



University of  
St Andrews

### Guidance on hazardous waste disposal and recycling of wastes

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# University of St Andrews

## University Guidance on Waste Recycling and Final Disposal of Hazardous Waste Materials

### 1. Introduction

The University disposes of a wide variety of items from domestic type waste, waste paper and packaging, redundant electronic equipment to hazardous chemicals and very low level radioactively contaminated items. It is therefore imperative that staff and students understand what can put in each waste stream and how each of the waste streams is managed. Appendix 1 shows the different waste streams used by this University and the complexity of waste disposal processes. It is vital that staff and students are aware that they must not put the wrong waste in the wrong waste stream as this would not comply with legislation and may cause our contractors to refuse that waste stream in the future.

It is vital that all staff and students understand that under the Scottish Government's Zero Waste Plan (see URL: [http://www.sepa.org.uk/waste/moving\\_towards\\_zero\\_waste.aspx](http://www.sepa.org.uk/waste/moving_towards_zero_waste.aspx)), the University must make all efforts to minimise waste production and minimise waste sent to landfill sites for final disposal. Staff and students should also be aware of the cost of waste disposal in terms of monetary value and cost to the environment to the University. It is therefore vital that all efforts are made by staff and students to minimise waste production by recycling equipment and chemicals where at all possible. The aim of this document is to provide guidance on the minimisation of waste production and also where waste is produced to provide guidance on reasonably practicable safe disposal procedures.

The University has a Sustainable Development Strategy. The purpose of the Strategy is to reduce the University's sustainability impacts by influencing day-to-day working practices and by incorporating the principles of sustainable development into the longer-term plans of the University. Details of this strategy can be found at <http://www.st-andrews.ac.uk/environment/SDStrategy/>

### 2. Legislation

Environment protection is a devolved responsibility thus since 2000, environmental protection legislation is produced by the Scottish Parliament and may be different compared to England and Wales. Most of the legislation is comparable at present but there are some differences and thus workers should be aware of the potentially different legal requirements in Scotland and England & Wales. This is of particular importance where waste has to be transferred between Scotland and England or Wales.

There is a wide variety of environmental legislation relating to the control of waste disposal. Some of the more relevant pieces legislation include:

1. **Environmental Protection Act 1990** - This is the over-arching Act of Parliament controlling waste disposal
2. **Environmental, Authorisations (Scotland) Regulations 2018** This controls the ability to hold and dispose of radioactive materials
3. **Environment Act 1995** - Which sets up and provides the remit for the Environment Agency in England and Wales and the Scottish Environment Protection Agency (SEPA) in Scotland;

4. **Pollution Prevention and Control (Scotland) Regulations 2000** - This requires all producers to consider waste generated by their operation and devise procedures which will minimise waste production.
5. **The Environmental Protection (Disposal of Polychlorinated Biphenyls and other Dangerous Substances)(Scotland) Regulations 2000** - This controls the way PCBs are disposed.
6. **The Special Waste Amendment (Scotland) Regulations 2004** - This piece of legislation regulates the disposal of hazardous agents/chemicals and enacts the European Hazardous Waste Directive (91/689/EC)
7. **Waste Electrical and Electronic Equipment Regulations 2006 as amended in 2009** - This requires producers and users of electrical equipment to recycle as much as practicable of waste electronic equipment
8. **The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2008 as amended in 2009** - This restricts the chemicals which can be used in electronic equipment to ensure that there is minimal risk when equipment is disposed or recycled.
9. **The Waste Batteries (Scotland) Regulations 2009** - This controls the disposal of batteries, particularly 12V Lead-Acid car batteries
10. **The Fluorinated Greenhouse Gases Regulations 2009 and The Environmental Protection (Controls on Ozone-Depleting Substances) Regulations 2011** - These regulations limit the ability to use certain ozone depleting chemical gases in certain applications eg CFC refrigerant gases in fridges and freezers, production of Halon gas fire extinguishers
11. **Waste (Scotland) Regulations 2012** - This legislation controls the waste uplift and disposal of domestic / household types of waste. It also requires all businesses to separate paper and card, plastic, metal and glass for recycling by January 2014

This is only a very small sample of environmental legislation which applies when trying to dispose of waste from the University.

To ensure that all the legal requirements are being complied with in respect to waste disposal, it is necessary to get a 'Duty of Care' pack from a waste disposal company with all the necessary licences, Certificates and permits to dispose of the relevant waste as well as Standard Operating Procedures for the handling and storage of waste **PROIR** to a company being allowed to uplift waste from the University.

It is **vital** that research staff notify and organise hazardous chemical, biological and radiological waste uplifts through the Director of EHSS who will ensure all legal requirements are met. Researchers should not try to find a waste disposal company themselves without having all the necessary knowledge on the legal requirements for the disposal of specific types of waste

If you are unsure if any of the above legislation applies to you or if you are unsure if there is legislation which may apply to your work, it is very important that you contact the Environment Team at Estates prior to starting the work or if it contains hazardous

chemical, biological and radioactive waste **ONLY** then you should contact Environmental, Health and Safety Services (EHSS)

### 3. University Organisation for Managing Waste Recycling and Final Disposal

The University manages waste in the following manner:

- **Environment Team at Estates** - The Environment team at Estates will ensure
  - waste paper, cans and plastic bottles are recycled,
  - domestic type waste is disposed,
  - waste electrical equipment is correctly disposed,
  - recycling of waste furniture,
  - recycling or disposal of fridges and freezers,
  - recycling of batteries,
- **Director of Environmental, Health and Safety Services** - EHSS will be responsible for ensure the safe disposal of:
  - Hazardous chemicals;
  - Biological agents;
  - Radioactive waste

Appendix 1 shows the outline of the different waste streams used by this University. Further guidance on waste disposal procedures in the next sections of this guidance.

### 4. Domestic Waste

Domestic waste is non-recyclable non-sharp, non-glass waste. This includes:

- Plastic materials
- Paper towels or tissues
- Paper cups or cartons
- 'Jiffy' bags with plastic filling
- Books

This waste is removed by Fife Council as 'Commercial Waste' under the relevant legislation

Domestic waste bins will have either black plastic bin liners or clear bins liners. The Estates or Residential and Business Services cleaners will empty these bins on a daily basis.

**NOTE: Under no circumstance should anything sharp (eg needles or broken glass) or any hazardous chemicals/biological materials be put in such a waste bin.** If any such waste is found in a 'Domestic Waste' bin then the cleaners will not remove any waste from that bin.

If non domestic type waste is found in this waste stream by Fife Council they have the right to refuse to uplift such waste from the University. This would require the University to employ specialised contractors at a significant extra cost. It is therefore vital that staff and students are aware that they must not put items not on the above list in this waste stream

## 5. Furniture Waste

When new furniture is bought or Schools / Units move, waste furniture is produced. Such furniture is a significant fire risk as it provides a large fuel load for a fire. It is therefore vital that such furniture is removed quickly from a School / Unit or stored in a safe fire resistant facility. Estates run a furniture recycling arrangement, details of which are available at:

<http://www.st-andrews.ac.uk/staff/tech/estates/waste/Furnitureexchange/>

Waste or furniture in the process of being removed must not be stored in Protected Fire Escape routes (these are routes which lead directly to the outside the building through main or fire exit doors). It is always tempting to store such furniture in stairwells etc. This must **NOT** be done as it poses a risk of fire in the main protected escape route for people above ground floors.

Estates should be notified as soon as practicable that there is waste furniture in the School/Unit and then they will arrange an uplift of the waste. The furniture will then be uplifted by Fife Council for final disposal (It should be noted that there is a significant cost for such disposal) or uplift it in a University vehicle and taken to an appropriate storage site for recycling.

**NOTE** There will be cost for Fife Council to uplift it and Schools/Unit should check this before asking for the items to be removed.

## 6. Recyclable Waste

The University is trying to reduce the amount of waste it sends to a landfill site for good environmental reasons (and also for financial reasons) as much of the items mentioned below can be recycled for financial gain to the University. Some waste can be taken for recycling or for further processing for re use eg food waste can be composted and then re-used as compost for agricultural or horticultural purposes.

The following waste should be put in the appropriate recycling containers:

- Paper;
- Plastic Bottles;
- Metal cans;
- Batteries
- Waste Food bins

### 6.1 Recyclable Paper

All white and coloured paper should be put in the recyclable waste paper bins. Cleaners will empty this bins on a daily basis from the work place. New containers can be requested from Estates.

The following items must not be put in the recycling waste paper bins:

- Previously recycled paper;
- Paper items contaminated with chemicals, biological agents, food should be put in this bin;
- Paper items filled with non-paper items (eg 'Jiffy Bags' with plastic 'bubble wrap' inside);

- Non -paper items eg plastic cups, bubble wrap etc

**NOTE:** Please do not over fill the waste paper bins with heavy catalogues, books etc. These are difficult to lift and often the bag containing the items breaks. If you have a lot of heavy paper items, please contact Estates Environment Team and they will supply you with extra bags

## 6.2 Confidential Paper waste

If you are able to shred your confidential waste using a cross-cutting shredder then the paper can be placed in the usual paper recycling bins.

Any confidential material that you are unable to shred (e.g. too great a volume), can be dealt with using special confidential waste bags. Contact your Senior Janitor to receive these bags. Please then arrange an uplift by filling in an Estates maintenance request.

