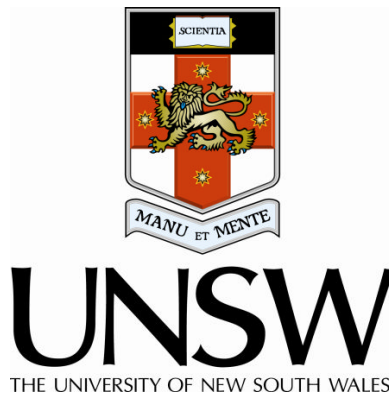




Major Projects

Facilities Management

PRELIMINARY OPERATIONAL WASTE MANAGEMENT PLAN

for the

**MATERIALS SCIENCE AND
ENGINEERING BUILDING**

UNSW Kensington Campus

11 October 2012

Principal
Document title
Date

UNSW
***Preliminary Operational Waste Management Plan
for Materials Science & Engineering Building
11 October 2012***

<i>Issue</i>	<i>Date</i>	<i>To</i>	<i>By</i>
1	4 October 2012	Draft	FT
2	11 October 2012	DA Issue	FT

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1. Introduction



Figure 1:
MS&EB Building

The new Material Sciences and Engineering Building (MS&EB) is to be constructed on the UNSW Kensington Lower Campus. Development approval for the MS&EB is to be sought under State Significant Development Application No. SSD 5373. UNSW has obtained the Director General's Requirements (DGRs) for this project which includes the need to address Service and Waste issues both during construction and in building operation. Construction Waste Management is addressed within the Preliminary Construction Management Plan (PCMP) for the MS&EB Project. The Contractor, once appointed is required to formalise the Construction Management Plan (CMP) addressing the construction waste management requirements of the PCMP and the SSD Conditions of Consent.

This Preliminary Operational Waste Management Plan (POWMP) has been prepared to address the proposed operational waste management of the new facility.

2. UNSW Interim Waste Plan

This Waste Minimisation Plan describes UNSW's current waste management procedures and achievements and outlines targets and actions to achieve sustainable outcomes and to meet its legislative requirements and financial goals.

UNSW's Sustainability has set an objective of increasing recycling across campus to 80% (decreasing landfill waste to 20%) and to ensure that all waste capable of being re-used or recycled is re-used and recycled. The plans include discussion on how separation of waste streams are managed and recycled and identified future waste management options for the campus. The Waste Minimisation Plan covers all facilities within the UNSW Kensington Campus and will be the basis for Operational Waste Management within the new MS&EB.

The UNSW Interim Waste Plan is provided as **Attachment A** to this POWMP.

3. Proposed New Building

The MS&EB is to be located at campus grid reference E10. It lies north-east of the Law building (F8) and north of the Chemical Sciences building (F10) and east of the existing Materials Science and Engineering Building.



Figure 2: Location of proposed MS&EB in relation to UNSW Kensington Campus.

The new MS&EB facility will consist 20,300 m² GFA in a multi-storey building that will house a variety of laboratories conducting material science research, ranging from macro-scale traditional testing to nano-scale fabrication and analysis. The building will also contain an atrium, classrooms, offices, and research spaces housing heavy testing equipment. Some of these spaces will incorporate the use of high temperature ovens and other heat sources which may pose potential fire risk. The building must be designed to be flexible enough to contain a range of other potential uses with a focus on sciences.

4. Existing Management of Waste

Access to the existing Materials Science Building is located off Union Road in campus grid reference E8. The building dates to 1965 and does not include formal enclosed waste storage rooms. The nearest designated refuse collection point is located in the Roundhouse immediately west of the existing building and accessible for waste collection through Gate 2.

Waste is separated into general, recyclable and hazardous waste streams as follows:

- General waste, collected daily
 1. Bin for kitchen & labs x 25
 2. Office rubbish bins x 110
- Recyclable waste, collected once a week
 1. Recycle Bin copy room size x 2
 2. Recycle bin outside E8 x 3
- Hazardous (chemical) waste, collected adhoc.

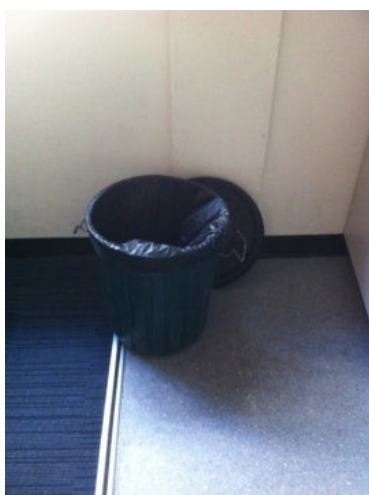


Figure 3: General Waste - Kitchens



Figure 4: General Waste - Offices



Figure 5: Recyclable Waste – e.g. Photocopy rooms

General waste is collected and held at the Roundhouse refuse collection point for daily collection by UNSW Waste Contractors.

Recyclable waste is currently collected and held in 660 litre bins stored externally adjacent to the Materials Sciences Building. Refer Figures 6 and 7 below:



Figure 6: 2 x 660L recycling bins stored adjacent to MS Building (E8)



Figure 7: Recycling Storage

5. Proposed Management of Waste

Waste pick-up from the new building will be through Gate 2, east along 3rd Avenue, south into the new D12 Lane and then west along Union Road to the new building's loading/deliveries area (refer Figure 8 below).

The new MSEB will be provided with a secure storage room on the ground floor of the new building (refer Figure 8, below). The storage room will include storage of both general and recycled waste. Hazardous (chemical) waste will continue to be stored securely, local to laboratory areas and disposed of on regular basis in accordance with UNSW Laboratory Hazardous Waste Disposal Guideline (OHS321) – Refer Attachment B.

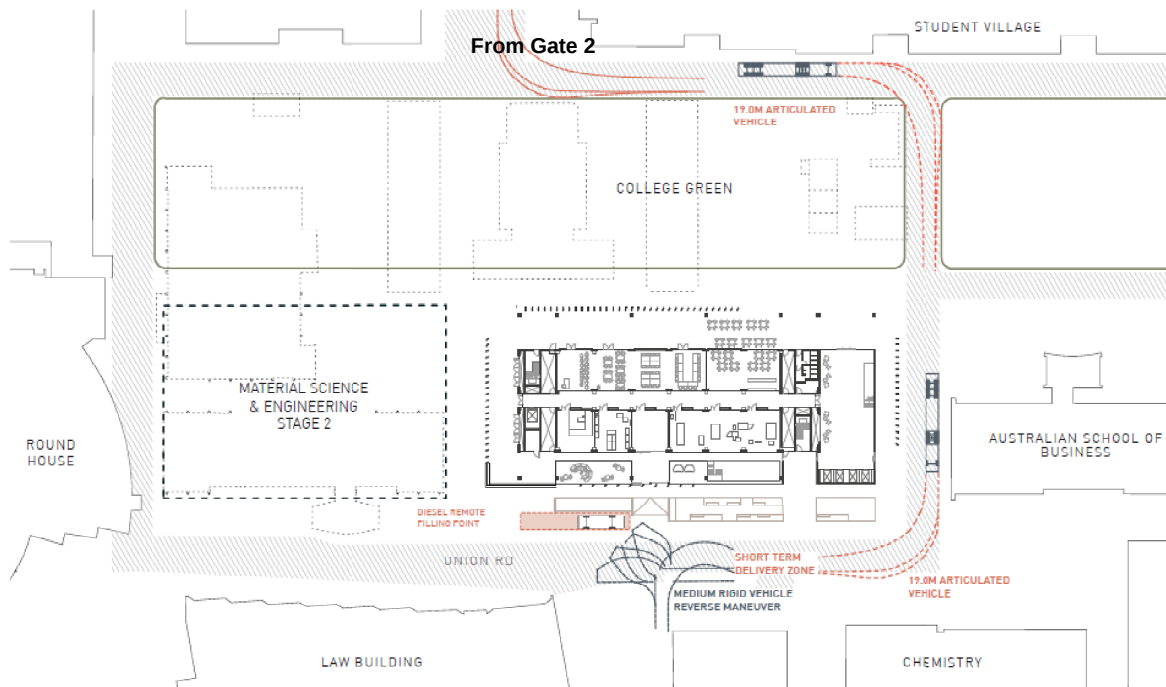


Figure 8: Proposed vehicle access to new MS&EB. The vehicle shown is a 19 metre articulated truck used for the delivery of Liquid Nitrogen. Waste vehicles are in the classification of medium rigid vehicles.

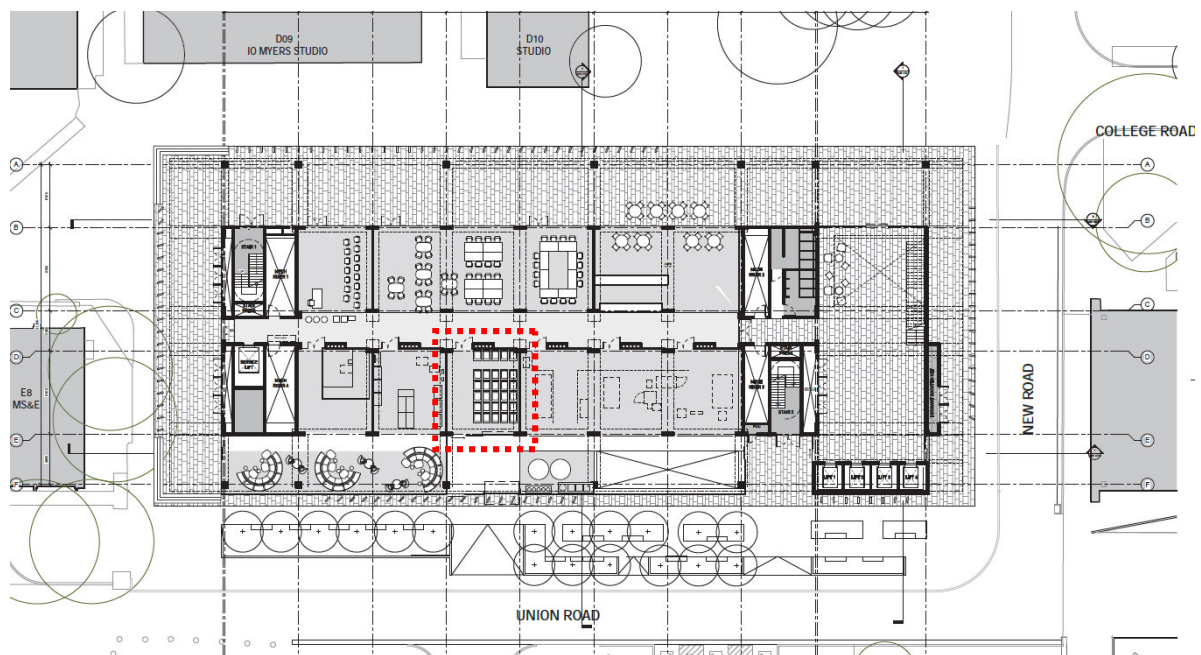


Figure 9: Proposed location of Bin Storage Room on Ground Floor of the new MS&EB.

Waste generation for the existing Materials Sciences Building has been used to extrapolate the potential waste generation of the proposed MS&EB. It is estimated that current student/staffing population of the E8 Building will increase by 144 to 834 to be housed within the new MS&EB. This represents an overall increase in the order of 21%.

Based on the waste collection figures received from UNSW, current projected waste generation based on average and high utilisation factors is estimated as follows:

<i>Waste Type</i>	<i>Quantity</i>	<i>Waste generation</i>	<i>Average Utilisation</i>	<i>High Utilisation</i>	<i>Current Ltr/week</i>
General					
	<i>Kitchens/Labs</i>	<i>25 x 55L x 5d</i>	<i>50%</i>	<i>80%</i>	<i>3440-5500</i>
	<i>Offices</i>	<i>110 x 10L x 5d</i>	<i>25%</i>	<i>80%</i>	<i>1380-4400</i>
	<i>Subtotal</i>				<i>4820-9900L</i>
Recyclable					
	<i>Copy Rooms</i>	<i>240L x2/wk</i>	<i>-</i>	<i>100%</i>	<i>480</i>
	<i>External</i>	<i>660L x 3/wk</i>	<i>-</i>	<i>100%</i>	<i>1980</i>
	<i>Subtotal</i>				<i>2460L</i>

Based on current usage estimated above, the future usage is expected to in the order of:

- General Waste: 5,800 litres/week (average), 12,000 litres/week (high)
- Recyclable Waste: 3,000 litres/week

Given that general waste is expected to continue to be collected daily, the number of general waste bins in the bin storage room will range from 5 to 10 240 litre bins or 2 to 4 x 660 litre skips.

