where clinical waste is not required to be treated before disposal to landfill. Untreated clinical waste may be disposed to landfill in these areas under supervised burial conditions.

Scheduled areas have been determined on the basis that their population is less than 5000 and they are categorised as remote or rural. However, there are exceptions where an area of larger population is surrounded by scheduled areas.

Premises in scheduled areas, although not required to treat clinical waste before landfill disposal, must still meet all other legislated requirements for managing clinical wastes.

Further information on disposing clinical waste in scheduled areas is in section 6.2 of this guideline. Clinical waste generated within local government areas which are not listed as scheduled areas must be treated before it can be disposed to landfill.

7. Sanitary hygiene waste management

Sanitary hygiene waste, for the purposes of this guideline, means disposable nappy and incontinence product waste and sanitary products including tampons and pads.

It is recommended that premises generating sanitary hygiene waste develop procedures for managing this type of waste which provide clear guidance and information on how to handle, store, transport and dispose of the waste. Large quantities of disposable nappies may cause offence to the public and waste disposal personnel. This should be considered when developing disposal procedures.

Correct waste classification and segregation at the source of generation will ensure that waste is properly managed.

For the purposes of management and disposal, sanitary hygiene waste from shopping centres, child care centres, family day care, public toilets, restaurants and other facilities whose primary function is not health care related, is not considered to be clinical waste or nightsoil. Also, sanitary hygiene waste, when sourced from aged care facilities and the geriatric and maternity care areas of hospitals, is not considered to be nightsoil.

Management practices

Sanitary hygiene waste from shopping centres, child care centres, family day care, public toilets, and restaurants and other facilities whose primary function is not health care related and from aged care facilities and the geriatric and maternity care areas of hospitals does not need to be managed as clinical waste and the following segregation and treatment practices do not apply.

Table 3 gives a summary of management practices for sanitary hygiene wastes. Further detail is provided in the sections below.

Table 3: Management practices for sanitary hygiene wastes

Waste classification	Source	Disposal	Development approval (DA) or environmental authority (EA)
General waste	General hospital ward areas, aged care facilities, child care centres, shopping centres, public toilets	Landfill (if accepted by the local government)	Not specifically for the sanitary hygiene waste, but an EA, and possibly DA, for the landfill

Waste classification	Source	Disposal	Development approval (DA) or environmental authority (EA)
Clinical waste	Isolation ward or persons known to have an infectious disease	Treatment at an approved facility prior to landfill disposal OR Supervised burial in a landfill in a scheduled area	DA and EA required for treatment and disposal. If buried in a scheduled area an EA, and possibly a DA, will be required for the landfill
Cytotoxic waste	Persons receiving cancer chemotherapy	High temperature incineration	DA and EA required

Segregation

The source of sanitary hygiene waste determines the type of treatment required before it can be disposed to landfill. Sanitary hygiene waste should be segregated on the following basis:

- if it comes from a person who is known to have an infectious disease (e.g. from an isolation area) or if it is saturated with, or containing free-flowing blood or other body fluids, must be segregated and managed as a clinical waste
- if it comes from a person who is receiving cytotoxic drugs, it must be segregated and managed as a cytotoxic waste
- if it comes from neither of the above, it can be segregated and managed as general waste.

Treatment

If sanitary hygiene waste is classified as clinical waste, it must be treated in an approved facility either by incineration, autoclave, chemical disinfection, or microwave options prior to landfill disposal. If the waste is generated in a scheduled area, it need not be treated but can be disposed directly to landfill through supervised burial.

If the waste is classified as cytotoxic, it must be incinerated in an approved facility before it is disposed to landfill.

If the waste is classified as general waste, it does not require any special treatment prior to disposal.

Storage

Sanitary waste classified as clinical waste or cytotoxic waste must be stored in an area that is not accessible to animals or unauthorised persons. The facility must ensure that the storage of sanitary hygiene waste, whether classified as general waste or clinical waste, does not create an environmental nuisance (e.g. odour).