Please note that these bags should not be filled to the top, as they are then too heavy to carry. If you cannot lift the bag with one hand, it is too full, and the content should be divided between two or more bags.

If you would like to witness your waste being shredded, this can be arranged.

Please therefore ensure that the confidential waste bags are used for **CONFIDENTIAL MATERIAL ONLY**.

## 6.3 Waste Cardboard

Waste cardboard will be uplifted by the University Grounds Unit and will be sent for recycling. Such material should be left in an appropriate place in your building which does **NOT:**

- Blocks any corridors;
- not near any ignition sources;
- is not stored in a Protected Fire Escape route or other types of escape route

Estates should be notified of any waste cardboard that needs uplifting as soon as practicable so that the cardboard is not left lying around for any length of time as this poses a fire risk.

## 6.4 Recyclable Plastic Containers

Plastic bottles should be put in the labelled recyclable plastic bottle bins. These plastic containers should be washed out and the label removed prior to disposal. If you do not have such a waste plastic bottle bin, then one can be requested from Estates.

The recyclable waste plastic bottle bins should not be located in a place where they compromise fire safety. They must not be located in 'Protected Fire Escape Routes' and should not block any corridors (there should be a 1.2 metre gap around the container at all times). If such containers need to be located in a corridor and you are not sure if such a container compromises fire safety you should contact the Director of EHSS. Fire resistant containers may be used but this should be confirmed with the Director of EHSS

## 6.5 Recyclable Can Containers

Metal cans (eg soft drinks cans) should be put in the labelled recyclable metal cans bins. If you do not have such a waste plastic bottle bin, then one can be requested from Estates.

The recyclable waste aluminium can container bins should not be located in a place where they compromise fire safety. They must not be located in 'Protected Fire Escape Routes' and should not block any corridors (there should be a 1.2 metre gap around the container at all times). If such containers need to be located in a corridor and you are not sure if such a container compromises fire safety you should contact the Director of EHSS. Fire resistant waste containers may be used but this should be confirmed with the Director of EHSS

## 6.6 Recyclable Glass Waste

Normal glass (soda lime glass - amorphous glass) bottles (and broken glass) **except borosilicate glass** (eg pyrex or QuickFit type glass materials) can be put in the appropriate glass waste bin from Fife council (green glass in the green bin etc). These glass bottles will then be uplifted by Fife Council.

All glass bottles must be washed clean and all labels removed from the bottle. Fife Council will assume if there is a label still on the bottle that the label will describe to contents of the bottle. If the label shows a hazardous chemical and there is fluid in the bottle (even though this is water), Fife Council will assume the bottle contains the hazardous chemical. To protect Fife Council workers, the Council can (and have in the past) refused to uplift waste glass bottles because of this situation. It is therefore vital that all workers are aware that they **must**:

- **Thoroughly wash out all bottles;**
- **Remove all labels**

Pyrex and other borosilicate glass must be disposed of as ordinary waste and should not be put out as glass for recycling

Many companies will now uplift packaging including glass bottles from the University. Where this is feasible, all packaging should be sent back to to supplier for recycling. If you send back a glassbottle or plastic bottle, again it is vital that the bottle is washed clean and any labels removed.

## 6.7 Recycling Used Batteries

The University's Special Waste contractor will uplift batteries (small AA, AAA, small lithium, Li/Cd Ni/Cd batteries) free of charge for recycling. Special containers for holding such waste batteries can be obtained from Estates Environment Team or from Environmental, Health and Safety Services. When the container is full, the University Special Waste form ([http://www.st-andrews.ac.uk/media/Blank Lab Smallis List.xls](http://www.st-andrews.ac.uk/media/Blank_Lab_Smallis_List.xls) or Appendix 2) should be completed and sent to EHSS. (**Please NOTE: only typed forms will be accepted - No handwritten forms will be accepted**). The waste contractor will then uplift the batteries the next time they visit the University.

At present we do not have a recycling route for larger lithium batteries eg from Laptops etc or for 12V lead acid batteries.

## 7. Fridges and Freezers

As fridge freezers often contain ozone depleting CFCs which are now banned from use under specific legislation. As a consequence of this, all fridge freezers must have their refrigerant removed by a specialised contractor. All fridges and freezers should be disposed of through Estates who will arrange for an appropriate contractor to remove and dispose the refrigerant safely. Further details on this matter can be found at:

<http://www.st-andrews.ac.uk/staff/tech/estates/waste/ElectricalEquipment/>

**New Fridge Freezers** - If you are about to purchase a new fridge or freezer, please can you confirm with the supplier that the refrigerant being used complies with ozone depleting legislation. This will reduce the cost of the fridge/Freezer when it needs to be disposed.

## 8. Disposal of Waste Computers and Other Electrical Equipment

Please note that the University is now legally required to recycle all of its unwanted electrical items (no matter how small).

The procedure for recycling these items is detailed below:

To dispose of electrical items that are unsuitable for reuse (other than computer equipment), first fill in a Register of Appliances form found on the Estates Website at:

<http://www.st-andrews.ac.uk/staff/tech/estates/waste/ElectricalEquipment/>

Store this register along with the equipment. Please ensure that the equipment is stored in an area that is easily accessible for uplift. Then complete an Estates Works Request requesting the uplift of the

### 8.1 Computer equipment

How to deal with computer equipment that is unsuitable for reuse:

- a. Follow the procedures set out by IT Services to wipe your computer of all data. If you need help with this please call the IT Helpdesk on extension 3333 or email the [helpdesk@st-andrews.ac.uk](mailto:helpdesk@st-andrews.ac.uk).
- b. Save a copy of the Register of IT Equipment form and complete the table by detailing each item of equipment you are getting rid of (eg 1 monitor, 1 base unit, 1 keyboard, 1 mouse) along with contact details.
- c. Keep your completed register with your equipment.
- d. Store your equipment correctly:
  - Ensure the equipment is stored in a central location (inside) which is easily accessible for uplift (you may need janitorial assistance), and does not present a fire hazard.
  - Do not move equipment yourself without undertaking a manual handling risk assessment or without manual handling training.
  - Do not stack computers
  - Do not cut cables or plugs from your equipment
- e. Request an uplift for your equipment by completing a [Estates Works Request](#).





















- f. Estates will check that the equipment matches the information given on the Register of Equipment before uplift and will then take the equipment to a secure storage area. Wherever possible, the University will aim to put this equipment back into circulation.
- g. Once a full load (approx. 50 PCs) has been obtained, a contractor will uplift them for reuse or recycling. The contractor will issue a Waste Transfer Note (legal document) to Estates.
- h. There is currently **NO CHARGE** to individual schools and units for this service.

For further information see the full guidance document on the Estates website. If you have any queries, contact the Environment Team, Estates.

## 9. Hazardous Chemicals

### Introduction

Hazardous chemicals are defined as any chemical or preparation which has a chemical that requires to be labelled with hazard warning pictogram on the container under the Chemical (Hazard Information and Packaging for Supply) Regulations 2009 (CHIP 2009). This label can be either an orange label or a diamond label as shown below:

	E	Explosive	
	O	Oxidiser	
	F	Flammable	
	T	Toxic	
	Xi	Harmful	
	Xn	Irritant	
	C	Corrosive	
	N	Dangerous to the environment	
		Gas cylinder	
		Long term Health risk eg respiratory sensitiser, carcinogen, teratogen etc	

Such hazardous chemicals will also have a safety data sheet which will give details of the compound/chemicals. In this Material Safety Data Sheet (MSDS), there will be a section which will give either a Risk Phrase (R plus a number) or a Hazard Phrase (H plus a number). This will define the type of hazards associated with the chemical. Details of such Risk Phrases and Hazard phrases are given in Appendix 3 (for Risk Phrases) and Appendix 4 (for Hazard Phrases).

Any chemicals with such a pictogram or with a Risk or Hazard phrase must be considered to be a hazardous agent and should be handled with care and disposed of with care and consideration to other workers and the environment.

### 9.1 HAZARD PHRASES

**PLEASE NOTE:** There are three systems used at the University which use something called a Hazard Phrase or Rating. They are very different and mean very different things and most importantly, they are **NOT** interchangeable as they mean different things. These are:

- **The University's internal Hazard Phrase for chemicals** which uses an alpha numeric system of 1 to 5 show degree of hazard (1 being lowest and 5 being highest) and a letter to show type of hazard eg T for Toxic, C for Carcinogenic, A for Irritant or Corrosive. Thus 5T= Highly Toxic