Recyclable waste is collected weekly and will require 13 x 240L bins or alternatively 5 x 660 litre skips to be located in the bin storage room.

The size of the storage room has been designed to suit storage of up to 30 x 240 litre bins with manoeuvring space and is therefore considered adequate for the facility and future building population.

In accordance with UNSW Waste Minimisation Strategies, it is intended that the new facility will feature initiatives to improve overall recyclable waste targets in line with current policies and recommendation. Some of these initiatives may include:

- the use of separate bins to assist Alternative Waste Technology (AWT). to process source separated food waste, and other waste streams from general waste;
- Reverse Vending Machines that allow students, staff and visitors to recycle plastic (PET) and aluminium beverage containers.
- provision of separate, collection boxes for recycling printer toners and batteries;
- identified storage area/zone for waste fluorescent light tubes and other lights.

The incorporation and location of waste minimisation initiatives will be developed in further stages of the MSEB design.

6. Attachment A – UNSW Interim Waste Plan

Interim Waste Plan

Managing UNSW's resources for a sustainable future



DRAFT INTERIM Waste Minimisation Plan as at July 2012

Related policy documents	Environment Policy Environmental Management Plan
Contact Officer	Aaron Magner, Director, UNSW Sustainability
File Number	TRIM File 2010/06324
Associated Documents	UNSW Environmental Management Plan
Date created	10 August 2011

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1. INTRODUCTION

1.1 Purpose

The purpose of this Waste Minimisation Plan is to set out the framework and procedures for sustainable management of waste within UNSW and to meet community expectations as well as state government and University resource recovery targets thereby ensuring the university's long-term environmental sustainability.

1.2 Strategic Vision

UNSW's Waste Management Strategic Vision is:

To manage our waste in a sustainable manner, minimise our environmental impact and recover the best resource value from it.

Achieving this vision will require actions to ensure UNSW's waste is collected, transported and processed using environmentally, socially and economically sound methods. It will also necessitate education and involvement of the campus community, utilisation of innovative technology and changes to our resource allocation.

1.3 Background

This Waste Minimisation Plan describes UNSW's current waste management procedures and achievements and outlines targets and actions to achieve sustainable outcomes and to meet its legislative requirements and financial goals.

If not managed properly waste can become a source of pollution that may cause harm to human health and the environment. Hazardous waste generated in residential properties requires additional consideration to protect the health of the residents and necessitates safe and timely removal.

Why UNSW needs a Waste Minimisation Plan

In 2001 the New South Wales State Government enacted the *Waste Avoidance and Resource Recovery Act 2001* which requires that waste management options are considered against the following hierarchy:

- A. Avoidance of unnecessary resource consumption
- B. Resource recovery (including re-use, reprocessing, recycling and energy recovery)
- C. Disposal

UNSW's Sustainability has set an objective of increasing recycling across campus to 80% (decreasing landfill waste to 20%) and to ensure that all waste capable of being re-used or recycled is re-used and recycled including:

- 1. General waste
- 2. Paper/cardboard
- 3. Plastics and aluminium
- 4. Glass
- 5. Furniture
- 6. Printer and copier cartridges
- 7. Food waste/organics
- 8. E-waste
- 9. Batteries
- 10. Mobile phones
- 11. Florescent lights
- 12. Building Waste

2. THE STRATEGY IN CONTEXT

2.1 Sustainability context

Universities are expected to be environmentally responsible and socially conscious. Waste management is an integral part of environmental sustainability, related to and affecting climate change, resource conservation, greenhouse gas emission levels and soil health.

Relying on landfill to dispose of waste is no longer acceptable to the UNSW community, nor is it economically viable in the long term in light of increasing disposal costs. Increased awareness amongst students and staff of the adverse environmental impacts of landfill has led to growing support for recycling, re-use and other strategies to reduce the volume of non-recycled waste.

Sustainable management of waste is environmentally sound, cost effective and socially acceptable with waste avoidance and reuse representing the best ways for the University to minimise its waste management costs and environmental impacts.

2.2 Legislative and regulatory context

The *Waste Avoidance and Resource Recovery Act 2001* (NSW) s.6 regulates waste management in NSW and requires the Director General of the Office of Environment and Heritage (OEH) to develop a waste strategy. The OEH's NSW Waste Avoidance and Resource Recovery Strategy ("OEH Waste Strategy") sets out the following key outcome areas:

- Preventing and avoiding waste (through resource efficiency and waste reduction)
- Increasing resource recovery and use of recycled/recovered materials
- Reducing toxicity in products and materials
- Reducing litter and illegal dumping
- Increasing community education and awareness in relation to waste management and resource efficiency

This strategy set a goal of fixing the total level of waste generated over a five-year period, using 2003 as the base year as well as a number of 2014 targets for increasing resource recovery in NSW including increasing recycling to 66%, commercial and industrial (C&I) to 63% and construction and demolition (C&D) wastes to 76%.

Under the *Protection of the Environment Operations Act 1997* (NSW) s.88 a Waste and Environmental Levy ("the Levy") is imposed on those contributing to certain waste facilities. This contribution is currently set at \$56.60 per tonne of waste disposed of at landfill and is set to increase by an additional \$10.00 (CPI adjusted) per tonne over the next four years. By 2014-15 the levy will be about \$90 per tonne and the landfill gate fees may reach up to \$200 per tonne. This will translate to a s.88 levy of approximately \$113, 284 and landfill gate fees of \$300, 768 should UNSW continue to generate the same level of waste generation and resource recovery.

Waste transportation and disposal activities including illegal dumping are regulated by the *Protection of the Environment Operations Act 1997* (NSW) and its associated Regulations.

Year	s88 Levy	UNSW volume	Amount
2011	\$56.60	1503.84 tonnes*	\$85,117.34
2012	\$62.26	1503.84 tonnes	\$93, 629.09
2013	\$68.49	1503.84 tonnes	\$102, 998
2014	\$75.33	1503.84 tonnes	\$113, 284.27

*Based on approximations from the 2010 Waste Audit, subject to limitations from limited sample size and timeframes, and based on figures obtained during peak campus use

2.2 Waste Management in the Sydney basin

2.2.1 Waste Collection

Innovative garbage and recycling collection and monitoring systems are now used by most waste management operations, including the use of microchips on garbage/recycling bins and trucks as well as the use of weighing mechanisms and waste bin content viewing camera. This allows for continuous collection of data on service delivery, bin presentation, participation in dry waste recycling, bin

contamination, etc with such information then used for service improvement, improved resource recovery, and for policy decisions and legislative reporting. Global Positioning System (GPS) and Geographical Information Systems (GIS) are additional components of these collection and monitoring systems and are helping to improve service delivery, OHS and quality management.

2.2.1 Disposal of Waste

The New South Wales Government Standing Committee on Public Works undertook a detailed inquiry into waste management. The Standing Committee's report confirmed that there is at most about 40 million tonnes of landfill capacity available in the Sydney basin. This means that at the current rate of 2 million tonnes per year disposal there is less than 15 years of landfill life in Sydney.

More urgently, the landfill site at Lucas Heights used by UNSW and Randwick City Council has only four to six years of life (as does Eastern Creek) and Woodlawn now has a consent cap on input (at 400,000 tonnes per year). Goulburn is the closest alternative landfill option outside of the Sydney basin.

Landfill is not therefore a viable option for UNSW for the long term. The NSW Government has also determined that "gate fees" for landfill, under s. 88 levy of the *Protection of the Environment Operations Act 1997*, will increase by 10% per annum, making landfill disposal a more costly option. On the positive side increasing landfill costs make recycling and re-use increasingly cost effective.

3. WASTE MANAGEMENT AT UNSW

3.1 UNSW Profile

UNSW has expanded rapidly and now has close to 60,000 students, including more than 8,000 international students from over 130 different countries. The main UNSW campus is located on a 38-hectare site at Kensington, seven kilometres from the centre of Sydney. Other campuses are the College of Fine Arts (Paddington), UNSW@ADFA (Canberra), and sub-campuses at Randwick and Coogee, as well as research stations around NSW.

UNSW has identified environmental sustainability as one of its strategic priorities.

3.2 Waste Management Service Responsibility

UNSW Facilities Management (FM) is responsible for general waste collection and cleaning on campus and covers the cost of this responsibility in their budget.

The UNSW OHS Unit within Human Resources manages and funds the removal of hazardous waste including biological waste and fluorescent lights.

UNSW Sustainability is responsible for the development of waste and recycling strategy, communication and engagement, reporting and regulatory compliance.

4. WASTE MANAGEMENT

4.1 Waste Collection

UNSW uses contract cleaners (Perpetual) and Doyle Bros to provide waste collection services for general waste collected from buildings and campus grounds. Doyle Bros provides a daily garbage collection service.

4.2 Waste Collection Issues

UNSW aims to collect general waste safely and to recover resources in a cost effective, sustainable manner in compliance with state legislation and the university's waste strategy.

4.4.2 Waste generation and resource recovery

A waste audit undertaken in 2010 during the semester period indicated that the largest component of the university's waste stream is organics (33% food waste and 4% other organics) followed by paper and cardboard (21.9%), other recyclables (15.2%) and other materials. This indicates that 74.1% of the university's waste could be readily recovered (through recycling systems and Alternative Waste Treatment) which would achieve its current target of reducing the volume of waste sent to landfill to 30%.

This waste audit also indicated that current bin capacity on campus may be excessive. Whilst a few bins were overfull a number were well below capacity, with average bin volume utilisation at 51% (an average of 65% for 660 litre bins and 47% for 240 litre bins). These conclusions indicate that UNSW may currently be incurring unnecessary waste disposal costs if waste collection is charged by volume.

UNSW Waste Streams⁺

General Waste

General waste from public place rubbish bins and general waste bins in offices and administration areas are emptied by contract cleaners from Quad and Perpetual into larger wheelie bins and collected daily by Randwick City Council. This general waste is transported to a waste transfer station in Rockdale operated by Waste Services Network (WSN) and then taken to a landfill site in Lucas Heights.

Paper and Cardboard

UNSW runs a successful recycling collection service for paper and cardboard with 140 litre and 240 litre blue bins located near printers, photocopiers and office corridors throughout the campus including the Library. This is then collected and sent to a recycling plant run by Amcor in Botany where it is recycled into a range of post consumer paper products. On average around 600 tonnes of material are collected each year, generating \$36, 000 in income.

Plastic and Aluminium

UNSW has installed a number of Reverse Vending Machines on campus that allows students, staff and visitors to recycle plastic (PET) and aluminium beverage containers. These machines are programmed to only accept aluminium and PET (Poly Ethylene Teraphthalate) ensuring that the materials collected are free from contamination and are of the highest quality. Reverse Vending Machines compact the waste received allowing each machine to collect up to 3000 containers and reducing the frequency of waste collection and transportation. They also offer prizes as an incentive to recycle, increasing their likelihood of being used. Envirobank provides these machines and collects the compacted materials free of charge.

E-waste

Electronic waste is taken to SIMS Metal in Villawood by a contractor at a cost of \$1,200 plus GST per tonne. UNSW collects approximately 40 tonnes of e-waste a year, costing the university \$30 000 for disposal. At present this service is not well promoted and, as a result, a proportion of UNSW's e-waste goes to landfill. UNSW has recently received an offer from Apple to host a community e-waste collection day whereby Apple would recycle through SIMS any e-waste collected free of charge.

Batteries

A domestic battery recycling collection service is available to UNSW staff and students through Battery World collection bins located in FM Assist and ARC reception. On average Battery World collects and recycles 750 kilograms of batteries each year at a cost of \$800 to UNSW.