Transport

Used sanitary items are not considered regulated waste for the purposes of the *Environmental Protection Act 1994*, with the exception of incontinence product waste that is sourced from a person:

- receiving cytotoxic drug treatment; or
- known to have an infectious disease.

A person transporting only sanitary hygiene waste that is classified as general waste is not required to hold an environmental authority to undertake this activity.

Disposal

If the waste is classified as general waste, it can be disposed of to landfill without prior treatment. However, advice should be sought from the local government in whose landfill the waste is proposed to be disposed regarding whether or not the local government will accept the waste.

A local government may choose to refuse to accept wastes into its landfills irrespective of the definitions, classification and management guidance contained in this information sheet.

Sanitary hygiene waste classified as clinical waste can be disposed to landfill if it has been treated in an approved facility. However, untreated clinical sanitary hygiene waste generated in a scheduled area can be disposed to landfill through supervised burial.

8. Pharmaceutical and cytotoxic waste management

Pharmaceutical waste

Pharmaceutical waste does not include empty capsules, empty bottles (containing no liquid) or uncontaminated wrapping (packaging boxes and empty blister packs) or pill cups that have been used to dispense patient medications. This waste may be disposed of as general waste. Ampoules should be disposed of as sharps waste.

High temperature incineration (ERA 61(3)(a)) is currently the only option that can be used for the treatment of pharmaceutical waste. The incineration process renders the waste inactive and unrecognisable.

Antibiotics (i.e. S4 substances) must not be disposed to sewer or landfill to avoid unnecessary additional environmental exposure to the development of resistance forming organisms.

Intravenous solutions containing glucose, saline solutions, liquid food preparations and electrolytes may be disposed to sewer (under a Trade Waste Agreement where applicable), with the IV bags and tubing then being able to be disposed of as general waste.

Figure 1 outlines the recommended disposal methods for pharmaceutical wastes and other products that people may take but which are not defined as pharmaceutical products under this Regulation.

Pharmaceutical waste may be stored for an extended period and removed as required, provided no environmental nuisance or risk is created through this storage.

Cytotoxic waste

Cytotoxic drugs are substances used predominantly in chemotherapy and are capable of impairing, injuring or killing cells. They are the most hazardous of the pharmaceutical substances and must be handled using special precautions.

Cytotoxic material should not come into contact with normal living cells. Clinical manifestations of toxicity may not become evident for a period of time, as much as 10 years in some cases.

All waste generated as a result of the use of cytotoxic drugs should be handled in the same manner as the drugs themselves.

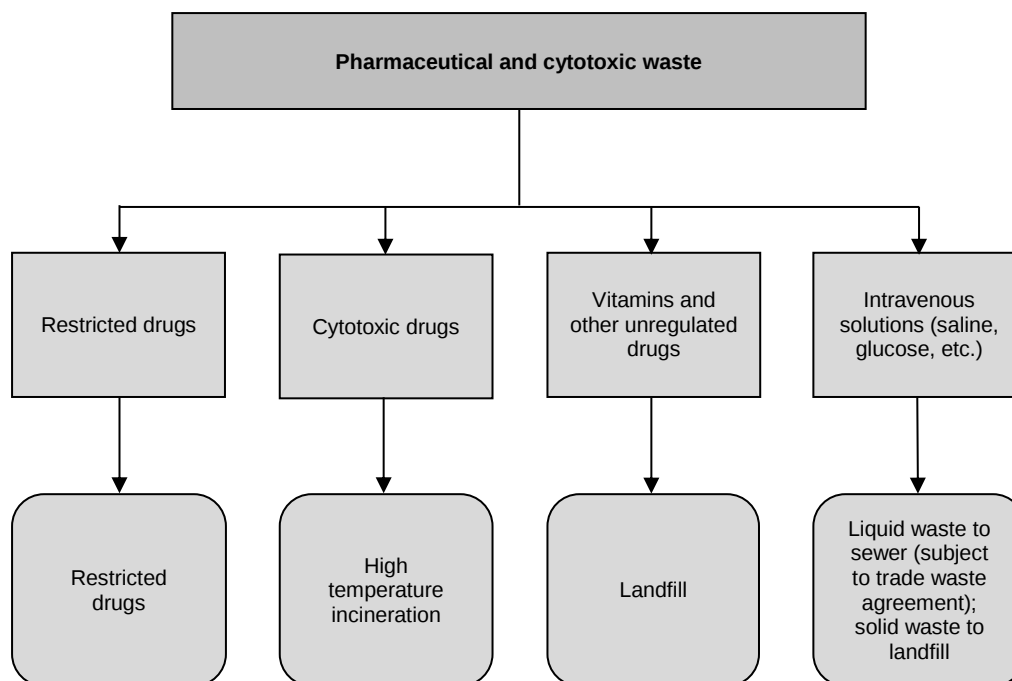
Cytotoxic waste must be disposed of into purple bags and containers, so that they are readily identifiable.