- **The Health and Safety Executive Risk Phrases or the European Hazard Phrase.** The 'Risk Phrase' was used in the UK under UK legislation. The system was under the management of the Health and Safety Executive. In this there are 68 risk types (see appendix 3). An example of this system is R25 = Toxic if swallowed. The 'Hazard Phrases' have now been implemented under European legislation. In this system, each chemical is given one or more hazard phrases to identify the hazards associated with it (see Appendix 4). This system is being managed by a European agency called the European Chemical Hazard Agency (ECHA). An example of such a hazard phrase is H301 = Toxic if swallowed
- **The Hazardous Waste Disposal Ratings** used by Scottish Environment Protection Agency / Environment Agency under the Special Waste disposal legislation (or hazardous waste disposal permit system in England and Wales). In this system the hazard Phrases means the following:
  - **H1 = Explosive:** Substances and preparations which may explode under the effect of flame or which are more sensitive to shocks or friction than di-nitrobenzene.
  - **H2 = Oxidizing:** Substances and preparations which exhibit highly exothermic reactions when in contact with other substances particularly flammable substances.
  - **H3A = Highly Flammable:** Liquid substances and preparations having a flash point below 21°C (including extremely flammable liquids)
  - **H3B = Flammable:** Liquid substances and preparations having a flash point equal to or greater than 21°C and less than or equal to 55°C.
  - **H4 = Irritant:** Non-corrosive substances and preparations which, through immediate, prolonged or repeated contact with the skin or mucous membranes, cause inflammation.
  - **H5 = Harmful:** Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may involve limited health risks.
  - **H6 = Toxic:** Substances and preparations (including very toxic substances and preparations) which, if they are inhaled or ingested or if they penetrate the skin, may involve serious, acute or chronic health risks and even death.
  - **H7 = Carcinogenic:** Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce cancer or increase its incidence.
  - **H8 = Corrosive:** Substances and preparations which may destroy living tissue on contact.
  - **H9 = Infectious:** Substances containing viable micro-organisms or their toxins which are known or reliably believed to cause disease in man or other living organisms.
  - **H10 = Teratogenic:** Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce non-heredity congenital malformations or increase their incidence.
  - **H11 = Mutagenic:** Substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce heredity defects or increase their incidence.
  - **H12 =** Substances and preparations which release toxic or very toxic gases in contact with water, air or acid.
  - **H-13 =** Substances and preparations capable by any means, after disposal, of yielding another substance e.g. a leachate, which possesses any characteristics listed above.

- **H14 = Ecotoxic:** Substances and preparations which present or may present immediate or delayed risks for one or more sectors of the environment.

## **It is vital that researchers are aware of the differences between the different Hazard Phrases**

### **9.2 Laboratory waste bins**

All laboratory waste produced within the University is classified as 'controlled waste' and must be disposed of in accordance with governing legislation. Hazardous waste, as defined by the 'Special Waste Amendment (Scotland) Regulations 2004', can only be disposed of by Specialist contractors. The arranging of the disposal of such Special Waste will be carried out by the Director of Environmental, Health and Safety Services.

All waste must be put in the correct coloured bag. The relevant colour coding of bags is as follows:

- Yellow bags for clinical waste
- Blue bags or clear bags with biological hazard sign on it for biological material requiring autoclaving
- red bags for chemically contaminated waste (e.g. gloves and weighing boats)
- clear bags or red bags with a radioactive hazard sign on it for radioactive waste
- yellow bag with red stripe on it for infectious waste contaminated with cytotoxic and/or cytostatic medicinal products
- Dustbin with purple strip - for oily rags and such workshop waste Black or Clear (with NO symbols on the bag) for domestic waste

Bins for general domestic waste, Non- contaminated items of paper, plastic, metal cans should not be located in laboratories to avoid cross contamination due to staff using the wrong container. Such bins should be located in offices outside the laboratory.

With respect to fire safety, **No** bins for any type of waste should block any fire escape doors, block corridors which lead to fire escape routes and no such containers should be located in a 'Protected Fire Escape Route'.

### **9.3 Chemically Contaminated Items**

These are items which should be considered as contaminated by tracer amounts of any agent which could be classed as a hazardous chemical agent. This can be solid items like gloves, weighing boats etc or may be glassware where chemicals have been removed (as far as possible) which is ready to be washed.

All Solid chemically contaminated waste eg things like contaminated gloves, weighing boats should be put into thick **red bags** using a separate bin system from the normal domestic wastes.

All such waste should be considered as contaminated and thus may pose a risk to human health or the environment. As such solid waste should not be put into the domestic waste stream for cleaners to pick up.

When these red bags are full, a trained member of staff should seal the bags and transfer them to 1100 Eurobins specially provided for such waste which will be uplifted by a Specialised Waste Contractor. These red bags must not be put in the general waste uplifted by Fife Council.

A University Special Waste Consignment Note should be completed for the uplift of chemically contaminated waste and sent to Environmental, Health and Safety Services (e-mail: ehss) and an approved contractor will be requested to uplift this waste.

When the contractor uplifts this waste, they will request that a member of staff complete and sign a SEPA consignment Note which is a document sent to SEPA stating that the hazardous noted on the form has been uplifted from the University of St Andrews. The consignor of the waste will then be given a green copy of the SEPA Consignors Note. This should be sent to Environmental, Health and Safety Services who keep records of all hazardous waste disposals.

Trace liquid chemically contaminated glassware (not significant quantities of liquid chemical agent) eg empty bottles of solvent can be washed by a trained member of staff and the trace quantities of chemical can be put to drain with copious quantities of water.

**NOTE: No significant quantities of hazardous chemical agent must be put in the domestic waste stream, put to drain or any other means which does not comply with relevant legislation.**

## 9.4 Hazardous Chemicals

**No significant quantities of hazardous chemical agent must be put in the domestic waste stream, put to drain or any other means which does not comply with relevant legislation.**

The disposal of all hazardous chemicals must comply with the relevant legislation which includes:

- Special Waste Amendment (Scotland) Regulations 2004
- Misuse of Drugs Regulations 2001 for disposal of 'Controlled Drugs'
- Chemical Weapons Act 1996 for disposal of Scheduled compounds regulated under this Act.

The Special Waste Amendment (Scotland) Regulations 2004 and the Environmental Permitting Regulations 2010 in England and Wales which implement European legislative Hazardous Waste Directive to control how liquid and solid hazardous waste is disposed.

**It is strongly recommended that all hazardous waste is disposed of through a specialised contractor.** To dispose of such waste (either as solid or liquid waste), a Special Waste Form (see Appendix 2) should be completed which details the waste and sent to Environmental, Health and Safety Services (e-mail: ehss). This ensures that at no point is hazardous waste put in the wrong waste stream putting other staff at risk (eg the plumbers being put at risk of chemicals being disposed of to drain). This includes putting waste water miscible solvents like methanol and ethanol to drain. It is strongly recommended that all such hazardous waste chemicals should be sent to a specialised waste contractor for uplift and disposal in an appropriate manner.

**PLEASE NOTE: Only typed copies of the Special Waste form will be accepted.** No handwritten copies will be accepted.

The regulations do allow other means of disposal of hazardous agents as waste may be deemed non-hazardous due to the nature of the agent and the dilution but this requires detailed understanding of how the limits for disposal are determined. It will also require detailed and accurate record keeping. If a School or Unit wishes to pursue this line they must first contact the Director of EHSS **PRIOR** to work starting to determine if they can dispose of the waste concerned safely and within the legislation. If waste is to be put to drain, it may also mean the University getting approval of this disposal to drain from Scottish Water as they manage the sewer system.

The methodology for disposal of hazardous waste other than by a Special Waste Contractor is given below.

The Scottish Environment Protection Agency (SEPA) regulate Special Waste disposal in Scotland. SEPA Guidance on Special Waste disposal is available on the SEPA website at:

[http://www.sepa.org.uk/waste/waste\\_regulation/special\\_waste/hazardous\\_waste.aspx](http://www.sepa.org.uk/waste/waste_regulation/special_waste/hazardous_waste.aspx)

The Regulations require that no amount of certain high risk substances may be put to drain or sent out as Non-Special waste. These will be the very hazardous compounds like known human carcinogens.

Such Substances which are defined as 'Absolute Entries' are detailed in the Guidance Document entitled:

Technical Guidance WM2 - **Hazardous Waste** Interpretation of the definition and classification of hazardous waste produced by SEPA.

([http://www.sepa.org.uk/waste/waste\\_regulation/idoc.ashx?docid=cb9c5dd5-8207-4593-a032-c2c95995072f&version=-1](http://www.sepa.org.uk/waste/waste_regulation/idoc.ashx?docid=cb9c5dd5-8207-4593-a032-c2c95995072f&version=-1))

All such substances **must be removed as Special waste** by a specialised contractor no matter at what concentration they are being used at. To dispose of such waste (either as solid or liquid waste), a Special Waste Form (see Appendix 2) should be completed which details the waste and sent to Environmental, Health and Safety Services (e-mail: ehss).

**PLEASE NOTE: Only typed copies of the Special Waste form will be accepted.** No handwritten copies will be accepted.

Most chemicals however have a threshold amount set before they are classed as 'Hazardous' by the waste regulations.

**Please note** - the definition of hazardous in COSHH, Transport and Waste regulations are all slightly different.

The definition of hazardous waste for most chemicals will depend on the Risk Phrase associated with the chemical or compound and the concentration of that chemical in the waste. An example of such an algorithm is given in appendix 5

Details of how to define waste as hazardous and under what category can be found in the above technical guidance WM2 at URL:

[http://www.sepa.org.uk/waste/waste\\_regulation/idoc.ashx?docid=cb9c5dd5-8207-4593-a032-c2c95995072f&version=-1](http://www.sepa.org.uk/waste/waste_regulation/idoc.ashx?docid=cb9c5dd5-8207-4593-a032-c2c95995072f&version=-1)

It is required that before this waste can be disposed of, it is necessary to show by using the algorithm in this document what limits must be placed on the disposal to make the waste non-hazardous (eg <0.1% solutions may be put to drain). If the waste is to go to drain, then it will also be necessary to check with Scottish Water that they will accept the waste into the sewerage system. Once this has been done, then a record sheet must be kept showing;

- What chemicals were disposed (including any mixtures),
- The concentration of each component of the waste,
- What the Risk Phrase is for each component;
- The Waste Hazard Phrase for each component (and how this was determined - This may be through a document which is approved by the School prior to waste disposal);
- When they were disposed (date and time),
- Who disposed of the waste (Printed name and signature);
- Where the waste was disposed.