Mobile Phones

A mobile phone recycling collection service is available to staff and students through Mobile Muster. Collection bins are located in FM Assist, Arc Reception and CONTACT with approximately 800 mobile phones collected each year at no cost to UNSW.

Printer Toner Cartridges

There are more than 80 collection boxes for recycling printer toners throughout UNSW, established through an informal, staff volunteer initiative. This collection and recycling service is provided for free by Cara Toner and Planet Ark/Close the Loop with over 5,788 empty cartridges collected for reuse since the service began.

Garden Waste

All garden organics and tree pruning off cuts are processed on site into mulch and woodchips and used back on the garden beds across the UNSW campus. Lawn clippings and some leaf material picked up while mowing lawns is collected and transported to Veolia waste station at Botany for processing.

⁺ For further information see Appendix 1- UNSW Management Responsibility for Waste Streams

Food Waste

Food represented the greatest proportion of material in the garbage stream at 33%. Recovery of this waste would allow UNSW to achieve 65% diversion from landfill and almost meet the NSW Waste Strategy 2007 target of 66%.

Fluorescent light tubes and other lights

Used fluorescent light tubes are collected by Spotless and taken to a site on Western Campus where they are stored in a safety bin which is periodically emptied by Chemsal. UNSW has a contract with Chemsal for the removal and disposal various hazardous materials including fluorescent, CFL, incandescent, halogen and discharge light bulbs/lamps and associated ballasts and transformers, High Intensity Discharge lamps (HIDs) and metal halide, through to plant and workshop waste. Approximately 65 tonnes of dead tubes are removed from UNSW each year.

Hazardous chemicals

Chemsal dispose of dangerous waste including organic solvents, oxidise, pesticides and "ionising radiation emitting materials not considered to be radioactive" (colloquially known as low level radioactive waste that is less than 100 Becquerel per gram.) Chemsal make weekly collections from the laboratories and other generators of the waste on request. They collect around 10-25 tonnes of laboratory waste a year, costing from \$500 000- \$800 000.

Sterihealth dispose of biowaste, including biowaste that contains ionising radiation emitting material that is considered sufficiently decayed to be "non- radioactive", (radioactive material cannot be disposed of from UNSW). Around 50-55 tonnes of biological waste are collected from laboratory research, at a cost of \$87, 450 (\$1.59 per kilo) to the university.

Building Waste

Waste management conditions are imposed on building contractors in their construction contracts and include criteria such as on-site separation of waste for re-use or recycling and development of a Construction Site Waste Minimisation Plan.

Re-use Initiatives

Furniture Reuse Centre

UNSW operates a furniture reuse system through which any staff member requiring additional furniture for their workplace, or wanting to responsibly dispose of old workplace furniture, can do so through an online user account. Furniture is stored offsite, with external storage provider A and N Storage.

Stationary Reuse Centre

UNSW Stationary Re-use Centre is managed by ARC volunteers and is a successful student volunteer initiative. Stationary is donated by UNSW staff and corporations.

Food Waste

Cooking oil is collected from some food outlets and processed into bio-diesel. This is done at no cost to UNSW and the program collects, on average, between 500-800 litres each month during session and 100 -250 litres out of session.

4.5 Future Waste Management Options

4.5.1 Waste Collection

Achieving UNSW's Sustainability targets will require the use of Alternative Waste Technology (AWT). There are various options for its implementation (see below) including the use of separate bins to allow AWT to process source separated food waste, or collecting green waste separately, both of which may achieve UNSW's 2014 target but which will require changes to UNSW's current waste bin infrastructure. There are also other AWT options available that will fit in the current collection system.

4.5.2 Recycling Collection

UNSW has a public place recycling collection service targeting comingled beverage container. The introduction of public place recycling and using a waste and recycling contractor delivering to a Material Recycling Facility has contributed to improved resource recovery rates to between 70 to 80% in 2011/12.

4.5.4 Resource recovery

Using current collection and recovery systems UNSW achieved a monthly resource recovery rate of between 70% and 80%.

The following actions implemented in combination can help UNSW achieving the 66% resource recovery target:

A. Increase recovery from recycling

The current recovery rates from recycling at UNSW are low. This is the result of a lack of current waste education and enforcement efforts and also stems from the fact that UNSW has a highly transient and ethnically diverse population which causes education issues. Improving waste education and enforcement activities may help reduce the current contamination rate of 7% and increase the current overall recyclable recovery rate of 83% by recovering the dry recyclables and green waste currently disposed of in garbage bins. This action alone could contribute another 9% to the overall resource recovery rate.

B. Recovery of organics from the waste stream

Currently food organics are collected in the general rubbish bin. The 2010 waste stream audit identified that 33% of UNSW's waste stream is food organics. Full recovery of this component in the rubbish bin could add another 24% to the current 39% overall landfill diversion resulting in a total diversion of 64%. In combination with increased recovery from recycling, food organics diversion will exceed the 66% resource recovery target.

Food organics can be recovered by source separation and processing in a food waste processing facility. However this will require an additional bin which will add to the existing problem of bin storage and presentation for collection. There are also issues relating to the availability of appropriate food organics processing facilities with only one such facility currently in operation in the Sydney area.

Collection of food organics with green waste in the same bin is another option. However such a collection system will require additional bins and significant public education. For this reason, resource recovery through source separated food organics is a difficult option for UNSW. But where possible it should still be investigated as it will make a significant difference to UNSW's resource recovery levels. Alternatively, this waste stream may be able to be recovered using Alternative Waste Technology.

C. Electronic Waste Recycling

Electronic waste or e-Waste is an emerging problem worldwide due to the success of the electronic industry over the last decade. Over these past ten years, consumer demand for items such as computers, mobile phones, televisions and other electronic devices has been phenomenal and is still growing at a rapid rate. Cost effective recycling would both protect the environment and increase resource recovery levels.

Recycling of e-waste is still in its infancy and quite costly. Using a sustainable method of collection and recycling of e-waste UNSW could increase diversion waste from landfill. UNSW should continue investigating sustainable method of collection and recycling of e-waste. It will also be important to increase education of any e-waste programs as the current program is not well utilised resulting in wasted resources.

D. Alternative Waste Technology

A good number of technologies are available, or are currently being developed, for the treatment of waste through mechanical, biological and/or thermal processes as an alternative to landfill. These technologies achieve varying levels of resource recovery depending on whether it processes mixed waste (collected in single bins) or source separate waste (collected in multiple bins or separated prior to processing). Source separated wastes with lower levels of contamination usually result in higher level of resource recovery.

Any alternative waste technology that is capable of processing waste collected in a three bin or less collection system will be able to address any collection issues prevalent in UNSW, and if capable of diverting more than 66% will be a viable alternative technology for UNSW. UNSW has the option of using existing facilities with the available capacity to process its waste or to develop a separate facility in collaboration with other suitably located universities and organisations.

4.6 Actions to Achieve Targets in Waste

To meet the requirements and targets of the UNSW Sustainability Strategy UNSW will take the following actions in relation to waste collection, disposal and community awareness.

A. Collection

- Improve collection systems to meet student, staff and visitor needs and achieving resource recovery target.
- Use the full capabilities of the implemented data gathering and collection monitoring systems to improve service delivery and sustainability reporting collection.

B. Resource Recovery

- Design and implement programmes to improve recovery from recycling.
- Investigate gaining access to AWT in the Sydney region and collaboration possibilities.
- Investigate possibilities of introducing source separation and processing of food waste.
- Implement AWT that will allow UNSW to meet its 66% resource recovery target by 2014.
- Investigate, identify and implement a sustainable method of e-waste recycling.

C. Education

- Develop and implement education programmes that will enable improvements in resource recovery.
- Develop and implement community education programmes to reduce levels of contamination in recycling waste bins.

Existing Waste Collection Services

Rubbish bins are installed throughout UNSW for the collection of public place waste. These bins are generally positioned in high use areas such as food halls, outside the library and along the main walkway. They are predominantly 240 litre fixed garbage bins housed in round and square blue stainless steel enclosures.

Internal and external waste and recycling bins are emptied by UNSW's contract cleaning staff.

Bins are emptied into larger 1100 litre bins stored in refuse storage points and presented for collection. (A list of refuse collection point locations and capacity is found at Annexure 2). The frequency of service varies between session and non-session and the area of the campus. The bins outside the UNSW Library are emptied and cleaned up to four times a day during term session. Other bins are serviced daily.



Typical UNSW Public place recycling and general waste bins

There are opportunities for improvements in the university's current collection system and service delivery. Further investigations will enable the identification of innovative collection systems with improved productivity and high quality service delivery.

UNSW is committed to the collection of recyclable material in public places. A number of recycling bins have been installed to determine the service requirements and contamination levels in the material collected.

Actions to Achieve Targets in Public Place Waste

To improve collection services and achieve the targets of the *NSW Waste Strategy 2007* UNSW will take the following actions:

- Investigate, identify and implement efficient collection system to improve productivity and customer satisfaction.
- Investigate, identify and implement appropriate alternative waste technology to achieve resource recovery that will meet the targets set in the *NSW Waste Strategy 2007*.

Waste Generation and Resource Recovery

Through commercial waste services UNSW collects approximately 1,500 tonnes of waste with high content of food organics.

About 14% of the waste has been recycled through collection of source separated cardboard. Implementation of AWT can help achieving 63% resource recovery target of the *NSW Waste Strategy 2007* for commercial and industrial waste.

Actions to Achieve Targets in Waste

To achieve the targets of the UNSW Sustainability Strategy and UNSW's financial goals UNSW will take the following action:

- Investigate, identify and implement financially viable recycling service to improve resource recovery.
- Prepare and implement a business plan for UNSW's Waste Services to improve recycling rates service and resource recovery.

5. Next steps

A total waste management system that aligns with the overarching vision of environmental sustainability will need to use advanced technologies and make further changes to the way we now manage waste.

Following the actions identified in this Interim Waste Strategy, UNSW expects to produce a Final Draft Waste Strategy later in 2013.

UNSW will be working with stakeholders and the University community in the development of its final Waste Minimisation Strategy.

There will also be further opportunity for the University community to review and comment on the Final Draft Waste Strategy in 2012/13.

Appendix 1- UNSW Management Responsibility for Waste Streams

Waste Stream	Executive Responsibility	UNSW Management Responsibility	Contractor	Details/Comment	Volume/ year
Batteries	University Services	UNSW Sustainability	MRI	Three collection bins on campus – FM Assist, Arc reception and Contact	750kg
Beverage containers – Plastic and Aluminium	University Services	Facilities Management – Cleaning services	Doyle Bros		
Biological Waste (Including Animal Carcasses., and sharps)	University Services	Human Resources - OHS Unit	Sterihealth	See: UNSW Laboratory Hazardous Waste Disposal Procedure . Infectious, Biological, Clinical, GMO, human blood or body fluids, infectious animal carcasses or material	~50 – 55 tonnes (varies in accordance with research)
Building Waste	Finance & Operations	FM – Project Director	Relevant contractor	Managed through Facilities Management via construction contract.	Varies according to construction pgm.
Chemicals - laboratory waste	University Services	Human Resources - OHS Unit	Chemsal	UNSW Laboratory Hazardous Waste Disposal Procedure .	10 - 25 tonnes (excludes trade waste)
Drugs (Schedule 8 drugs)	University Services	Human Resources - OHS Unit	n/a	Duty Pharmacist from NSW Health Department notified if any Schedule 8 drugs require disposal.	>10 kilos
E-waste	Finance & Operations	Facilities Management – Waste Manager	SIMS Metal	E-waste collection arranged via an Request for Works and Services (RWS) .	40 tonnes
Fluorescent lights	Finance & Operations	Facilities Management -	Chemsal and Spotless	A site for receiving old tubes located adjacent the Spotless Office on the Western Campus. Spotless contact the UNSW OHS Co-ordinator via a Chemical Waste Inventory Form OHS014 to pick up and remove any dead tubes etc. Lights stored in a safety bin in the On a periodical basis the bin is emptied by Chemsal. Removal and disposal various hazardous materials including fluorescent, CFL, incandescent, halogen and discharge light bulbs/lamps and	Approx 65 tonne

				associated ballasts and transformers, High Intensity Discharge lamps (HIDs) and metal halide, through to plant and workshop waste.	
Furniture reuse	Finance & Operations	Facilities Management	Crown	Any UNSW staff member needing additional furniture for their workplace, or wanting to responsibly dispose of old workplace furniture can create a user account, and search for furniture via the UNSW Furniture Re-use Centre . To donate furniture to the Furniture Re-use Centre fill out an online Request for Works and Services (RWS). Furniture is stored offsite, with external storage provider	
Garden Waste	Finance & Operations	Facilities Management - Grounds	The Green Horticultural Group	All garden organics and tree pruning off cuts are processed on site into mulch and woodchips and used back on the garden beds across the UNSW campus. Lawn clippings and some leaf material picked up while mowing lawns is collected and transported to Veolia waste station at Botany for processing. UNSW uses organic fertilisers for the gardens, lawns and sports fields.	
General Waste	Finance & Operations	Facilities Management – Waste Manager	Doyle Bros		
Glass	Finance & Operations	Facilities Management – Waste Manager	Doyle Bros	Glass where UNSW can present sorted for separate collection.	
Human Tissue	University Services	Human Resources - OHS Unit	Sterihealth	Recognisable Human Tissues or body parts	Sent back to Families
Mobile Phones	University Services	UNSW Sustainability	Australian Recycling Program	UNSW partners with Fauna and Flora international	
Paper and Cardboard	Finance &	Facilities Management –	Amcor		600 tonnes