Cytotoxic waste may be stored for extended periods of time, provided all precautions are taken to ensure that there is no environmental nuisance or risk created through the storage of this material.

Unused or part-used pharmaceutical or cytotoxic drugs should be taken back to the pharmacy, hospital or veterinary clinic that dispensed the drugs if they have a 'take-back' policy. Where possible, such a system should be used, to ensure that these drugs are managed appropriately to minimise risk to the environment and to human health.

Tubing and dressings generated in the home as a result of treatment with cytotoxic drugs are not clinical or related waste and therefore do not have to be treated before disposal to landfill. They may be disposed of into the household waste bin. However, they should be bagged first so that the waste is confined to this bag and cannot spread throughout the bin.

Sharps that are generated in the home must be disposed of into a rigid-walled, puncture resistant container. Containers full of sharps may also be placed into the household waste bin. However, people disposing of sharps in this manner should check with the local council, hospitals, pharmacies or home health care agencies to see whether they will 'take back' containerised sharps. This system should be used in preference to disposal into the household bin.

Figure 1: Decision flowchart for the segregation and treatment of pharmaceutical and cytotoxic waste

9. Definitions

Clinical waste is as defined in Schedule 9 of the WRR Reg, meaning waste that has the potential to cause disease including, for example, the following—animal waste, discarded sharps, human tissue waste and laboratory waste.

Cytotoxic drug means a drug known to have carcinogenic, mutagenic or teratogenic potential.

Cytotoxic waste means waste that is contaminated by a cytotoxic drug.

Infectious agent means an organism, including a micro-organism or worm that causes disease or another adverse health impact in humans. When used under the provisions of the WRR Reg relating to clinical or related waste, the term infectious agent includes organisms that cause notifiable diseases⁷, controlled notifiable diseases or infectious animal diseases⁸, including the following:

- Amoebiasis
- Anthrax
- Australian lyssavirus (including bat lyssavirus)
- Avian influenza virus
- Bovine spongiform encephalopathy (mad cow disease)
- Brucellosis (due to *Brucella abortus* or *B. melitensis*)
- Cholera
- Colibacillosis
- Dermatophilosis
- Diphtheria
- Encephalitis
- Food poisoning in two or more associated cases, caused by:
 - Camphylobacter infection
 - E.coli infection
 - Shigella infection
 - Yersiniosis infection
- Giardia infection
- Haemophilus influenzae
- Hepatitis (A; B; C; non-A; non-B)
- Human Immunodeficiency Virus
- Legionellosis
- Leprosy
- Malaria
- Measles
- Meningitis
 - Aseptic
 - Haemophilus
 - Meningococcal
 - Other
- Mumps
- Newcastle disease
- Pertussis
- Poliomyelitis
- Rubella
- Psittacosis
- Rat bite fever

⁷ A full list of notifiable and controlled notifiable diseases can be found in the Health Regulation 1996 (Qld).

⁸ A full list of infectious diseases in animals can be found in the Exotic Diseases in Animals Regulation 1998 (Qld).