All records should be sent to the Director of EHSS at the end of each year and must be kept for at least 5 years.

Where substances are deemed to be hazardous waste under this SEPA Technical Guidance document, then these substances **MUST** be removed as Special waste by a specialised contractor.

Where there is highly reactive waste generated, it may need to be inactivated prior to final disposal. Details of such waste and the procedures for inactivation are given in the University Chemical Safety Guidance at:

When the contractor uplifts Special Waste, they will request that a member of staff complete and sign a SEPA Consignment Note which is a document sent to SEPA stating that the hazardous waste noted on the form has been uplifted from the University of St Andrews. The consignor of the waste will then be given a green copy of the SEPA Consignors Note. This should be sent to the Director of EHSS who will keep records of all hazardous waste disposals.

Where solid waste is deemed not to be hazardous waste according to this SEPA Technical document then it should be disposed of as chemically contaminated waste. It is strongly recommended that no significant quantities of chemically contaminated liquid waste is disposed of to drain as this will pose an unknown risk to maintenance staff and possibly to the environment.

### **9.5 Prescription Only Drugs and Drugs Controlled Under the Misuse of Drugs Regulations**

Unused prescription only drugs should be returned to a pharmacist for correct disposal by incineration or sent out to an approved contractor as 'Special waste'. No controlled drug waste should ever be put to drain.

A Home Office Licence is required if you are work with 'Controlled Drugs' under the Misuse of Drugs Regulations.

A written record of all usage and all disposals of such drugs must be maintained and made available to a Home Officer Inspector. Disposal of Controlled Drugs must be by an authorised route which will be stated in the licence.

For the disposal of stcok solid/liquid Controlled Drugs, the Licence Holder must get the appropriate signatures to show that the waste has been disposed of by an authorised contractor and the records kept for inspection by the Home Office.

All such substances should be removed as Special waste by a specialised contractor who is licenced to handle such wastes. To dispose of such waste (either as solid or liquid waste), a Special Waste Form (see Appendix 2) should be completed which details the waste and sent to Environmental, Health and Safety Services (e-mail: ehss). When the contractor uplifts this waste, they will request that a member of staff complete and sign a SEPA consignment Note which is a document sent to SEPA stating that the hazardous noted on the form has been uplifted from the University of St Andrews. The consignor of the waste will then be given a green copy of the SEPA Consignors Note. This should be sent to Director of EHSS who keep records of all hazardous waste disposals.

**PLEASE NOTE: Only typed copies of the Special Waste form will be accepted.** No handwritten copies will be accepted.

### **9.6 Schedule 1 Chemicals in the Chemical Weapons Act 1996**

A licence is required for any Schedule 1 chemicals in this legislation. The licence will detail the storage requirements, usage and disposal record requirements. These must be followed and the written records of disposal made available for inspection.



Any researcher who has a Chemical Weapons Act Schedule 1 licence for working with such chemicals should notify the Director of EHSS to ensure that the correct disposal procedures for this chemical are followed.

When such waste needs to be disposed, the University must ensure that the waste is disposed of in the correct manner and must get written confirmation that the waste has been finally disposed. The Director of EHSS will maintain all records showing confirmation of final disposal.

To arrange for uplift and disposal of such compounds, either as solid or liquid waste, a Special Waste Form (see Appendix 2) should be completed which details the waste and sent to Environmental, Health and Safety Services (e-mail: ehss). When the contractor uplifts this waste, they will request that a member of staff complete and sign a SEPA consignment Note which is a document sent to SEPA stating that the hazardous noted on the form has been uplifted from the University of St Andrews. The consignor of the waste will then be given a green copy of the SEPA Consignors Note. This should be sent to Director of EHSS who keep records of all hazardous waste disposals.

### **9.7 Schedule 5 Anti-Terrorism, Security and Crime Act 2001 Toxins**

There is a requirement for the University to notify the police if any research group is using such toxins. There is a requirement to keep suitable and sufficient records which identifies the source of the toxin, the storage requirements, what it will be used for and how it will be disposed of.

When such waste needs to be disposed, the University must ensure that the waste is disposed of in the correct manner and must get written confirmation that the waste has been finally disposed. The Director of EHSS will maintain all records showing confirmation of final disposal.

To arrange for uplift and disposal of such compounds, either as solid or liquid waste, a Special Waste Form (see Appendix 2) should be completed which details the waste and sent to Environmental, Health and Safety Services (e-mail: ehss).

### **9.8 Ozone Depleting and Possible Climate Change Chemicals**

Specific legislation (eg. The Fluorinated Greenhouse Gases Regulations 2009 and The Environmental Protection (Controls on Ozone-Depleting Substances) Regulations 2011 ) require certain chemicals which have significant ozone depleting characteristics or are considered to be a possible cause of climate change cannot be used or disposed of by normal disposal routes. The list of such chemicals is available from the Director of EHSS on request but includes many chloro-fluoro-carbon (CFCs) molecules. These compounds have to be disposed of via specialised licenced contractors and sent for incineration at specific temperatures.

All such substances should be removed as Special waste by a specialised contractor who is licenced to handle such wastes. To dispose of such waste (either as solid or liquid waste), a Special Waste Form (see Appendix 2) should be completed which details the waste and sent to Environmental, Health and Safety Services (e-mail: ehss).

**PLEASE NOTE: Only typed copies of the Special Waste form will be accepted.** No handwritten copies will be accepted.

## 9.9 Environmentally Accumulating Chemicals (eg Poly Chlorinated Biphenyls -PCBs)

There are many chemicals which are not metabolised and thus just accumulate in the environment or in humans eg. PCBs. Such compounds must be incinerated at specific temperatures to ensure they are properly destroyed and do not form toxic compounds if they are incorrectly incinerated.

PCBs have been used in significant quantities throughout the University for different purposes eg electrical insulation in high voltage switch gear. If you believe you may have waste PCBs which you need to destroy, then you must inform the Director of EHSS who will find a suitable waste contractor who can get these compounds incinerated at the correct temperature

Under specific legislation, work with new PCBs requires a specific licence from SEPA which will require a written record of all usage of PCBs and how the PCBs have been destroyed. There will be a need for the waste contractor to be aware that they must inform the University of final disposal by the appropriate means.

To arrange for uplift and disposal of such compounds, either as solid or liquid waste, a Special Waste Form (see Appendix 2) should be completed which details the waste and sent to Environmental, Health and Safety Services (e-mail: ehss).

## 10. Sharps waste

To avoid injury, research groups should try to use no sharp items for their research (eg do not use glass Pasteur pipettes but use plastic ones).

If this is not feasible, all sharps waste must be put in a puncture proof container so that the waste poses no risk to other workers.

Broken non-contaminated glass must be put inside a plastic or other resistant container such that it can be transported to the external waste bins without risk. Ordinary cardboard boxes are NOT suitable for this purpose and should not be used.

If practicable, users of syringes and needles should use the equipment which automatically separates the syringe from the needle (eg <http://www.safe-point.co.uk/>). The syringe should then be disposed of in the normal way according to the contamination

Contaminated sharps should be put in the appropriate labelled sharps container (if at all possible, do not put chemically contaminated sharps in a container saying biological risk). The label on the container will define the route (and thus cost) of disposal

All such chemically contaminated waste must go out as Special Waste.

Standard biological hazard marked sharps container should be used for biologically contaminated items which are then removed by a specialised contractor for incineration.

If the sharps are radioactively contaminated, chemical and biological hazard markings must be removed and the sharps container labelled to identify that it is radioactively contaminated. These containers will then be disposed of as radioactive waste - See Section 11.

## 11. Disposal of Clinical and Biologically Contaminated Waste

## 11.1 Disposal of Clinical Samples

The use of primary clinical samples (as opposed to long term transformed human cell lines) must have obtained ethical approval prior to use. This Ethical Approval process must detail what will be done with the clinical samples and how the samples will be disposed.

All solid clinical waste should be put into yellow bags with either a statement saying 'Clinical Waste' or a biological hazard symbol on it.

Clinical tissue samples must be destroyed by incineration and a record kept of the route and final disposal of such samples unless written dispensation is given for an alternative route. It is not recommended that such tissue samples are autoclaved and put out with other autoclaved waste.

Disposal of primary clinical cell cultures may be autoclaved and disposed of via normal autoclaved waste route (see section 10.3).

## 11.2 Autoclaving of ACDP Category 1&2 Pathogens and Category 1&2 Genetically Modified Organisms in Biologically Contaminated Waste

Where practicable all waste which may be contaminated by ACDP Category 1&2 pathogens or Category 1&2 genetically modified organisms must be autoclaved to ensure there is at the very least  $10^5$  reduction in viable organisms.

All solid waste contaminated by category 1 & 2 pathogens and/or GMOs must be put in blue or clear bags with a biological hazard symbol.

Most autoclaves run on a cycle of 120°C and 15 pounds per square inch (psi) for 20 minutes. This may not be enough for some organisms (for example some thermophilus bacterial strains are resistant to temperature, bacterial spores are temperature resistant, prions eg Transmissible spongiform encephalopathy -TSEs). It is therefore vital that **prior to the work starting**, the risk assessment includes details of the waste disposal procedure including any specific requirements for the operation of the autoclave.