	Operations	Waste Manager			
Radioactive	University Services	Human Resources - OHS Unit	Chemsal	Radioactive Waste Transfer Request Form	No Radiation 'waste' is allowed to leave UNSW.
Ionising radiation emitting materials (<schedule 1, Radiation Control Regulations)	University Services	Human Resources - OHS Unit	Chemsal	Integrated into hazardous waste removal: See: UNSW Laboratory Hazardous Waste Disposal Procedure .<schedule 1 Radiation Control Regulations statement eg<100 Bq/g Radioisotopic declaration form	Decayed radioactive isotopes are incorporated into the figures for chemical waste (i.e. are now just chemicals)
Stationary - Reuse	University Services	ARC	ARC volunteers	Student volunteer project	
Toner Cartridges	University Services	UNSW Staff Volunteers	Caratoner and Planet Arc		5,788 empties

Appendix 2 - UNSW Refuse collection points

The locations for the storage of waste and recycling are set out in the following table. These locations are convenient for users and waste collections staff.

Location Name	Map Ref	Building serviced	Bin Storage Capacity	Gate Entrance	Vehicle Access and clearance	Maximum distance travelled between storage point and collection point
Wallace Wurth	C27	Wallace Wurth	14 X 240 L	Gate 10		
Biological Science	D26	Bio, Scieince – Lowy Samuels – Wallace Wurth	12 X 660 L 18 X 240 L	Gate 11		
AGSM	G27	AGSM	6 X 240 L	Gate 11		
Valentine Annex	H22	Mathews Civil Library	3 X 660L 18 X 240 L	Gate 11		
Chancellery	B21/C21	Chancellery	2 X 660 L 6 X 240 L	Gate 8		
Basser College	B18	College	3 X 240 L	Gate 7		
Morven Brown	C20	Morven Brown Goodsell	12 X 240 L	Gate 8		
Goldstein College	D16	College Kitchens	3 X 660L	Gate 5		
Goldstein College	D16	College Kitchens	11 X 240 L Recycling Bins	Gate 5		
Goldstein College Baxter	C16	College Kitchens	3 X 660L 21 X 240L	Gate 4		
Campus Living Villages	D14	Campus Living Villages	10 X 660 L 10 X 240 L	Gate 2		
Quadrangle	E15	Quad & ASB	?	Gate 2		
Scientia	G19	Scientia	9 X 240 L	Gate 14		
Mechanical Engineering	G18/J17	K17 Mechanical Engineering Electric	3 X 660L	Gate 14		
Barker St Parking Station	M15	Rupert Myers – K17	4 X 660L 2 X 240L	Gate 14		
Physics Theatre	K14	OMB REDCTR	14 X 660L 11 X 240L	Gate 14		
Barker Apartments	N13		1 X 660L 9 X 240L	Gate 14		
House at Pooh Corner	N8		1 X 660L	Gate 14		
New College	L6		10 X 240L	Gate 14		

223 Anzac Parade	L5		4 X 660	Houston Lane		
New College PostGrad Village	J2/H3		12 X 240			
NIDA						
Squarehouse	E4	Square House Unigym	4 X 660L 3 X 240L	Gate 2		
Roundhouse	E6/E8	MA/SCI Roundhouse	8 X 660L 12 X 240 L	Gate 2		
IO Myers Studio	D8/D9					
Allens Arthur Robinson ?	F8/F10	Chemical Science Dalton Law	4 X 660L 13 X 240L	Gate 2		

* These collection points are based on those identified in the 2010 UNSW Waste Audit. The bin storage capacity at these sites is subject to variation due to the transient nature of UNSW bins—they are moved daily by cleaning staff for OH&S and ease of servicing reasons.

Appendix 3 - Distances of Waste Facilities from UNSW Kensington Campus

Facility	Waste Stream	Location	Web site	Comment	Distance
Sita Resource Recovery Centre	General Waste	Rockdale		Location where Randwick Council initially transport general waste	12km
Landfill site	General Waste	Lucas Heights		NB: From Rockdale to Lucas Heights where Sita transports Randwick waste to a landfill site the distance is 26.8km.	36.8km
Sita Resource Recovery Centre	General Waste	Artarmon	http://www.wsn.com.au/dir138/wsn.nsf/Content/Facilities_Artarmon+Facility	Macquarie Uni transports its waste here for compacting before it is transferred to Narellan	14.3 km
Sita Resource Recovery Park	Deals with organics, resource recovery, green energy, landfill etc, AWT	Narellan	http://www.wsn.com.au/dir138/wsn.nsf/Content/Facilities_Jacks+Gully+Facility http://www.wsn.com.au/dir138/wsn.nsf/AttachmentsByTitle/brochure_ecolibrium_casestudy_macarthur/\$FILE/Macarthur_case_study.pdf	Macquarie Uni has its waste transported from Artarmon/Ryde to here for processing and to reduce the number of trucks going here. From Artarmon to Narellan is 72.6km The MRRP is Australia's first fully integrated waste processing facility. The only materials leaving the site are the recovered resources sold for recycling and re-use.	61.4km
Sita Eastern Creek	AWT, Organics, bioreactor, green energy	Eastern Creek	http://www.wsn.com.au/dir138/wsn.nsf/Content/Facilities_Eastern+Creek+Facility		43.3km
AMCOR	Paper and cardboard	Botany		Paper and cardboard recycling	6.9km
VISY	Glass recycling	Botany			6.9km
SIMS Metal -	e-waste	Villawood		E-waste	
Veolia Woodlawn Eco-Precinct	Bioreactor, AWT, proposals to build and Alternative Sorting and Processing facility and Composted Organics and Greenwaste	Tarago	http://www.veoliaes.com.au/recycling-services/resource-recovery-facilities/bioreactor-landfills		236.8km

Appendix 4 - Waste, Recycling and Reuse Action Plan

Action	Key Personnel
Improvement of collection systems to meet the UNSW needs and achieving resource recovery target	FM Waste Manager
Design programmes to improve recovery of recyclable waste	UNSW Sustainability.
Implement programmes to improve recovery of recyclable waste	FM
Establish a Waste Reduction & Recycling Action Group to find solutions for UNSW's waste	UNSW Sustainability.
Examine and re-examine our supply chain to find new ways of reducing waste from consumption and transforming waste into resources	Procurement
Investigate gaining access to an Advanced Waste Treatment facility in the Sydney region and collaboration possibilities	UNSW Sustainability.
Investigate possibilities of introducing source separation for glass, plastic and aluminium cans	UNSW Sustainability and FM Waste Manager
Investigate possibilities of introducing source separation and processing of food waste	UNSW Sustainability and FM Waste Manager
Develop and implement community education programme aiming at reduction of contamination in recycling waste bins	UNSW Sustainability and FM Waste Manager Arc Marketing
Investigate and identify sustainable method of e-waste collection and recycling	UNSW Sustainability and FM Waste Manager IT Procurement Manager
Run a waste and recycling awareness campaign to educate and raise consciousness in the University community of sustainable waste management practices (rethink, reduce, reuse, recycle).	UNSW Sustainability Media and Communications
Gather data and report on progress on an annual basis.	UNSW Sustainability and FM Waste Manager
Establish a Waste Reduction and Recycling Action Group to advise and assist in the implementation of our sustainability targets.	UNSW Sustainability and FM Waste Manager

7. Attachment B – UNSW Laboratory Hazardous Waste Disposal Guideline



Policy Hierarchy link	OHS Policy		
Responsible Officer	Manager, OHS Unit		
Contact Officer	Manager, OHS Unit. Adam Janssen, Ph 93852214 Email: d.janssen@unsw.edu.au		
Superseded Documents	Version 2.3		
File Number	TRIM 2007/1217.		
Associated Forms	Chemical Waste Request form Biological Waste Request form Radiation Waste Declaration form Radiation waste transfer form		
Version	Authorised by	Approval Date	Effective Date
3.0	Director Human Resources	4/04/2011	4/04/2011

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1. Introduction and Scope

The purpose of this procedure is to assist the University of New South Wales (UNSW) in meeting its obligations to dispose of hazardous waste items, generated by research and teaching laboratories, in an environmentally safe manner.

During the planning phase of projects, the hazards associated with the storage and disposal of wastes should be addressed and should include waste minimisation strategies.

This procedure applies to all UNSW facilities and operations where hazardous substances are used for research or teaching. It includes chemical waste (solids, liquids and gases), infectious and biological hazardous waste, general laboratory waste, glass, sharps, radioactive wastes and other hazardous liquids and materials.

Where UNSW personnel are occupying a facility controlled by another organisation, that organisation's waste disposal procedures may be followed.

2. Definitions

Animal carcasses: deceased animals or animal tissue that has been used for research or teaching. This category does not include animals that have been contaminated with any other hazardous substance see section 3.12 Co-mingled waste requirements.

Biological waste:

- any material from animals (including birds and fish), plants and invertebrates, whether or not the material is recognisable, and including the whole organism (carcass)
- microorganisms (including protozoa & other parasites) fungi, archaea, bacteria, unicellular algae, viruses and viroids,
- anything else that could cause disease in a host (such as prions)
- genetically modified organisms (GMOs) or products from GMOs,
- SSBA's (see definition)
- any material that is contaminated with or potentially contaminated with any of the above, including:
 - disposable laboratory plastic-ware, petri-dishes, culture bottles, pipettes, disposable equipment, gloves, infected bedding, soil and water, left-over feed.

Broken glass: broken laboratory glassware. Considered a sharp and therefore must be disposed of into a rigid, puncture-proof container. Ordinarily, broken glass pieces will be placed into the 15 litre white buckets, particularly pieces that are too large to place in a laboratory sharps bin. Broken glass must be segregated into separate buckets labelled either Contaminated or Non-contaminated broken glass, with the nature of the contamination as described in 3.3 and 3.4.

Chemical waste: all chemicals or materials that are contaminated with chemicals. This includes but is not limited to explosive, flammable liquids/solids, poisonous, toxic, ecotoxic, infectious substances, waste oils/water, hydrocarbons/water mixtures, emulsions; wastes from the production, formulation and use of resins, latex, plasticisers, glues/adhesives; wastes resulting from surface treatment of metals and plastics; residues arising from industrial waste disposal operations; and wastes which contain certain compounds such as: copper, zinc, cadmium, mercury, lead and asbestos.

Co-mingled waste: a combination of two or more waste categories, such as infectious and radioactive waste, or infectious and chemical wastes.