- Scarlet fever
- Smallpox
- Staphylococcal infection
- Streptococcal infection
- Syphilis
- Ringworm
- Toxoplasmosis
- Tuberculosis (all forms)
- Typhoid
- Typhus (all forms)
- Yellow fever

log10kill=4 means a 4 decade reduction or a 0.0001 survival probability in a microbial population.

log10kill=6 means a 6 decade reduction or a 0.000001 survival probability in a microbial population.

Non-infectious, for waste, means the waste:

- (b) has a log10kill=4 for bacterial spores; and
- (c) has a log10kill=6 for vegetative bacteria.

Pharmaceutical product means a restricted drug under the Health (Drugs and Poisons) Regulation 1996.

Pharmaceutical waste is as defined in Schedule 9 of the WRR Reg, meaning waste arising from:

- (a) pharmaceutical products that have passed their recommended shelf life
- (b) pharmaceutical products discarded due to off-specification batches or contaminated packaging
- (c) pharmaceutical products returned by patients or discarded by the public
- (d) pharmaceutical products no longer required by the public; and
- (e) waste generated during the manufacture of pharmaceutical products.

Radioactive material is as defined in Schedule 2 of the *Radiation Safety Act 1999*, meaning material that spontaneously emits ionising radiation as a result of the radioactive decay of a radionuclide in it, but does not include a mineral within the meaning of the *Mineral Resources Act 1989* situated within the boundaries of land the subject of a mining lease, mineral development licence or exploration permit within the meaning of that Act.

Radioactive substance is as defined in Schedule 2 of the *Radiation Safety Act 1999*, meaning radioactive material (whether or not it is sealed):

- (a) containing more than the concentration or activity of a radionuclide prescribed under a regulation; or
- (b) prescribed under a regulation to be a radioactive substance.

Radioactive waste means waste that is contaminated with a radioactive substance.

Related waste means waste that constitutes, or is contaminated with, chemicals, cytotoxic drugs, human body parts, pharmaceutical products or radioactive substances.

Restricted drug under the Health (Drugs and Poisons) Regulation 1996 means an S4 substance.

Scheduled area has the meaning in section 15 of the Environmental Protection Regulation 2008. A list of scheduled areas is provided in Appendix A of this guideline.

Segregation means the practice of categorising and separating wastes, at the point of generation, into various waste streams to allow appropriate storage, transport, treatment or disposal.

Treated waste means waste that has undergone processing through one of the methods listed in schedule 5 of the Regulation (excluding compaction and landfill, which are not treatment methods).

Unrecognisable means that the form of the waste has been changed through a mechanical or chemical process so that its original form cannot be determined. A process such as double-bagging does not render the waste unrecognisable as the waste is still in its original form.

Untreated clinical waste includes clinical waste that has only been partly treated.

10. Further information

If you transport, store, treat or dispose of clinical or related waste you may be required to obtain an environmental authority and a development approval⁹ (depending on the nature of the activity). Please refer to the Business and Industry Portal at www.business.qld.gov.au for more information.

⁹ Development approvals and environmental authorities are legally binding documents that outline the holder's commitment to protect the environment and the department's approval of activities operating in an acceptable environmental manner.

Advice and support are also available by visiting the department's website at www.ehp.qld.gov.au or by contacting 13 QGOV (13 74 68).

Other supporting information can be obtained at:

Australian Code for the Transport of Dangerous Goods by Road or Rail (Edition 7.3, August 2014, or most recent version). Commonwealth of Australia.

Australian Standard AS 4031:1992/Amdt 1-1996. Non-reusable containers for the collection of sharp medical items used in health care areas.

Australian Standard AS/NZS 3816:1998. Management of Clinical and related Wastes. <www.standards.org.au>

Australian/New Zealand Standard AS/NZS 4261:1994/Amdt 1:1997. Reusable containers for the collection of sharp items used in human and animal medical applications.

Waste Management Association of Australia (2014) Industry Code of Practice for the Management of Biohazardous Waste (including Clinical & Related wastes).