Autoclaves exponentially reduce the number of viable organisms, which means that after a run there will always be viable organisms left. This is something which must be considered when determining the requirements for the autoclave run. There is also a lot of information regarding the sensitivity of organisms of specific organisms to specific temperatures and pressures in autoclaves. This is given in the D-Value for an organism which gives the temperature, pressure and time for a 90% reduction in viable organisms eg

Average Value of D-Value for Some Typical Micro-Organisms	
Micro-Organism	Time needed for autoclave at 121°C at 15 psi reduce the number of viable organisms 90% ( $D_{121}$ ) (Minutes)
Clostridium botulinum	0.2
Bacillus stearothermophilus	2.0
Bacillus subtilis	0.5
Bacillus megaterium	0.04
Clostridium sporogenes	0.8-1.4
Clostridium histolyticum	0.01

Table from Fedegari Autoclavi Spa (<http://www.fedegariusa.com/techno.asp>)

Given  $D_{121}$  is a 1 log reduction, to ensure proper disinfection with an autoclave there should be at least a 5 log reduction in viable organisms, thus you will need at the very least 10 minutes to reduce *Bacillus stearothermophilus* by  $10^5$  fold at  $121^\circ\text{C}$  at 15psi. For prions like TSE you will need to use a much higher temperature of  $134^\circ\text{C}$  for 18 minutes at the very least to achieve a level of disinfection which is appropriate.

When using an autoclave for such disinfection of waste, it is vital that specific thermocouples are used to accurately measure the temperature in the autoclave during every run to ensure it reaches the appropriate temperature. A written record of the temperature and time of the autoclave runs should be kept for 5 years.

Once the biological contaminated waste has been autoclaved then it is deemed not to be biologically contaminated. If there is no further contamination eg chemical contamination then the waste can be put out to Fife Council Eurobins. If there is still chemical contamination, then the waste must go out via 'Chemically Contaminated' waste routes

### 11.3 **Chemical Disinfection of ACDP Category 1&2 Pathogens and Category 1&2 Genetically Modified Organisms (GMOs) in Biologically Contaminated Waste.**

The purpose of liquid disinfection is to render biological agents in liquid waste non-viable. The Health and Safety Executive require that if chemical disinfectants are to be used, then there must be written validated evidence that they are effective. This may be evidence provided by the supplier, or published data or by personal experimentation (details of the experiments to show effectiveness must be kept). The effectiveness of the disinfectant will depend on the type of pathogen (e.g. ACDP Category 4 pathogens require a greater level of inactivation as the consequences of escape of such a pathogen would be much greater than an ACDP Category 1 pathogen) or the state that the pathogen is in (e.g. spores are much harder to inactivate than eukaryotic cell lines). Thus the risk assessment for the work will determine the type of disinfectant which can be used and the required reduction in pathogen titre. The HSE have recommended that for category 1 and 2 pathogens/GMOs there should be a reduction in titre of  $10^5$  at the very least.

The following chemicals are used for disinfection:

**Clear Soluble Phenolics** - These are not greatly inactivated by organic matter and do not attack metals. They are effective against vegetative bacteria and against lipid containing viruses. They should be used in general microbiology, for discard jars and for disinfecting benches. Use all phenolics at the manufacturers' recommended dilutions. Do not store diluted disinfectants.

Examples of phenolic disinfectants are 'Clearsol' , 'Printol' , 'Stericol' 'Sudol' .

**Peroxyulfates** - These are disinfectants like hypochlorites which act as a strong oxidiser of biological materials. These compounds are much less corrosive than hypochlorites and are less sensitive to inactivation by proteinaceous materials than hypochlorites (though they are inactivated by high concentrations of such materials). Example of a peroxyulfate compound is Virkon.

**Hypochlorites** - These disinfectants are usually inactivated by organic matter and attack metals to varying degrees. Hypochlorites are suitable disinfectants for vegetative bacteria (including mycobacteria), spores, fungi and both lipid containing and non-lipid containing viruses depending on the concentration of chlorine.

**Note:** Hypochlorites must never be used on centrifuges or moving parts of machinery or metal surfaces.

As hypochlorites are easily inactivated by protein they should not be used for highly proteinaceous material. They may be used in virology for virus samples, small quantities of blood, discard jars, pipette holders and for surface disinfection. 'Chloros' and 'Domestos' contain nominally 100,000 ppm of available chlorine but many bleaches contain 50,000 ppm or less. 'Chloros' and 'Domestos' should be used as follows:

General use	1% v/v (1,000 ppm available chlorine)
Pipette jars	2.5% v/v (2,500 ppm available chlorine)
Blood spillage	10% v/v (10,000 ppm available chlorine).

Hypochlorites are compatible with anionic and non-ionic detergents but not with cationic detergents such as quaternary ammonium compounds (e.g. cetrimide). The activity of the hypochlorite should be regularly tested e.g. with starch iodide paper, which turns blue-black in the presence of hypochlorite.

Examples of hypochlorite disinfectants are 'Chloros', 'Domestos', 'Milton'.

**Alcohols** - Ethanol and propan-2-ol at concentrations of 70-80% are effective, albeit slowly, against vegetative bacteria and lipid containing viruses. They are not effective against spores, fungi and non-lipid containing viruses. These solutions are very useful for disinfecting surfaces. It should be noted that 70% propan-2-ol is much more effective than 70% ethanol

**Quaternary Ammonium Compounds** - These are cationic detergents which are effective against vegetative bacteria, lipid containing viruses and some fungi but are not effective against mycobacteria, spores and non-lipid containing viruses. These compounds are inactivated by protein, by a variety of natural and plastic materials and by non-ionic detergents. These compounds have limited use for disinfection within the laboratory due to inactivation but as they are non-corroding they are good for cleaning metallic surfaces.

Example of a quaternary ammonium disinfectant is 'Cetrimide'.

**Aldehydes** - Aldehydes (eg Formaldehyde and Gluteraldehyde) are toxic substances and should only be used as disinfectants in special situations. They are effective against vegetative bacteria (including mycobacteria), spores, fungi and both lipid and non-lipid containing viruses. Aldehydes are active in the presence of protein and are not inactivated by natural or man-made substances or detergents.

**Note:** Gluteraldehyde is a known sensitiser and can cause serious respiratory diseases. It should not normally be used as a disinfectant. Alternatives to gluteraldehyde include Peracetic acid (tradename: NU-CIDEX, Johnson and Johnson Medical).

It is vital that if a disinfectant is used there must be evidence that it will reduce the pathogen titre by  $10^5$ . In many cases this information can be supplied by the manufacturer eg for Virkon (Details can be obtained from Virkon - [http://www2.dupont.com/Virkon\\_S/en\\_GB/products/downloads.html](http://www2.dupont.com/Virkon_S/en_GB/products/downloads.html))

The disposal of chemically disinfected waste to drain will depend on the disinfectant. No toxic substance used as a disinfectant may be put to drain. Only large volumes of very dilute Virkon treated biological media where the biological contaminated cells should ever be put to drain. All other such liquid waste should be kept and disposed of as 'Special Waste' by the standard route.

Agents like formaldehyde or gluteraldehyde or hypochlorites etc treated biological contaminated waste must never be put to drain as these are extremely hazardous and reactive chemical agents which may put other workers at risk (eg if they use an agent which reacts with hypochlorites, this can generate chlorine gas) or may put the environment at risk.

#### **11.4 Disposal of ACDP Category 3 pathogens or category 3 GMOs or agents listed as Specified Animal Pathogens (SAPO) or Infectious Plant Pathogens**

Category 3 pathogens pose a significant risk of human disease and agents listed under the Specified Animal Pathogens (Scotland) Order 2009 (SAPO) or plant pathogens listed in the Plant Health Order as amended pose significant risk to the environment. It is therefore vital that detailed written waste management procedures are put in place and followed.

These procedures will be detailed in the Code of Practice within the Category 3 containment laboratory where all such work will be carried out.

It is a requirement for chemical disinfection of category 3 pathogens or SAPO agents that the chemical agents reduces the titre of the agent by at least  $10^5$  to  $10^6$  fold but preferably better than this standard. This has to be done in the media that the agents are being grown in to ensure that the activity of the disinfectant is not affected by the media eg hypochlorites will react with proteins making the hypochlorite inactive as a disinfectant.

All waste disposal procedures used in category 3 containment facilities **must be approved by the Director and the Manager of the Category 3 facilities prior to work starting.**

All solid category pathogen /SAPO contaminated waste must be autoclaved and then sent for incineration afterwards.

The chemical disinfectant should ensure that no category 3 agent can escape from the containment facility.

## **12. Radioactive Waste**

### **12.1 Introduction**

Radioactive waste is managed under the Environmental Authorisations (Scotland ) Regulations 2018 as amended in Scotland but the Environmental Permitting (England and Wales) Regulations 2010 in England and Wales. The Environmental Authorisations (Scotland) Regulations 2018 is enforced by the Scottish Environment Protection Agency (SEPA). In both sets of legislation, Certificates are issued on how much radioactivity a site may hold and also how much radioactivity can dispose to the environment. The University of St Andrews has one Certificate of Registration which limits the amount and types of radioactive isotopes that may be held in all the buildings in St Andrews. The University Radiation Protection Adviser then allocates a specific amount of the total University allocation to each building registered to work with radioactivity. The University also holds a Certificate of Authorisation to dispose of the solid and liquid radioactive waste it may hold.