Cytotoxic waste:

- waste materials that are or may be directly toxic to cells, kills cells, or prevent their reproduction or growth.
- waste material that is, or may be, contaminated with a cytotoxic drug during the preparation, transport or administration of chemotherapy. Cytotoxic drugs are toxic compounds known to have carcinogenic, mutagenic and/or teratogenic potential.
- waste materials that contain or may contain agents which, as a side effect, can damage healthy, noncancerous tissues or organs which have a high proportion of actively dividing cells.

Domestic waste: includes paper, boxes, plastic (*non-scientific* disposables), paper towels and any other disposable material that has not been in contact with chemical, biological, infectious, GMO, cytotoxic, SSBA, radiation or other hazardous substances. Much of this waste can be recycled.

Note: *Do not dispose of gloves, pipettes, plastic laboratory disposables, tips or tubes, whether or not they have come into contact with any contaminants, into a laboratory domestic waste bin.*

Double containment: any container of viable microorganisms shall be transported between laboratories, or to pressure steam sterilizers within the building, within a second unbreakable and closed container which can be readily decontaminated. All GMOs must be transported according to the OGTR Guidelines (Office of the Gene Technology Regulator) for the Transport of GMOs.

GMO: Genetically modified organism, as defined by the OGTR (Office of the Gene Technology Regulator).

General laboratory waste: contains paper, paper towels, gloves, pipettes, tips, tubes and other general laboratory material, including those that may be contaminated with trace amounts of chemical residues.

- This waste is disposed of as either chemical waste or as biological waste, depending on the laboratory in which it was generated.
- Absorbent materials that have been used with disinfectants to disinfect surfaces are included in general laboratory waste and are disposed of as chemical waste (see 3.13).

Hazardous waste: any waste that has the potential to cause harm. It includes:

- explosive flammable liquids/solids, poisonous, toxic, ecotoxic, infectious substances, chemicals, potentially unstable substances,
- clinical, GMO, Quarantine, SSBA wastes,
- waste oils/water, hydrocarbons/water mixtures and emulsions,
- wastes from the production, formulation and use of resins, latex, plasticizers, glues/adhesives,
- wastes resulting from surface treatment of metals and plastics,
- residues arising from industrial waste disposal operations, and
- wastes which contain certain compounds such as: copper, zinc, cadmium, mercury, lead and asbestos.

Human tissue: recognisable human tissue or body parts.

Plant workshop waste: typical waste includes hydrocarbons such as oil and grease, detergents, batteries, scrap metal, timber off cuts, perspex, fibre-glass, obsolete plant and equipment and building materials.

Sharps: objects or devices having sharp points, protruding pieces or cutting edges, capable of cutting or piercing the skin and include (loaded or empty) syringes with needles, suture needles, glass slides and coverslips, broken glass, broken tissue-culture plastic-ware, scalpel blades, broken bone edges, and pointy-tipped surgical

instruments (eg small drill-bits, fine-nosed scissors and forceps). Sharps waste must be collected in a rigid, puncture-proof container (see AS4031). See also 3.3, and 3.4.

Radioactive waste: material that has a:

- A. specific activity greater than 100 becquerels per gram (2.7 nCi/gm or 2.7 μ Ci/Kg) **AND**
- B. total activity of one of the following:
 - i. greater than **40 kBq** ($\sim 1\mu$ Ci) of Group1 radionuclides, **OR**
 - ii. greater than **400 kBq** ($\sim 10 \mu$ Ci) of Group2 radionuclides, **OR**
 - iii. greater than **4 MBq** ($\sim 100 \mu$ Ci) of Group 3 radionuclides, **OR**
 - iv. greater than **40 MBq** (~ 1 mCi) of Group 4 radionuclides.

Note : UNSW cannot **dispose** of radioactive waste. It must be stored until the background level has reached an acceptable level. See section 3.9 Radioactive waste Requirements.

Schedule 8 drugs: those drugs which are listed under Schedule 8 of the Standard for the Uniform Scheduling of Drugs and Poisons (SUSDP) which is incorporated within the Drugs and Poisons and Controlled Substances (DPCS) Act and are also known as Drugs of Addiction.

SSBA: Security Sensitive Biological Agent. Biological agents considered a security concern in Australia, according to the Federal Government's Department of Health and Aging.

3. Waste guidelines

3.1 General requirements

3.1.1 Responsibility

Managers and supervisors must ensure that:

- a) staff and students implement the requirements of this procedure;
- b) hazardous waste is identified and segregated into the appropriate waste streams;
- c) hazardous waste is stored, labelled and transported appropriately;
- d) staff receive appropriate training that includes waste segregation, storage requirements, transportation requirements, labelling, emergency procedures, spill control and awareness of all associated hazards.

All hazardous waste generated for the purposes of research or teaching shall be:

- a) managed using Sections 3.2 to 3.14 of this Guideline.
- b) segregated into the waste categories identified in Table 1 Hazardous Waste Categories;
- c) clearly labelled using the UNSW Hazardous Waste Label (additional information may be added if required).

There must be ready access to spill kits and appropriate Personal Protective Clothing and Equipment (PPCE) close to the waste storage location.

3.1.2 Table 1: Hazardous Waste Categories

Waste Category & Colour Code	Waste Descriptor (See Section 3 Definitions)	Specific Category Information	Legislation, Australian Standard
Domestic	Paper and plastics	3.2	AS/NZS 2243.3
Broken glass	Broken glass – non contaminated	3.3	AS/NZS 2243.1
Sharps	Sharps e.g. scalpel blades, syringe needles	3.4	- AS/NZS 2243.3 - AS 4031
Chemical	Chemical	3.5	- NSW OHS Act and Regulations - POEO Act 1997 - AS/NZS 2243.2
Biological	Infectious, Biological, Clinical, GMO, human blood or body fluids, infectious animal carcasses or material, SSBA	3.6	- AS/NZS 2243.3 - AQIS - Gene Technology Act and Regulation - National Security Act and Regulation
Animal Carcasses	Animal carcasses	3.7	AS/NZS 2243.3 & .4
Cytotoxic	Cytotoxic drugs or materials contaminated with cytotoxic drugs	3.8	AS/NZS 2243.1
Radioactive	Radioactive waste (Stored at UNSW until decayed)	3.9	- NSW Radiation Control Act and Regulation - AS/NZS 2243.4
Schedule 8 Drugs	Drugs of addiction	3.10	NSW Poisons and Therapeutic Goods Act and Regulation
Human Tissue	Recognisable Human Tissues or body part	3.11	NSW Anatomy Act and Regulation
Co-mingled	Mixed waste categories	3.12	AS/NZS 2243.3
General Laboratory Waste	General laboratory disposable materials eg. including soft waste (PPE) and tips/tubes contaminated with residues including absorbent materials used with disinfectants.	3.13	- Health Industries Resources, waste management - EMIAA
Plant Workshop Waste	Typical waste includes hydrocarbons such as oil and grease, detergents, batteries, scrap metal, timber off cuts, perspex, fibre glass, obsolete plant and equipment and building materials	3.14	DECCW

3.1.3 Table 2: UNSW Hazardous Waste Collection Days

Waste Type	Fax must be received on	Collection Day	Fax Number
Biological	Monday Noon	Tuesday	9385 4532
Biological	Thursday Noon	Friday	9385 4532
Chemical	Monday Noon	Thursday	9385 4532

Use the Biological and Chemical Waste Request forms.

3.1.4 Waste labels

The UNSW Hazardous Waste Label requires the following information to be included:

- **Waste Category:** _____
- **Specific hazard information:** _____
- **Waste Generator:** person responsible for the waste
- **Date:** date or period over which the waste was generated
- **Building:** Building and building number
- **Room:** where the waste was generated (laboratory or facility, room number)

3.2 Domestic Waste Requirements

Domestic waste must only be placed in a bin labelled “Domestic Waste Only”. This may also include uncontaminated plant material. Domestic waste must not be mixed with any other waste category.

If domestic waste is contaminated, it takes on the waste category of the contaminating material.

Uncontaminated paper and cardboard may be recycled into the blue paper recycling wheelie bins.

Labelling

- The bin for collecting non contaminated waste must be labelled as “**Domestic Waste Only**”.

Storage

- Black-plastic lined bin.

Disposal

- Cleaning staff collect Domestic Waste Only bins weekly. They will not touch Domestic Waste bins that contain non-domestic type wastes (gloves, pipettes etc). Domestic waste is removed from UNSW by council waste contractors.

3.3 Broken Laboratory Glass Waste Requirements

- Broken glass is considered a Sharp and must be disposed of into a rigid, puncture-proof container that meets Australian Standard requirements (see AS 4031).
- All large pieces of broken glass are to be collected in the white 15L lidded buckets.
- The bucket must be labelled “Uncontaminated broken glass” unless the glass has been contaminated.
- Contaminated broken glass must be segregated from non-contaminated broken glass and labelled as “Contaminated broken glass”, and the nature of the contamination specified.
- **NOTE:** If contaminated glass ends up in the bucket with uncontaminated glass, the bucket must be labelled according to the contamination as “Contaminated broken glass”.
- Small glass items, such as pasteur pipettes, glass slides, cover slips and small glass vials can be disposed of into yellow sharps containers. See also 3.4.

The white 15L buckets are available from:

- Faculty of Science WebStore, Lowy Building LG08 x52007 (link, Section 5.3)
- Chemistry Store, Applied Sciences Building F10 – ext 54695

When disposing of any broken glass, ensure any contamination hazard is taken into account before disposal.

Note: *Only glass “sharps” are to be placed in buckets that are labelled as containing broken glass. Do not mix broken glass with sharps of other materials.*

Labelling

- The broken glass waste label requires the following information:

Waste Category: (type of) Broken glass

Specific hazard information: Broken Glass – keep lid closed

Waste Generator: person responsible for the waste

Date: date or period over which the waste was generated

Building: Building and building Number

Room: where the waste was generated (laboratory or facility, room number)

Storage

- All broken glass must be stored in a white 15L broken glass bucket with the lid closed.

Disposal

- When the glass bucket is full, close the lid and fill out a chemical waste request form identifying the number of glass buckets to be removed. All waste request forms should be faxed through to FM Assist on ext. 54532.

3.4 Sharps Waste Requirements

All sharps are to be collected in a rigid, puncture-proof container that meets Australian Standard requirements (see AS 4031).

Large broken glass pieces are collected in the *white buckets* (described in 3.3).

Small items with sharp edges are collected in the *yellow* sharps bins. Fill the bins up to the level indicated on the front label. Overfilling the bins can result in sharps injuries, so do not overfill them. Do not force items into the container.

The yellow bins are to remain in the area where the sharps are generated until the container is full or the container is no longer required. Once full, the bins are to be locked closed and removed from the area.

- The bins **must not be used** unless properly assembled, as this can increase the risk of a sharps injury.
- The bins **must not be used** for any other purpose than for the disposal of sharps, **including** the use of half the unassembled yellow bin for ANY other purpose, as this can lead to confusion and possible sharps injuries.

Note : *do not dispose of liquids into sharps bins. They are not leak-proof.*

UNSW supplies Australian Standard AS 4031 approved sharps containers for free. They are available from:

- Faculty of Science WebStore, Lowy Building LG08 x52007 (link, Section 5.3)
- Chemistry Store, Applied Sciences Building F10 – ext 54695

Figure 1: Sharps container before assembly



Labelling

- The sharps bin requires the following additional information to be included:

Waste Generator: person responsible for the waste

Building: Building and building number

Room: where the waste was generated (laboratory or facility, room number)

Storage

- Sharps waste must be stored in an assembled sharps bin (figure 1) which is kept close to where the sharps are generated.

Disposal

- When the sharps bin is full, the lid must be closed and then locked by pressing in the locking mechanism. It is then placed into one of the yellow wheelie bins at a biological waste collection point (see the Biological Waste Collection Schedule). Fill in the biological waste request form.

Note: Don't autoclave sharps bins.