HB 202-2000. A management system for clinical and related wastes – Guide to application of AS/NZS 3816:1998, Management of clinical and related wastes.

NHMRC (2010) Australian Guidelines for the Prevention and Control of Infection in Healthcare. Commonwealth of Australia.

This guideline replaces previous information documents produced by the department including:

- Guideline: Waste management, *Managing clinical or related waste in scheduled areas* (EM1243)
- Information sheet: Environmental Protection Regulation, *Clinical or related waste management* (EM1244)
- Information sheet: Waste management, *Storage and transport of clinical or related waste* (EM1246)
- Information sheet: Waste management, *Clinical or related waste treatment and disposal* (EM1247)
- Information sheet: Waste management, *Managing sanitary hygiene waste* (EM1248)
- Information sheet: Waste management, *Determining whether waste is 'clinical waste'* (EM1249)
- Information sheet: Waste management, *Defining clinical waste* (EM1250)
- Information sheet: Waste management, *Pharmaceutical and cytotoxic waste management* (EM2976)

Appendix A

The following areas are listed as scheduled areas in Schedule 4 of the Environmental Protection Regulation 2008 (Qld) as at March 2015.

1	Aurukun shire	43	the part of the local government area of Banana Shire Council that was, immediately before 15 March 2008, the part of the local government area of Taroom Shire Council
2	Balonne shire		
3	Barcaldine region		
4	Barcoo shire	44	the part of the local government area of Bundaberg Regional Council that was, immediately before 15 March 2008, the local government area of Kolan Shire Council
5	Blackall Tambo region		
6	Boulia shire		
7	Bulloo shire		
8	Burke shire	45	the parts of the local government area of Central Highlands Regional Council that were, immediately before 15 March 2008, the local government areas of Bauhinia Shire Council and Peak Downs Shire Council
9	Carpentaria shire		
10	Cherbourg shire		
11	Cloncurry shire		
12	Cook shire	46	the part of the local government area of Charters Regional Council that was, immediately before 15 March 2008, the local government area of Dalrymple Shire Council
13	Croydon shire		
15	Diamantina shire		
16	Doomadgee shire	47	the parts of the local government area of Fraser Coast Regional Council that were, immediately before 15 March 2008, the local government area of Woocoo Shire Council and part of the local government area of Tiaro Shire Council
17	Etheridge shire		
18	Flinders shire		
19	Goondiwindi region		
20	Hope Vale shire		
21	Kowanyama shire	48	the parts of the local government area of Gympie Regional Council that were, immediately before 15 March 2008, the local government area of Kilkivan Shire Council and part of the local government area of Tiaro Shire Council
22	Lockhart River shire		
23	Longreach region		
24	Mapoon shire		
24A	Maranoa region		
25	McKinlay shire	49	the part of the local government area of Isaac Regional Council that was, immediately before 15 March 2008, the local government area of Nebo Shire Council
26	Mornington shire		
27	Mount Isa city		
28	Murweh shire		
29	Napranum shire	50	the part of the local government area of Rockhampton Regional Council that was, immediately before 15 March 2008, the local government area of Mount Morgan Shire Council
30	North Burnett region		
31	Northern Peninsula Area region		
32	Paroo shire		
33	Pormpuraaw shire	51	the part of the local government area of Somerset Regional Council that was, immediately before 15 March 2008, the local government area of Kilcoy Shire Council
34	Quilpie shire		
35	Richmond shire		
37	Torres shire	52	the parts of the local government area of South Burnett Regional Council that were, immediately before 15 March 2008, the local government areas of Murgon Shire Council and Wondai Shire Council
38	Torres Strait Island region		
38A	Western Downs region		
39	Winton shire		
40	Woorabinda shire	53	the parts of the local government area of Toowoomba Regional Council that were, immediately before 15 March 2008, the local government areas of Cambooya Shire Council, Clifton Shire Council, Millmerran Shire Council and Pittsworth Shire Council
41	Wujal Wujal shire		
42	Yarrabah shire		