Under no circumstances may radioactive materials be held which the University is not registered to hold and no waste may be disposed without a Certificate of Authorisation.

Details of how work with radioactive materials is controlled is given in the University Local Rules for Work with Ionising Radiations which can be found at:

## 12.2 Sealed Radioactive Sources

Many pieces of equipment have sealed radioactive sources embedded in the equipment eg scintillation counters, ni-63 in ionisation detectors, older fire detector heads.

Each School/Unit **must** have a written record of each of these sources and undertake an annual check to ensure that such sources have not been put to waste with equipment.

There is a piece of legislation which allows some low activity sealed sources to be disposed of without a Certificate of Authorisation. Before any such source is disposed, it is vital that this is checked with the Director of EHSS prior to disposal.

Where practicable, these sources must be removed from the equipment prior to disposal or the company undertaking disposal has appropriate certification to receive the sources for final disposal. Records **must be kept** of all such sealed source waste disposal.

Larger sealed radioactive sources that have a certificate of registration will not have a Certificate of authorisation and thus may NOT be disposed of until such an authorisation has been obtained from SEPA. No such sources may thus be disposed of until the Director of EHSS has been notified and this office has obtained a Certificate of Authorisation from SEPA. This type of certificate often takes 6-12 months to obtain and thus it is vital that if there is a need for disposal this is well planned in advance.

Disposal of large radioactive sources are very expensive and as such, the financial implications for disposal must be considered before purchasing such a large radioactive source.

## 12.2 Solid Radioactive Contaminated Waste

All usage of radioactivity must be recorded on the University computerised radioactive management system called RadProt (<https://portal.st-andrews.ac.uk/radprot/open/>). As an aliquot of radioactivity is used, then the waste it generates must be recorded. It is vital to do this as SEPA annually inspect the University for the holding of radioactivity and for the radioactive waste disposal records.

All solid radioactively contaminated waste (there should be no liquid waste bar minor quantities which are sealed in containers) should be put inside a solid leak-proof bin with a lid which is lined with a black plastic bag or red bags or clear plastic bags which are identified as containing radioactive materials by having a radioactive trefoil symbol printed on the bag or having tape with a radioactive trefoil placed on the bag. Each bag should have a number which corresponds to the number for the RadProt Programme so that it can be identified what aliquot has been disposed of into that bag.

When the bag is full it should be sealed with tape with a trefoil on it and then double bagged then sealed with tape with a trefoil on it. The RadProt number of the bag and the contents and activity in that bag should be printed off from the RadProt programme and taped to the bag in question. The full bag should then be stored in a safe place which does not expose other users to radiation.

The radioactive waste bags should then be moved to the University Radioactive waste store as soon as practicable. This is done by requesting an uplift of such radioactive materials to the Director of EHSS who will arrange such an uplift.

The record of waste at the School /Unit held on the RadProt system must then be updated to show the waste has been transferred to the Central University Radioactive Waste Store.

Final disposal of all solid radioactive waste will be organised by the Director of EHSS. Only an approved contractor who has the necessary certification can be used as a final disposal site for radioactive waste.

**NOTE:** No radioactive waste of un-registered isotopes or if there is in excess of 40 MBq of  $^3\text{H}/^{14}\text{C}$  or Short half-life isotopes (<365 days half-life - eg  $^{32}\text{P}$ ,  $^{35}\text{S}$ ) or greater than 4MBq of long half-life isotopes (>365 days half-life eg  $^{36}\text{Cl}$ ) waste will be uplifted as these exceed or limits set by SEPA. These are clearly stated on the University Certificate of Authorisation, a copy of which has been issued to all user Schools/Units.

### 12.3 Liquid Radioactive Waste Disposal

Then University Certificate of Authorisation details the type of isotope and the amount of liquid radioactive waste that may be disposed of to drain per month. This is the total allocation for the whole University. Each School/Unit who uses radioactivity has been given a specific amount it can dispose of to drain per month which is part of the total allocation. All workers should be aware of the types of activity that may be disposed of from their building and the limits on the amount that can be disposed to drain per month.

All usage of radioactivity must be recorded on the University computerised radioactive management system called RadProt. As an aliquot of radioactivity is used, then the waste it generates must be recorded. It is vital to do this as SEPA regularly (annually) inspect the University for the holding of radioactivity and for the radioactive waste disposal records. This system allows the user to define how much radioactive waste can be put to drain.

Radioactive waste can only be put to specific designated drains which go directly to the main drain and do not have spurs onto the hand washing drains. There should be a clear symbol on the drain to identify that radioactive materials are disposed using the drain.

Only water miscible non-toxic compounds can be put to drain. Any organic solvents or hazardous compounds must be kept for disposal by other routes eg scintillant must be kept for specific disposal as 'Solid Waste', organic solvents will be sent out using a specialised contractor. The Special Waste Regulations apply to all radioactive substances thus something may be disposable to drain under the Radioactive Substances Act but not under the Special Waste Regulations, in which case it is NOT disposable to drain.

Only radionuclides identified and in the quantities in the Certificate of Authorisation may be disposed of to drain. A record of all liquid waste disposals to drain must be kept using the RadProt University radiation Management programme. These records are inspected on an annual basis by SEPA.

**NOTE:** No radioactive waste of isotopes not registered to held or disposed at the University or in excess of the limits set in the Certificate of Authorisation may be put to drain. These are clearly stated on the University Certificate of Authorisation, a copy of which has been issued to all user Schools/Units.



## 12.4 Radioactive Geological Samples

It is no longer legal to dispose of uranium salts to drain in the quantities as before. The New Radioactive Substances (Exemption) Order 2011 revokes all the previous exemption orders. Uranium and other radioactive geological minerals disposal needs to take into account the Special Waste Regulations as well as the Radioactive Substances Act. All disposals of radioactive geological samples must now be approved by the University Radiological Protection Adviser.

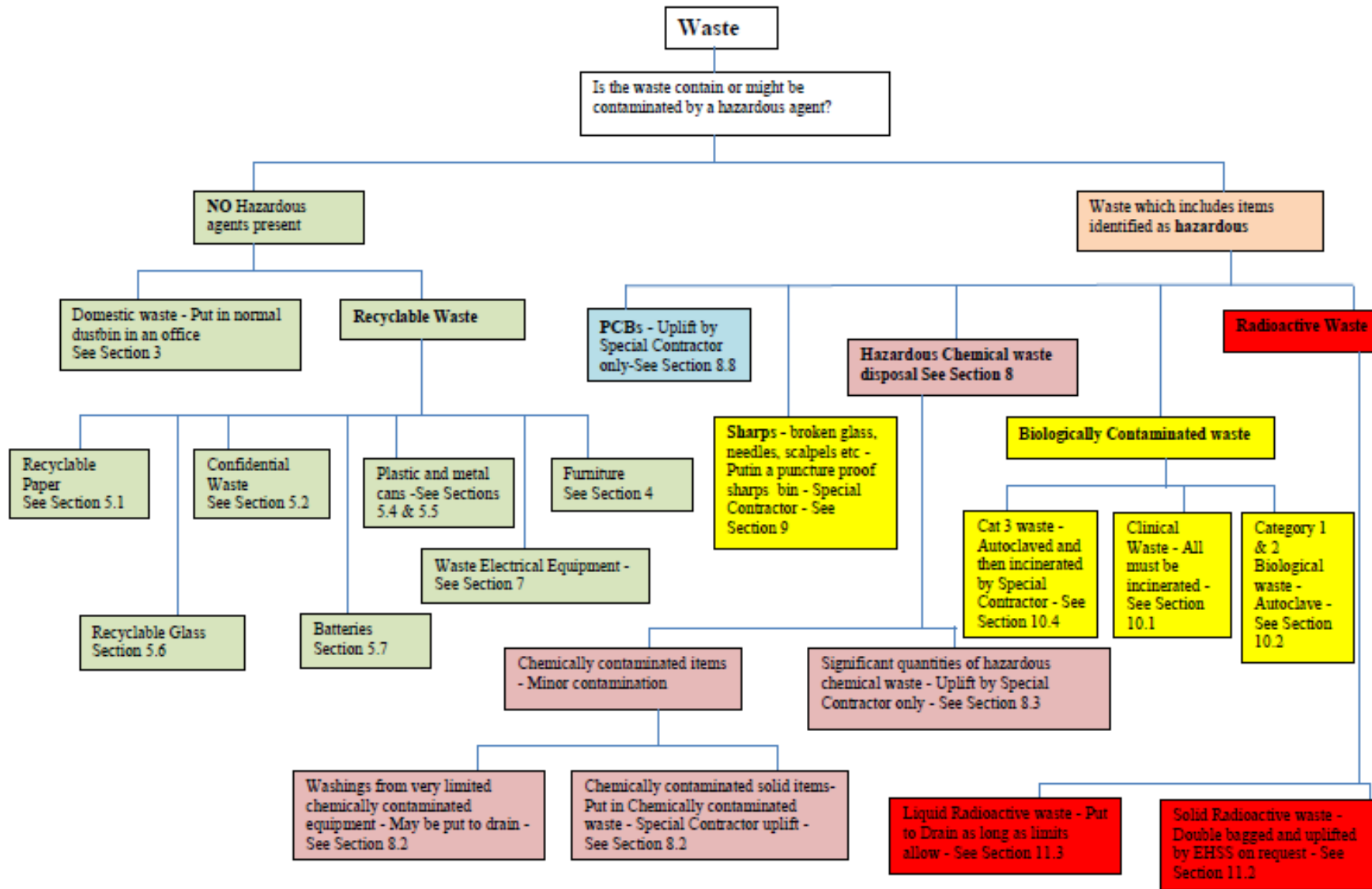
## 13. Transportation of Waste

There is a wide variety of legislation managing the transport different types of waste, the training of drivers for carrying such waste, the labelling of the waste containers and vehicle as well as the insurance of vehicles carrying this waste on the public highway. All such transport of waste has to be approved by SEPA with a Certificate of Registration Under the Control of Pollution (Amendment) Act 1989. The labelling of the waste containers and the vehicle must meet the Carriage of Dangerous Goods Regulations (guidance can be seen at: <http://www.hse.gov.uk/cdg/index.htm>).