- there may be chemical residues which could be explosive, corrosive or produce toxic fumes
- the plastic will melt, potentially leaving exposed sharps
- melted plastic can block the autoclave's vent mechanism

3.5 Chemical Waste Requirements

Hazardous substances must, under no circumstances, be allowed to enter storm water drains. **Do not dispose of hazardous substances or dangerous goods down the sink.** In addition, careful consideration shall be given to the placement of chemical waste containers to ensure any potential leaks do not enter drains, including storm water drains.

Chemical wastes must be segregated according to 3.5.4(b).

Spill kits must be available for all types of hazardous waste generated and staff trained and competent in spill clean-up procedures.

Where metal drums are used for waste transport, they must be compatible with the liquids they are intended to contain, and must be placed in spill containment trays at all times to contain the waste in the event of a leak.

Empty glass containers, such as Winchesters, must not be used to collect or store chemical wastes. See 3.5.3 for disposal. Glass containers should be packaged to minimise damage to the container. Glass winchesters should be transported in polypacks, racks, or other suitable non breakable container.

3.5.1 Liquid-waste containers

Liquid-waste containers (available from the upper and lower campus stores) must be kept closed (sealed) at all times except when you are actually adding waste. Cork, rubber, or ground-glass stoppers; aluminum foil; and polyethylene film or parafilm are not considered adequate. Open the container for only as long as you need to add the waste.

A container with a funnel in the opening is not considered closed unless the funnel itself seals to the container and would prevent spillage.

If the waste is likely to generate gases during storage, vented caps should be used.

3.5.2 Secondary containment (bundling) of liquid waste

All liquid waste containers must be banded (i.e. the waste container placed within an embankment or secondary container in order to prevent any spills from travelling) in order to contain any liquid in the event of an emergency spill or leak.

These secondary containers must be compatible with the chemicals they are intended to contain. The height of the band required will depend on the volume of liquid in storage, and the band volume normally is 120% of the volume. Segregation of incompatible hazardous wastes must be observed.

3.5.3 Empty chemical containers

Containers that are empty, or contain only small residual amounts of liquid, must be identified as 'empty' on the Chemical Waste form.

3.5.4 Specific Hazardous Waste

- **Peroxide forming compounds** (e.g. diethyl ether,) must have a date of receipt and opening written on the container. The maximum storage period must not have expired. This is generally six months.
- **Unknown waste** is handled on a case by case basis.
 - Avoid generating unknowns by keeping the chemical register up to date and keeping good records of the waste you produce.
 - Diligently label all waste containers.
 - On completion of research projects, and before leaving the University, research staff and students must decontaminate equipment, and either dispose of their chemicals and samples, or pass them on to their Supervisor.
- **Explosive waste** is handled on a case by case basis.
 - Avoid generating this waste by storing the chemical as recommended on the MSDS.
 - Diligently observe the expiration dates on chemical labels.

- **Radiation liquid wastes** measured **above** background levels are not allowed to be disposed of. See Section 3.9.1 for handling this waste.
- **Tissue samples in fluid**, such as animal or human tissue samples fixed in formalin, are disposed in the following manner:
 - Drain off the fluid into a chemical waste container (no solid pieces are to remain in the fluid). This fluid becomes chemical waste, must be labelled according to its hazard and is collected by the chemical waste contractor.
 - The solid wastes are wrapped so that they are unidentifiable as tissue, and don't leak. They become solid chemical waste, must be labelled according to the chemical hazard and collected by the chemical waste contractor.

Labelling

- The Chemical Waste label requires the following information:

Waste Category: Chemical Waste

Specific hazard information: Name of substance or, if a mixture, the list of ingredients. Add DG class, if relevant

Waste Generator: person responsible for the waste

Date: date or period over which the waste was generated

Building: Building and building Number

Room: where the waste was generated (laboratory or facility, room number)

Storage

a) Collection Point

Ensure there are defined waste collection points in each area or building which have restricted access, to members of the public. If the waste collection point is inside the laboratory, occupants are to ensure the area is kept clear, is dedicated to waste storage and is labelled accordingly. Bunding is recommended at all waste collection points appropriate to the size of the container.

b) Waste Segregation

The rule is the same for chemical waste as it is for chemical storage. Waste should be segregated in accordance with chemical compatibility and Dangerous Goods class.

Where many different substances are being used and it is not practicable to have separate containers for each individual substances the following waste categories are acceptable:

- Halogenated Hydrocarbons
- Non-Halogenated Hydrocarbons
- Aqueous Waste – Acid [dilute solutions less than 5M*]
- Aqueous Waste – Alkali [dilute solutions less than 5M*]
- Aqueous Waste with Heavy Metal Content
- Aqueous Waste with non-Heavy Metal Content

Note *: Any acids or alkalis more concentrated than this should not be mixed. They should be stored as their individual constituent (eg. Hydrochloric acid, Nitric acid etc) for pick-up by the chemical waste contractor. Alternatively, they could be diluted or neutralised, following a safe work procedure, and put out for collection.

Disposal

- For collection of chemical waste, please complete a chemical waste request form.
- All waste request forms should be faxed through to the FM Assist on 9385 4532.

3.5.5 Other Hazardous Waste

- **Polychlorinated biphenyls (PCBs)**

At no stage should polychlorinated biphenyls (PCBs) or other halogenated compounds be mixed with other waste. These require special disposal through the OHS Unit.

Note: Refer to OHS301 PCB Spill Response and Disposal Procedure

- **Asbestos**

Where asbestos material has been identified or is suspected within the infrastructure of a building i.e. pipe lagging, roof sheeting, wall insulation etc., you must contact your Facilities Client Manager. Contact the OHS unit if you have ovens, furnaces or other laboratory equipment which you suspect may pose an asbestos risk. The waste contractor currently used by UNSW for Chemical Waste removal is also licensed to accept Asbestos waste.

3.6 Biological Waste Requirements

Note: some biological agents, such as Prions, may require more than one decontamination method to successfully render them non-viable. Refer to AS/NZS2243.3 to check the requirements for your biological agent.

Note: All Security Sensitive Biological Agents (**SSBA**) waste disposal must also follow the Department of Health and Aging requirements, in consultation with the UNSW OHS Unit, and in addition to Section 3.6 of this guideline.

Biological waste is either liquid, non-liquid waste (solid), or mixed. See the definition for Biological Waste. The following describes the methods for the treatment and disposal of each type.

3.6.1 Liquid biological waste requirements

(a) Chemical decontamination

Liquid biological waste that contains or potentially contains infective agents or GMOs, can be decontaminated by using the appropriate chemical decontaminant, as identified in AS/NZS2243.3:2010 Appendix F. Once decontaminated, the waste is disposed of as *chemical waste* and collected by the chemical waste contractor.

Warning:

DO NOT chemically treat the waste AND then, also, autoclave it. This can lead to an [explosion](#), as well as corrosive and toxic atmospheres inside the autoclave. Once chemically treated, the waste is disposed of as *chemical waste*.

(b) Waste containing cytotoxic substances

The waste must go into purple cytotoxic bins as described in 3.8.

3.6.2 Non-liquid biological waste requirements

- Solid biological waste is disposed of in one of two different ways. See 3.6.2 a) and b).
- If the waste is likely to putrefy before the day of biowaste collection, it is advised to either freeze it or put it in a cold-room until the afternoon before the day of collection, and then take it to the yellow wheelie-bin. The waste contractors often arrive very early in the morning.
- Remember, you must double-contain all of the above waste for transport to the autoclave or yellow wheelie bin.
- No animal carcasses are to be placed into any domestic waste bin. All carcasses are to be disposed of as biological waste.
- Disposal of laboratory-animal waste and bedding, and plant soil and containers:
 - If the waste is **not** contaminated with infectious microorganisms, GMOs, radiation or chemicals, it may be disposed of as solid domestic waste. No such waste is to be disposed of to building drainage, storm water or sewerage system. If you need extra regular green wheelie bins for this domestic waste, contact FM Assist on 9385 6642.

(a) Autoclave method

Note: You must follow the autoclave process described in **Appendix 1: Autoclave Requirements**.

- Waste is contained in autoclave or clinical waste bags that have the biohazard symbol on the outside. The waste is autoclaved according to the requirements in AS/NZS2243.3. See *Appendix 1: Autoclave Requirements for autoclaving biowaste*.
- Once autoclaved, the treated waste is either:
 - Labelled (see 3.1.4) and placed into a yellow biowaste bin for collection by the Biowaste contractor, or
 - **ONLY IF** the autoclave load has been **validated** and documented to ensure that all GMOs and potentially pathogenic biological agents have been rendered non-viable, the autoclaved bag is to be de-identified, by placing it inside a black plastic bag and then disposing of it into a green domestic waste wheelie-bins. See Appendix 1, paragraph 4.
- Carcasses that contain infective agents or viable GMOs should be autoclaved before disposal. They must go out as biowaste, whether or not they've been autoclaved.

(b) Non-autoclave method

- Waste is placed into an autoclave or clinical waste bag with the biohazard symbol on the outside, or wrapped in opaque wrapping with a biohazard symbol applied to the outside. The waste is labelled according to 3.6.5, and placed into a yellow biowaste bin for collection by the Biowaste contractor.

3.6.3 Mixed biological waste requirements

An example of mixed waste would be tissues in a fluid bath, such as when fixed in formalin. These are disposed of as chemical waste in the following manner:

- Drain off the fluid into a chemical waste container (no solid pieces are to remain in the fluid). If the fluid contains viable microorganisms or GMOs, it must be chemically treated (Appendix F in AS/NZS2243.3). This fluid becomes *chemical waste*, must be labelled according to its hazard and is collected by the chemical waste contractor.

- The solid wastes are wrapped so that they are unidentifiable as tissue, and don't leak. If the tissue contains cytotoxic chemicals it must be disposed of as cytotoxic waste into a purple cytotoxic bin (see 3.8). In all other cases they become solid *chemical waste*, must be labelled according to the chemical hazard and collected by the chemical waste contractor.

3.6.4 Liquid biological waste disposal

This waste is chemically decontaminated. Once treated, the liquid become chemical waste and must follow the requirements for the disposal of chemical waste described in 3.5.

3.6.5 Non-liquid biological waste disposal

Labelling

- All biological waste (that is not contaminated with cytotoxic chemicals or dangerous goods) must be collected in a robust plastic bag (autoclave or yellow clinical waste bag) and double-contained for any transport outside of the facility (eg to the autoclave or to the biowaste store). The outside container must display the biohazard symbol (figure 2).
 - Solid waste, such as whole or part animal carcasses, must be wrapped so that contents are not visible or identifiable.
- Biowaste that is disposed of into the yellow wheelie-bins must have the following label:

Waste Category: eg Biological waste

Specific hazard information: if relevant eg Risk Group 2 or Infectious waste etc. If it is infectious, include DG 6.2.

Waste Generator: person responsible for the waste

Date: date or period over which the waste was generated

Building: Building and building Number

Room: where the waste was generated (laboratory or facility, room number)

Figure 2: - Hazard symbols for biological waste



- ONCE AUTOCLAVED, bags of autoclaved biological waste that are to be placed into a domestic bin must first be put into opaque (eg black), *unlabelled* plastic bags and sealed.

Storage

- Biological (non-domestic) waste in robust plastic bags must be contained in a solid-based container with a lid and the container labelled "Biological Waste" and must display a biological hazard symbol (see figure 2).
- If the waste is likely to putrefy before the day of biowaste collection, it is advised to either freeze it or put it in a cold-room until the afternoon

before the day of collection, and then take it to the yellow wheelie-bin. The waste contractor often arrive very early in the morning.

Disposal

- UNSW provides a clinical waste contractor to remove biological waste from all University Campuses. For the location of the nearest biological waste collection points (yellow biological waste wheelie bins, figure 3) contact Bob Wilcox at FM Assist on x56642.

Figure 3: - Wheelie bins for biological waste



- If your laboratory requires the removal of biological waste, place the biological waste in one of the yellow wheelie bins at a biological waste collection points (remember you must double contain all infectious waste for transport to the yellow Bin).
- Normally you will not need to fill in or fax a Biological Waste Collection Form, as these waste collections will occur automatically, except where laboratories are known to FM Assist and do not regularly generate biological waste.
- The biological waste contractor will not go to individual rooms to collect bags of biological waste, sharps bins etc, unless your laboratory is known to FM Assist as an infrequent generator of waste. You will need to fax a waste collection form on each occasion that you want waste to be picked up.
- If you have more than your usual amount of biological waste that needs to be removed, or your School does not have a yellow biological waste bin, contact Bob Wilcox at FM Assist on x56642 to organise a biological waste collection point, or an additional waste collection.