If the waste is transported on the public highway from one site to another site (which is not the final disposal site), the second site is deemed to be a 'Transfer Station' and requires a licence which is regulated by SEPA (the exception is if the site is within 100 metres and the waste is carried by hand - see <http://www.hse.gov.uk/cdg/manual/exemptions.htm> ). This is a very complicated and expensive procedure to get such a licence and is rigorously enforced by SEPA. No such licence exists at the University thus all such waste must be kept on site and will be uplifted by a specialised and approved contractor who will take it to a licenced transfer station or to final disposal.

All hazardous waste disposal therefore includes a transport cost which relates to meeting these requirement

Waste Disposal Routes



## Special waste Consignment Note

### Appendix 2

Use form at link <http://www.st-andrews.ac.uk/media/Blank%20Lab%20Smalls%20List.xls> or

					<b>University of St. Andrews</b>		
					<b>Special Waste Information Form</b>		
Materials	Physical Form	Colour	Total Quantity	Container Size, Type Number	Chemical/Biological Components that make it 'Special Waste' Components Concentration (% or mg/Kg)	Hazard Code	Process Giving Rise to Waste
<b>School / Unit</b>					<b>Environmental, Health and Safety Services,</b>		
					<b>University of St. Andrews,</b>		
					<b>65 North Street,</b>		
					<b>St. Andrews, Fife KY16 9AJ</b>		
<b>Tel:</b>					<b>Tel: 01334 462750</b>		
<b>Fax:</b>					<b>Fax: 01334 462747</b>		

## Health and Safety Executive - Risk Phrases

### Appendix 3

R1	Explosive when dry
R2	Risk of explosion by shock, friction, fire or other sources of ignition
R3	Extreme risk of explosion by shock, friction, fire or other sources of ignition
R4	Forms very sensitive explosive metallic compounds
R5	Heating may cause an explosion
R6	Explosive with or without contact with air
R7	May cause fire
R8	Contact with combustible material may cause fire
R9	Explosive when mixed with combustible material
R10	Flammable
R11	Highly flammable
R12	Extremely flammable
R14	Reacts violently with water
R14/15	Reacts violently with water, liberating extremely flammable gases
R15	Contact with water liberates extremely flammable gases
R15/29	Contact with water liberates toxic, extremely flammable gases
R16	Explosive when mixed with oxidising substances
R17	Spontaneously flammable in air
R18	In use, may form flammable/explosive vapour-air mixture
R19	May form explosive peroxides
R20	Harmful by inhalation
R20/21	Harmful by inhalation and in contact with skin
R20/21/22	Harmful by inhalation, in contact with skin and if swallowed
R20/22	Harmful by inhalation and if swallowed
R21	Harmful in contact with skin
R21/22	Harmful in contact with skin and if swallowed
R22	Harmful if swallowed
R23	Toxic by inhalation
R23/24	Toxic by inhalation and in contact with skin
R23/24/25	Toxic by inhalation, in contact with skin and if swallowed
R23/25	Toxic by inhalation and if swallowed
R24	Toxic in contact with skin
R24/25	Toxic in contact with skin and if swallowed
R25	Toxic if swallowed
R26	Very toxic by inhalation
R26/27	Very toxic by inhalation and in contact with skin
R26/27/28	Very toxic by inhalation, in contact with skin and if swallowed
R26/28	Very toxic by inhalation and if swallowed
R27	Very toxic in contact with skin
R27/28	Very toxic in contact with skin and if swallowed
R28	Very toxic if swallowed
R29	Contact with water liberates toxic gas
R30	Can become highly flammable in use
R31	Contact with acids liberates toxic gas
R32	Contact with acids liberates very toxic gas
R33	Danger of cumulative effects
R34	Causes burns
R35	Causes severe burns
R36	Irritating to eyes
R36/37	Irritating to eyes and respiratory system

R36/37/38	Irritating to eyes, respiratory system and skin
R36/38	Irritating to eyes and skin
R37	Irritating to respiratory system
R37/38	Irritating to respiratory system and skin
R38	Irritating to skin
R39	Danger of very serious irreversible effects
R39/23	Toxic: danger of very serious irreversible effects through inhalation
R39/23/24	Toxic: danger of very serious irreversible effects through inhalation and in contact with skin
R39/23/24/25	Toxic: danger of very serious irreversible effects through inhalation in contact with skin and if swallowed
R39/23/25	Toxic: danger of very serious irreversible effects through inhalation and if swallowed
R39/24	Toxic: danger of very serious irreversible effects in contact with skin
R39/24/25	Toxic: danger of very serious irreversible effects in contact with skin and if swallowed
R39/25	Toxic: danger of very serious irreversible effects if swallowed
R39/26	Very Toxic: danger of very serious irreversible effects through inhalation
R39/26/27	Very Toxic: danger of very serious irreversible effects through inhalation and in contact with skin
R39/26/27/28	Very Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed
R39/26/28	Very Toxic: danger of very serious irreversible effects through inhalation and if swallowed
R39/27	Very Toxic: danger of very serious irreversible effects in contact with skin
R39/27/28	Very Toxic: danger of very serious irreversible effects in contact with skin and if swallowed
R39/28	Very Toxic: danger of very serious irreversible effects if swallowed
R40	Limited evidence of a carcinogenic effect
R41	Risk of serious damage to eyes
R42	May cause sensitisation by inhalation
R42/43	May cause sensitisation by inhalation and skin contact
R43	May cause sensitisation by skin contact
R44	Risk of explosion if heated under confinement
R45	May cause cancer
R46	May cause heritable genetic damage
R48	Danger of serious damage to health by prolonged exposure
R48/20	Harmful: danger of serious damage to health by prolonged exposure through inhalation
R48/20/21	Harmful: danger of serious damage to health by prolonged exposure through inhalation and in contact with skin
R48/20/21/22	Harmful: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed
R48/20/22	Harmful: danger of serious damage to health by prolonged exposure through inhalation and if swallowed
R48/21	Harmful: danger of serious damage to health by prolonged exposure in contact with skin

R48/21/22	Harmful: danger of serious damage to health by prolonged exposure in contact with skin and if swallowed
R48/22	Harmful: danger of serious damage to health by prolonged exposure if swallowed
R48/23	Toxic: danger of serious damage to health by prolonged exposure through inhalation
R48/23/24	Toxic: danger of serious damage to health by prolonged exposure through inhalation and in contact with skin
R48/23/24/25	Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed
R48/23/25	Toxic: danger of serious damage to health by prolonged exposure through inhalation and if swallowed
R48/24	Toxic: danger of serious damage to health by prolonged exposure contact with skin
R48/24/25	Toxic: danger of serious damage to health by prolonged exposure contact with skin and if swallowed
R48/25	Toxic: danger of serious damage to health by prolonged exposure swallowed
R49	May cause cancer by inhalation
R50	Very toxic to aquatic organisms
R50/53	Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
R51	Toxic to aquatic organisms
R52	Harmful to aquatic organisms
R53	May cause long-term adverse effects in the aquatic environment
R54	Toxic to flora
R55	Toxic to fauna
R56	Toxic to soil organisms
R57	Toxic to bees
R58	May cause long-term adverse effects in the environment
R59	Dangerous for the ozone layer
R60	May impair fertility
R61	May cause harm to the unborn child
R62	Possible risk of impaired fertility
R63	Possible risk of harm to the unborn child
R64	May cause harm to breast-fed babies
R65	Harmful: may cause lung damage if swallowed
R66	Repeated exposure may cause skin dryness or cracking
R67	Vapours may cause drowsiness and dizziness
R68	Possible risk of irreversible effects

## Appendix 4

## European Chemical Hazard Codes

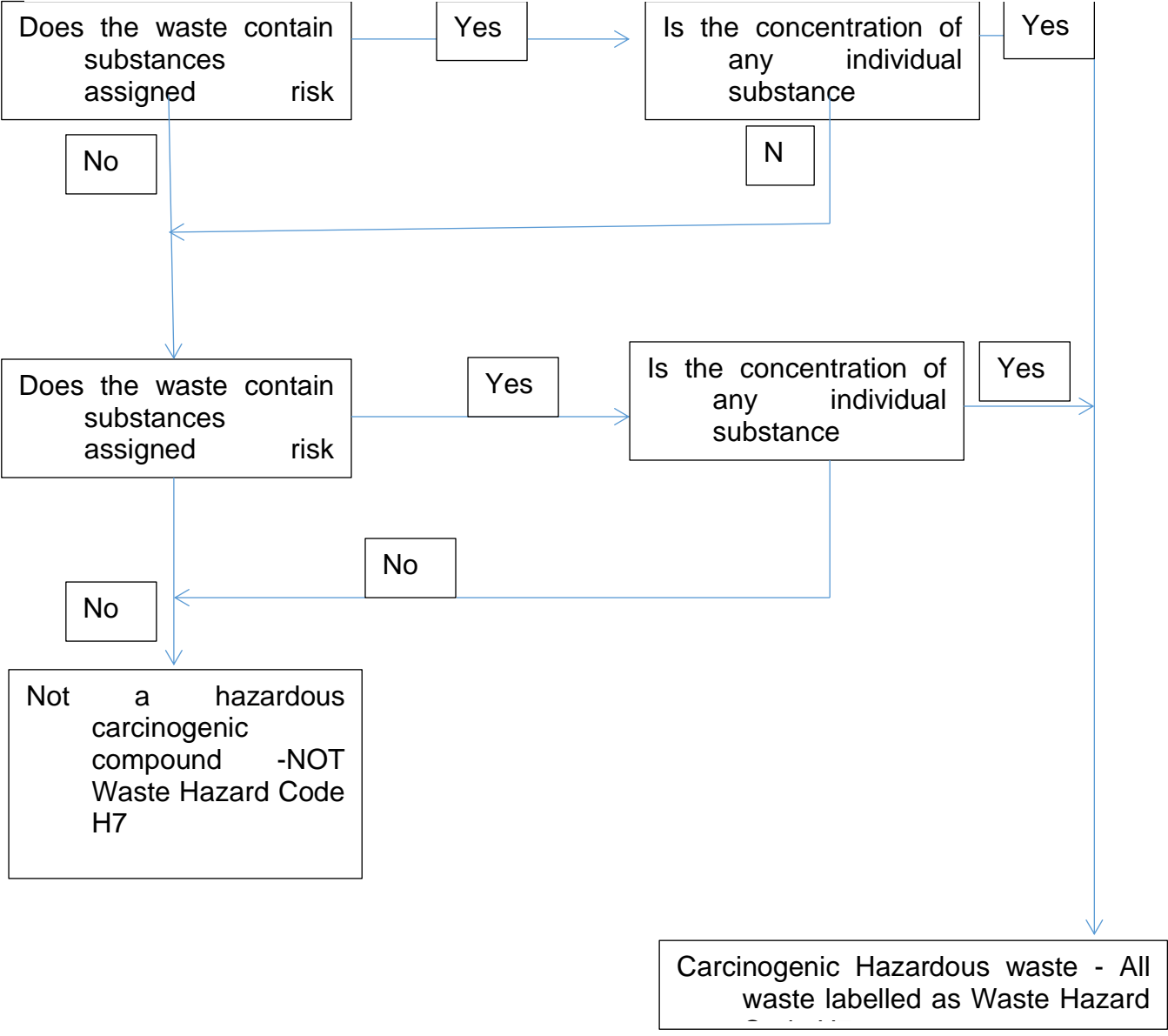
Hazard Code	Hazard Statement	Hazard Class
H200	Unstable explosive	Explosives
H201	Explosive, mass explosive hazard	Explosives
H202	Explosive; sever projection hazard	Explosives
H203	Explosive: fire, blast and projection hazard	Explosives
H204	Fire or projection hazard	Explosives
H205	May mass explode in fire	Explosives
H220	Extremely flammable gas	Flammable gases
H221	Flammable Gas	Flammable gases
H222	Extremely flammable aerosol	Flammable aerosols
H223	Flammable Aerosol	Flammable aerosols
H224	Extremely flammable liquid and vapour	Flammable liquids
H225	Highly flammable liquid and vapour	Flammable liquids
H226	Flammable liquid and vapour	Flammable liquids
H227	Combustible liquid	Flammable liquids
H228	Flammable solid (category 1)	Flammable solids
H228	Flammable solid (Category 2)	Flammable solids
H240	Heating may cause explosion	Self-reactive substances and mixtures and organic peroxides
H241	Heating may cause fire or explosion	Self-reactive substances and mixtures and organic peroxides
H242	Heating may cause fire	Self-reactive substances and mixtures and organic peroxides
H250	Catches fire spontaneously if exposed to air	Pyrophoric liquids, pyrophoric solids
H251	Self-heating may catch fire	Self-heating substances and mixtures
H252	Self-heating in large quantities: may catch fire	Self-heating substances and mixtures
H260	In contact with water, releases flammable gases which ignite spontaneously	Substances and mixtures which in contact with water emit flammable gases
H261	In contact with water, releases flammable gases	Substances and mixtures which in contact with water emit flammable gases
H270	May cause or intensify fire: Oxidiser	Oxidising Gases
H271	May cause fire or explosion: Strong Oxidiser	Oxidising liquids, Oxidising solids
H272	May intensify fire: Oxidiser (category 2& 3)	Oxidising liquids, Oxidising solids
H280	Contains gas under pressure: may explode if heated	Gases under pressure
H281	Contains refrigerant gas: may cause cryogenic burns or injury	Gases under pressure
H290	May be corrosive to metals	Corrosive to metals
H300	Fatal if swallowed	Acute toxicity - oral
H301	Toxic if swallowed	Acute toxicity - oral
H302	Harmful if swallowed	Acute toxicity - oral
H303	Maybe harmful if swallowed	Acute toxicity - oral

H304	Maybe fatal if swallowed and enters airways (Category 1)	Aspiration hazard
H305	Maybe fatal if swallowed and enters airways (Category 2)	Aspiration hazard
H310	Fatal in contact with skin	Acute toxicity, dermal
H311	Toxic in contact with skin	Acute toxicity, dermal
H312	Harmful in contact with skin	Acute toxicity, dermal
H313	Maybe harmful in contact with skin	Acute toxicity, dermal
H314	Causes severe skin burns/eye damage	Skin corrosive/irritant
H315	Causes skin irritation	Skin corrosive/irritant
H316	Causes mild skin irritation	Skin corrosive/irritant
H317	May cause an allergic skin reaction	Sensitisation, skin
H318	Causes serious eye damage (Category 1)	Serious eye damage/eye irritation
H319	Causes serious eye damage (Category 2A)	Serious eye damage/eye irritation
H320	Causes eye irritation (Category 2B)	Serious eye damage/eye irritation
<b>Hazard Code</b>	<b>Hazard Statement</b>	<b>Hazard Class</b>
H330	Fatal if inhaled	Acute toxicity, inhalation
H331	Toxic if inhaled	Acute toxicity, inhalation
H332	Harmful if inhaled	Acute toxicity, inhalation
H333	Maybe harmful if inhaled	Acute toxicity, inhalation
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled	Sensitisation, respiratory
H335	May cause respiratory irritation	Specific target organ toxicity, single exposure, Respiratory tract irritation
H335	May cause drowsiness or dizziness	Specific target organ toxicity, single exposure, Narcotic effects
H340	May cause genetic effects	Germ cell mutagenicity
H341	Suspected of causing genetic effects	Germ cell mutagenicity
H350	May cause cancer	Carcinogenicity
H351	Suspected of causing cancer	Carcinogenicity
H360	May damage fertility or the unborn child	Reproductive toxicity
H361	Suspected of causing damage fertility or the unborn child	Reproductive toxicity
H362	May cause harm to breast fed children	Reproductive toxicity / effects on or via lactation
H370	Causes damage to organs	Specific target organ toxicity, single exposure
H371	May cause damage to organs	Specific target organ toxicity, single exposure
H372	Causes damage to organs through prolonged or repeated exposure (Category 1)	Specific target organ toxicity, single exposure
H373	Causes damage to organs through prolonged or repeated exposure (Category 2)	Specific target organ toxicity, single exposure
H400	Very toxic to aquatic life	Hazardous to aquatic environment, acute hazard
H401	Toxic to aquatic life	Hazardous to aquatic environment, acute hazard
H402	Harmful to aquatic life	Hazardous to aquatic environment, acute hazard



H410	Very toxic to aquatic life with long lasting effects	Hazardous to aquatic environment, long term hazard
H411	Toxic to aquatic life with long lasting effects	Hazardous to aquatic environment, long term hazard
H412	Harmful to aquatic life with long lasting effects	Hazardous to aquatic environment, long term hazard
H413	May cause long lasting harmful effects to aquatic life	Hazardous to aquatic environment, long term hazard
H420	Harms public health and the environment by destroying ozone in the upper atmosphere	Hazardous to the ozone layer
	<b>Additional Hazard Statements</b>	
EUH001	Explosive when dry	
EUH006	Explosive with or without contact with air	
EUH014	Reacts violently with water	
EUH018	In use may form flammable / explosive vapour air mixture	
EUH019	May form explosive peroxides	
EUH029	Contact with water liberates toxic gas	
EUH 031	Contact with acids liberates toxic gas	
EUH 032	Contact with acids liberates very toxic gas	
EUH044	Risk of explosion if heated under confinement	
EUH059	Hazardous to the ozone layer	
EUH066	Repeated exposure may cause skin dryness or cracking	
EUH070	Toxic by eye contact	

C7 Assessment of Hazard Code H7 - Carcinogenic



<b>Version number</b>	<b>Purpose / changes</b>	<b>Document status</b>	<b>Author of changes, role and school / unit</b>	<b>Date</b>
V1.0	Revision	Draft	Paul Szawlowski	28/06/2019
V1.1	Reviewed	Draft	Paul Szawlowski	08/06/2021