3.7 Animal, plant and invertebrate carcass waste requirements

All animals (including birds), plants and fish carcasses from all research and teaching areas are to be collected in a robust plastic bag (autoclave or yellow clinical waste bag) displaying the biohazard symbol and must go out as biological waste. (See also 3.6.5)

Additional *specific* precautions and requirements apply to any carcasses that are contaminated with radiation (3.9), chemicals (3.5), cytotoxics (3.8), or that contain infectious agents or GMOs (3.6). See each of the individual hazard categories on how to deal each of these.

No carcasses are to be placed into domestic waste bins.

Carcasses that contain cytotoxic substances must be put into the purple cytotoxic bins for incineration. (See 3.8)

All solid animal waste products and bedding, and plant soil and containers, that are **not** contaminated with infectious microorganisms, GMOs, radiation or chemicals, may be disposed of as solid domestic waste. No such waste is to be disposed of to building drainage, storm water or sewerage system. If you need extra regular green wheelie bins for this domestic waste, contact FM Assist on 9385 6642. This does not include carcasses, which must go into the biowaste bins.

Labelling

- The Carcass waste label requires the following information:

Waste Category: eg Animal carcass, or, fish carcasses, etc

Specific hazard information: If infectious, add DG 6.2 infectious waste, if also contains a toxic, corrosive or some other DG, that symbol must also appear on the label.

Waste Generator: person responsible for the waste

Date: date or period over which the waste was generated

Building: Building and building Number

Room: where the waste was generated (laboratory or facility, room number)

Storage

- Carcasses must be contained in a robust plastic bag and preferably stored in a **minus 20 °C** freezer, or at least in a cold room.
- For buildings that regularly generate carcasses and use the upper campus BioSciences biological waste store (LG41), carcasses are to be stored in the freezer or cold room until the evening before collection, when they are to be moved to the waste store. Carcasses are either biological waste or cytotoxic (purple) waste. They must go into either a yellow or purple wheelie bin and they **MUST** have the respective biohazard or cytotoxic symbol on it r purple cytotoxic wheelie-bin, as appropriate.
- For other areas that are either not regular generators of carcasses or do not have access to the upper campus biowaste store, their freezer or cold room needs to be listed as one of the Waste Contractor's waste collection points and the contractor will go to this area (on request) to collect the carcasses. Any specific hazard must be noted on the carcass label.

Disposal

- The biowaste contractor visits campus twice per week and will attend to carcass waste in the upper campus biowaste store, any of the regular carcass collection points and any of the sporadic collection points that have indicated they have carcass waste to collect.
- Due to the irregular demand for the collection of carcasses in some areas, these areas will need to fax the biological waste request form for removal of carcasses on each occasion.
- To find out the location of your nearest collection point, or to have your carcass freezer or cold room added to the collection schedule, contact FM Assist.
- All Biological Waste Collection Forms should be faxed through to FM Assist on x54532.

3.8 Cytotoxic Waste Requirements

All cytotoxic drugs and related wastes must be placed in purple sharps containers, and/or purple liners and waste bins, with the white telophase cytotoxic symbol (figure 4).

The bins should be identified as 'Cytotoxic waste – incinerate at 1100°C'.

If you are using cytotoxic chemicals please contact the OHS Unit on extension 51565 for storage and disposal requirements.

- **Animal, plant and fish carcasses** containing cytotoxic chemicals must be bagged according to 3.8 requirements and *also* CLEARLY labelled with the Cytotoxic Waste symbol, clearly giving information about the chemical. These go into purple cytotoxic bins. Do not put these carcasses into the yellow wheelie-bins because these carcasses must be incinerated.

Labelling

- Cytotoxic waste must be collected in a purple robust plastic bag displaying the cytotoxic hazard symbol (figure 4) with the following label:

Waste Category: Cytotoxic Waste – incinerate at 1100°C

Specific hazard information: Toxic Risk, DG Class 6, name of chemical(s)

Waste Generator: person responsible for the waste

Date: date or period over which the waste was generated

Building: Building and building Number

Room: where the waste was generated (laboratory or facility, room number)

Figure 4: Hazard symbol for cytotoxic waste



Figure 5: Cytotoxic Waste bins



Storage

- Cytotoxic waste in robust plastic bags must be contained in a solid-based container with a lid and the container labelled "Cytotoxic Waste" and display a Cytotoxic hazard symbol (see figures 4 and 5).

Disposal

- UNSW provides a clinical waste contractor to remove cytotoxic waste from the location of all biological waste collection points (purple cytotoxic waste wheelie bins). Contact Bob Wilcox at FM Assist to ensure there are sufficient bins available: x56642.

3.9 Radioactive Waste Requirements

Radioactive Waste cannot be disposed of without special permission from the Director-General of the Department of Environment, Climate Change and Water (DECCW).

Only material having the following activity may be disposed of as waste:

- a) a concentration activity of less than 100 Bq per gm [2.7 mCi/kg] (ie not radioactive according to the legal definition) **OR**
- b) Total activity of a given quantity of waste is <1 where Total Activity = $A1/40 + A2/400 + A3/4000 + A4/40000$ **AND**
 - A1 represents the total activity (kBq) of group 1 radionuclides
 - A2 represents the total activity (kBq) of group 2 radionuclides
 - A3 represents the total activity (kBq) of group 3 radionuclides
 - A4 represents the total activity (kBq) of group 4 radionuclides

Radioactive Waste must be stored until the activity has reduced to the acceptable level. Once the levels have reduced to less than **a)** or **b)** above, it can be disposed of as hazardous waste by faxing to the OHS Unit (x52365) with a Radiation Declaration form.

The Radioactivity Decay Reckoner calculates when radioactive waste will decay to levels determined by the DECCW which will allow its removal by contractors as chemical waste."

- **Carcasses** containing **ionising radiation** must be bagged and labelled according to 3.7 Carcass Waste requirements and stored frozen, and appropriately shielded until the radiation activity meets the requirements in points **a)** or **b)**.
 - They must not be autoclaved until the activity meets points **a)** or **b)**.
 - Carcasses must also be labelled with the Radiation Hazard symbol.
 - This waste could include associated bedding, soil and containers.
 - The freezer must show the Radiation Hazard symbol.

Please contact the UNSW Radiation Safety Officer on ext 52912 for advice regarding your radioactive waste disposal requirements.

3.9.1 Liquids

Liquid Radiation Waste

1. Radiation liquid waste should be kept for disposal in a container labelled 'Radioactive Waste'. Labelling needs to include the following information:
 - a) Type of Radioisotope;
 - b) Calculated Activity at date of Radioactive Waste Disposal Request (Bq/gram);

- c) Contact name of waste generator and phone number;
 - d) Originating School.
2. Radioactive organic solvent waste and water solutions should also be kept separate even if they are of the same radioisotope.
 3. Radioisotopes which have short half lives,(eg. P^{32}) should be kept for a period of time depending on volume and activity (see 3.9 b) until the radioisotopes have decayed to below DECCW disposal levels. This waste can then be disposed of as normal chemical waste (provide **former** radioactive details on the chemical waste form and fax to OHS Unit).

Mixed radioactive liquid wastes with short-lived isotopes [e.g., <30-day half-life (^{32}P)] should be segregated from isotopes with half-lives between 30 and 90 days (^{35}S , ^{125}I) and from long-lived isotopes (3H , ^{14}C).

You must maintain an inventory of all activity added to waste containers, in order to ensure that the activity limit of 100 Bq/gm is not exceeded. They are usually measured quantities and should not be difficult to add up. Where total activity may exceed the limit, there are a number of alternatives:

- a) For short half life radionuclides, decay in storage until appropriate levels are reached.
- b) For long half life radionuclides, it may be possible to mix differing levels of waste activities of the same radionuclides, to ensure that the total activity for that radionuclide remains below 100 Bq/gm.

Note: Do not mix different radionuclides

- c) If this is not possible, carefully decant ONLY the high level scintillation liquid into a suitable vessel for long term storage. Label this as above and send a signed Radiation Waste Transfer form to the OHS Unit.

Scintillation Waste and Scintillation Vials

To dispose of scintillation vials and their contents:

1. Collect sealed vials into a metal or fibreboard drum (available from OHS Unit) which has been lined with a strong plastic bag.
2. Seal the inner liner.
3. Seal the drum.
4. Label the drum with:-
 - a) your name
 - b) your laboratory
 - c) a description of the contents
 - d) the radionuclide
 - e) activity(Bq) of isotope at current date
 - f) weight(Kg) of waste
 - g) the date
5. Send a signed Chemical Waste form *including* the above information to OHS Unit.

Liquid scintillation vials and contents may be disposed of together **if** the activity concentration is below 100 Bq per gm (2.7 mCi per kg). Keep this type of waste separate and place in a hazardous waste drum lined with a strong plastic bag. Identify separately on the Chemical Waste form. Scintillation waste with activity concentration above 100 Bq per gm (2.7 mCi per kg) must be stored. Please contact the UNSW Radiation Safety Officer on ext 52912 for advice.

3.9.2 Solids

Solid radioactive waste (contaminated pipette tips, lab coats, gloves, absorbent materials used to mop up spills etc.) should be placed in a suitable container appropriate to the radioisotope (eg. Fibre drums) and then contact the Radiation Safety Officer on ext x52912. The container should be lined with a thick strong plastic bag and labelled with radioactive hazard signs and completed waste labels.

All Radiation Hazard signs and labels must be removed from items before placing them into the lined container. This container must have the Radiation Hazard signs and labels on the outside and can be used until full. Contact the OHS Unit in order to have the waste transported to the University's radiation store.

All requests for the pick-up of radioactive waste should be faxed to 9385 2365.

3.10 Schedule (S8) Drugs Waste Requirements

For information relating to the Schedule 8 drugs of addiction, see Schedule 8 Drugs Procedure OHS 331.

3.11 Human Tissue Waste Requirements

If you are disposing of recognisable human tissue, please contact the FM Assist on x56642 to make special arrangements for the delivery of a container, and its subsequent collection.

3.12 Co-mingled Waste Requirements

When dealing with mixed waste streams, e.g. biological and radioactive, infectious material and animal carcasses, cytotoxic material and animal carcasses, chemicals and solids, you must ensure that you address all hazards associated with the storage and disposal of the waste. This should be done during the planning phase of the project, and should include waste minimisation strategies.

Before combining wastes and prior to storage or disposal, an assessment of each situation shall be conducted by the generator of the waste or their supervisor, and approved by the area supervisor or laboratory manager .

Contact the OHS Unit if you need further information regarding co-mingled waste.

3.13 General Laboratory Waste

General laboratory waste is disposed of *either* as Chemical waste *or* as Biological waste, depending on the hazardous nature of the residue.

General Laboratory Waste includes all waste paper, gloves, laboratory plastic-ware (eg plastic pipette tips, plastic tubes, petri-dishes, *whether or not they have been used*) or other general laboratory material that is or may be contaminated with chemical or biological residues.

Absorbent materials and disinfectants that have been used to decontaminate surfaces or spills must be treated as General Laboratory Waste and disposed of as chemical waste. They must not be treated as Domestic Waste.

3.13.1 From chemical and teaching laboratories as well as workshops

This waste is considered to be chemical waste and put out for collection by the Chemical Waste Contractor.

3.13.2 From (micro)-biological and teaching laboratories as well as animal facilities

This waste is considered to be biowaste and put into the yellow wheelie-bins for collection by the Bio-Waste Contractor.

Labelling

- The General Laboratory Waste label requires the following information:

Waste Category: General laboratory waste

Specific hazard information: Chemical residue (or Biological residue – depending on the type of lab where the waste was generated). If relevant, add the DG information or the biohazard symbol to the outside of the container.

Waste Generator: person responsible for the waste

Date: date or period over which the waste was generated

Building: Building and building Number

Room: where the waste was generated (laboratory or facility, room number)

Storage

- All **General Laboratory Waste** must be collected in a robust plastic bag. The robust plastic bag must be contained in a solid-based container with a lid, and labelled “General Laboratory Waste”.

Disposal

- General Laboratory Waste that may contain chemical residues **must not** be autoclaved. It is critical to label and segregate the various waste streams in your laboratory to ensure that no chemical waste is autoclaved. Traces of hazardous chemical substances could result in an [explosion](#), inside the autoclave, and injury and/or release of toxic vapours. All waste collected by the Chemical contractor goes for incineration.
- General Laboratory Waste from biological workplaces can be taken to any Biological Waste collection point and placed directly into a yellow Biological Waste wheelie bins. These bins will be collected by the biological waste contractor according to the biowaste collection schedule.
- General Laboratory Waste that contain cytotoxic residues must be disposed of as cytotoxic waste into the purple bins.

3.14 Plant Workshop Waste

Typical plant workshop waste includes hydrocarbons (such as oil and grease), detergents, batteries, scrap metal, timber off cuts, perspex, fibre-glass, obsolete plant and equipment, and building materials.

a) Treat the following workshop waste as chemical waste:

- hydrocarbons (eg oil or grease),
- asbestos (you must contact FM Assist for advice on handling asbestos),
- batteries (some batteries can be recycled),
- paints
- other chemicals used in the workshop.

b) All other waste must be placed in suitable waste bins before disposal in a skip or other appropriate container for reuse or recycling (eg scrap metal, timber off cuts, perspex, fibre glass, obsolete plant and equipment and building materials).

- If any of these wastes or materials have been mixed or contaminated with chemicals then they should be discarded as Chemical Waste (section 3.5).

Labelling

- The bin for collecting non contaminated workshop waste must be labelled to segregate it from chemical or other waste streams.

Storage

- A robust container appropriate to the material being stored, eg metal bin for steel waste.

Disposal

- Staff or students must dispose of waste in an appropriate skip or container for reuse, recycling or collection by a contractor.
- Skips will be collected as scheduled or upon demand by contacting FM Assist.
- Facilities cleaning staff will only collect domestic-type waste and not Plant Workshop Waste.

3.15 Miscellaneous (batteries, mobile phones)

Batteries

Batteries of any description should not be disposed of with general waste. They contain heavy metals and other contaminants that leach from the casing and will contaminate ground water.

Spent batteries that are C-size and smaller, and all button batteries from your small laboratory devices, can be recycled by depositing them in the specific bins at the following locations:

- FM Assist, located at Level 2 Mathews Building F23 (entry via Mathews Pavilions), and
- ARC, Ground Floor, The Blockhouse (1st building on left inside main entrance on Anzac Pde)

Note: *“wet” batteries are not accepted for recycling.*

All other batteries are disposed of as chemical waste.

Mobile phones

Mobile phones, their batteries and all accessories can be recycled by depositing them in the specific bins at the following locations:

- FM Assist, located at Level 2 Mathews Building F23 (entry via Mathews Pavilions), and
- ARC reception, Ground Floor, The Blockhouse (1st building on left inside main entrance on Anzac Pde)

4. Summary of Waste Collection

4.1 Waste for collection by Chemical waste Contractor

1. Have an appropriate, designated area in the laboratory for the storage of hazardous waste until pick-up.
2. Ensure that waste storage is in accordance with chemical compatibility.
3. Containers must be in good condition, not leaking and not over-full. All containers must be lidded. If lids do not adequately seal then containers must be replaced. We have a duty of care to the chemical waste contractor to ensure our waste is in a safe condition for transport.

4. The waste container's material must be compatible with the waste it contains. Appropriate dangerous goods containers can be obtained from (See Waste Management link in 5.3):
 - Upper campus – Biosciences Store
 - Lower campus – Chemistry Store
5. Containers should be banded to accommodate at least the container's contents.
 - Bunds in areas that may be affected by rain must be monitored and water removed following rain in order that they are kept dry. Wherever possible, store chemicals under cover.
6. Containers must remain closed, unless adding or removing waste.
7. Containers must be labelled as **"Hazardous Waste"** and the components must be listed. The list of contents **MUST** be updated whenever waste is added. Labels must be waterproof or laminated to make them so.

The container label must include the name of the person responsible for faxing the chemical waste form to the OHS Unit.
8. **.To get your waste picked up:**
 - i. Download the chemical waste form OHS Unit website.
 - ii. Complete the details accurately especially regarding the chemical substance, the quantity, the exact location of the waste and local contact details for the contractor in case there are specific questions about the nature of the waste etc
 - iii. Send the completed form to FM Assist on 9385 4532 by noon on Mondays.

Chemical waste will be picked up from Thursdays between 8AM and 1PM

- iv. On the day of the pick-up ensure access for the contractor. If the waste is located in a locked room, provide details for the person who has a key to this room.

4.2 Waste for collection by Biological waste Contractor

1. Must be in autoclavable bag showing the biohazard symbol. Infectious waste must be double-contained. Sharps waste must be in a proper sharps bin/container.
2. Bags and containers must be labelled.
3. Bags and containers must be in good condition, not leaking, not over-full and must be sealed. We have a duty of care to the waste contractor to ensure our waste is in a safe condition for transport.

Biological waste will be picked up on Tuesdays and Fridays between 8AM and 1PM, from the designated points

4. To get your waste picked up:
 - a) Take the waste to the yellow wheelie bin that is in your designated collection area.
 - b) If the waste is located from a locked room, provide details for the person who has a key to this room.
 - c) Those submitting periodic collection requests should fax their form by noon the day before collection, to FM Assist on 9385 4532.

4.3 Radioactive waste storage

Radioactive waste must be stored on campus until the activity is below the required level. To have radioactive waste taken to the UNSW radiation waste store, contact the Radiation Safety Officer on ext 52912.

5. Acknowledgements, References, Appendices

The University of Melbourne's Environment Health and Safety Manual was reviewed and parts utilised, with permission, in the production of this document.

5.1 References

NSW Occupational Health & Safety [Act](#) 2000 and [Regulation](#) 2001 (especially Ch 6)

[NSW Environmentally Hazardous Chemicals Act 1985](#)

[NSW Waste Avoidance and Resource Recovery Act 2001](#)

Department of Environment, Climate change and Water (DECCW) - [Protection of the Environment Operations Act](#) 1997 (POEO Act)

Department of the Environment, Water, Heritage and the Arts - [Hazardous Waste \(Regulation of exports and imports\) Act 1989](#)

Health Industries resources - [waste management](#)

Department of Environment, Climate Change and Water (DECCW): [Waste management and resource recovery framework](#) – waste classifications

[Radiation Control Act](#) 1990 and [Regulation](#) 1993

[NSW Department of Climate Change and Water](#)

Environment Management Industry Association of Australian [EMIAA](#)

[Biological Control Act 1984](#);

[Poisons and Therapeutic Goods Regulation 2002](#)

[Code for Transport of Dangerous Goods](#)

[Office of the Gene Technology Regulator](#)

[Department of Health and Aging](#) for SSBA's, National Security Act 2007 and National Security Regulations 2008

[Australian Standards](#):

- AS1940 The Storage and Handling of Flammable and Combustible Liquids
- AS2243.2 Safety in Laboratories Part 2: Chemical Aspects
- AS2243.3 Safety in Laboratories Part 3: microbiological safety and containment,
- AS2243.10 Safety in Laboratories Part 10: Chemical Storage
- AS4031 Non-reusable containers for the collection of sharp medical items used in health care areas

5.2 Associated Documents

[UNSW OHS Policy](#)

[Hazardous Substances and Dangerous Goods Procedure](#) (OHS 332)

[Radiation Safety](#) Procedures

[Biosafety Procedure](#) (OHS 323)

[PCB Spill Response and Disposal Procedure](#)

[Schedule 8 Drugs Procedure](#) (OHS 331)

[Protocol for Chemical Waste Store LG41](#) (OHS 503)

5.3 UNSW links

[Faculty of Science WebStore](#) (upper campus)

UNSW [Waste management](#) and Chemistry store (lower campus)

[Radioactivity Decay calculator](#) (ready reckoner)

5.4 Appendix 1: Autoclave Requirements

Autoclaved biological waste may be disposed of as domestic waste **ONLY IF** you have received specific authorisation from the OHS Unit to do so.

In order to gain authorisation, you must demonstrate that you will meet the following requirements:

1. The effectiveness of the autoclave being used to decontaminate the waste must be **validated monthly** and the results of each month's testing kept for at least 12 months. They must be made available to the OHS Unit on request and may be requested by other regulatory bodies (such as the Office of the Gene Technology Regulator [OGTR]).
 - (a) The effectiveness of the **autoclave** must be validated monthly by the use of:
 - thermocouples or resistance thermometers, to ensure that the required temperature has been achieved; or
 - chemical indicators which use a combination of moisture, heat and time and which progressively change colour with the time exposed at the specified temperature; or
 - biological indicators such as spore strips; or
 - enzyme indicators.
2. In addition to the **annual boiler inspection**, the autoclave must be **calibrated annually** by a qualified person and the results of each year's calibration must be kept for the previous 5 years and made available on request. Autoclave calibration must include the calibration of the thermocouple and safety valves.
3. **Each autoclave load** must be performed using a combination of temperature and time that has been validated as effective in rendering the infectious material or GMO non-viable.
 - i. loads must be packed and loaded to allow for the penetration of steam into the material being decontaminated in accordance with AS/NZS2243.3;
 - ii. the coldest part of the load must be exposed to a minimum temperature of 121°C and 103 kPa for at least 15 minutes or at 134°C and 203 kPa for at least 3 minutes in accordance with AS/NZS2243.3;
 - iii. each load of biowaste that is intended to be disposed of as domestic waste **MUST** be validated by either :
 - a. chemical indicators which use a combination of moisture, heat and time and which progressively change colour with the time exposed at the specified temperature; or
 - b. biological indicators such as spore strips; or
 - c. enzyme indicators.
 - iv. No waste is to be disposed of into domestic bins unless the load has been validated. Validation results must be kept for 12 months and made available on request.
 - v. Measures must be taken to ensure that loads that have been processed can be differentiated from loads that have not (e.g. by use of **autoclave** tape).

AS/NZS2243.3:2010, S12, for autoclave validation.

AS/NZS2243.3:2010 10.6 for autoclave requirements

4. Once autoclaved, the waste must be de-identified by placing into a black, opaque bag before going into domestic waste wheelie-bins. This does not apply to animal, plant and fish carcasses (see 3.7)

5.5 Appendix 2: History

This procedure will be reviewed to address changes in legislation or any changes within the University that impact on the management of hazardous waste.

Version	Authorised by	Approval Date	Effective Date	Sections modified
1.0	Director Human Resources	09/2003	Sept/2003	New document (ML)
0.1	Director Human Resources	01/11/2006	01/Nov/2006	Consultation draft. Whole document. Focus on laboratory waste. Segregated laboratory wastes into 13 different waste streams with corresponding procedures for each one. (AJ)
2.0	Director Human Resources	22/03/2007	22/March/2007	4.2, 4.3, 4.4, 4.5, 4.7, 6.1 Clarified procedures for biowaste, co-mingled waste, glass waste and chemical waste from stakeholders meeting Changes to biological waste sections due to new waste contractor (AJ)
2.1	Manager OHS&WC	31/7/07	31/July/2007	4.12 Up date of changes to disposal of general laboratory waste (AJ)
2.2	Manager OHS&WC	13/11/07	13/Nov/2007	4.0 Table 1 Change to biowaste collection day (AJ)
2.3	Manager OHS	13/12/2010	13/12/2010	1. Facilities Management looking after waste management administration and OHS Unit technical. 2. Weblink's updated from old site to new site
3.0	Director Human Resources	14/04/2011	14/04/2011	Review entire document. Reformat to UNSW Guideline template. Revised Austr Standard2243.3, add references to SSBAs, revised waste collection responsibility (KN)