

HAZARDOUS WASTE MANAGEMENT PLAN

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POLICY FOR THE DISPOSAL OF CHEMICALS

Section I - General Information

A. Purpose

The purpose of the following policy and procedures is to ensure that all hazardous waste is properly and safely managed, from its generation through handling, storage, and preparation for transportation. This policy covers the responsibilities of both the individuals generating the waste and the individuals removing and storing the waste for transport. The management of hazardous waste shall be conducted in accordance with all applicable local, state, and federal laws and regulations.

The Chemical Hygiene Officer (CHO) routinely coordinates the collection of all unwanted chemicals. You are encouraged to recycle chemicals that are not expired and that are usable within your department. The CHO should assist with the transfer of chemicals between departments.

The following procedures must be followed for the disposal of all unwanted chemicals. These Procedures apply to chemicals that are not authorized for disposal in the regular trash. For information regarding chemicals allowed for drain disposal, please refer to the Waste Treatment & Drain Disposal section of this policy.

This Hazardous Waste Policy does not apply to radioactive waste, Regulated Medical Waste (RMW), and mixed wastes (i.e. hazardous waste & radioactive waste or hazardous waste & RMW), contact the CHO if you generate this type of waste.

B. Definitions

General Definitions & Acronyms

Bulking – the consolidation of compatible wastes into a single container for storage/shipment.

Lab Pack – the consolidation of containers of small quantities of waste (i.e. out dated chemicals in their original containers) into a single container for storage/shipment.

EPA – Environmental Protection Agency

“P” Listed Waste - Specific chemicals that the EPA deemed Acutely Hazardous wastes when discarded and listed as hazardous wastes from commercial chemical product, intermediates, and residues. These substances have a “P” number and are subject to more rigorous management requirements. The empty containers for “P” waste are to be managed as hazardous waste.

RCRA – Resource Conservation and Recovery Act: Title 40 CFR, main regulatory document, other regulatory texts include the Clean Air Act, Clean Water Act, and Toxic Substances Control Act.

CESQG – Conditionally Exempt Small Quantity Generator – a facility that generates less than 220 pounds (100 kilograms) of hazardous waste or less than 2.2 lbs (1 kg) of acute hazardous waste per month. As a CESQG, you cannot accumulate onsite more than 2200 pounds (1000 kilograms) of hazardous waste at any one time prior to disposal. If this happens, you must then follow all the requirements of a small quantity generator.

SQG - Small Quantity Generator – a facility that generates greater than 100 kilograms but less than 1,000 kilograms of hazardous waste in a calendar month, provided that such waste does not include more than a total of one kilogram of acute hazardous wastes. SQGs are subject to stricter training, labeling, and storage guidelines than CESQG. SQGs are also need to acquire an EPA ID number. SQGs are required to dispose of their hazardous waste within 180 days of placing their waste into a container. The exception to this is if the facility elects to "satellite" its waste first.

SAA - Satellite Accumulation Area – A location within a laboratory, studio, or shop where hazardous waste is collected. The regulations specify for this area to be located “at or near any point of generation” and to be “under the control of the operator” generating the waste. Once the 55-gallon limit has been reached or one year passes from the beginning of waste accumulation the waste must be moved to an central accumulation area or building where it can be stored for up to 180 days before disposal. It is recommended that you call for a waste pickup well before you reach the 55 gallon limit (See Section II for the procedure to request waste removal).

CAA- Central Accumulation Area- The location where hazardous and some non hazardous waste is stored before being picked up by a licensed waste vendor. Wastes accumulated in SAAs are moved to this area to be stored prior to disposal.

Definition of Hazardous Waste

Hazardous waste is a waste that is dangerous or capable of having a harmful effect on human health or the environment. A discarded material will be deemed a hazardous waste if it exhibits any of the four hazardous waste characteristics identified below, or if it is contained on one of the four separate types of “listed waste”, identified below.

Characteristic Hazardous Waste (All D-Codes):

Ignitability – (D001) Wastes capable of causing a fire or sustaining an existing fire. Specifically waste with a flash point less than 140 °F (60 °C) for liquids, non-liquids capable of causing fire under standard temperature and pressure, and ignitable compressed gas or an oxidizer as defined by the Department of Transportation.

Corrosivity – (D002) Wastes which corrode metals or other material. Specifically aqueous wastes having a pH less than or equal to 2, or greater than or equal to 12.5; and liquid wastes that corrode steel at a rate greater than 0.250 inches (6.35 mm) per year at a temperature of 130°F (55°C).

Reactivity –(D003) Unstable wastes having a tendency to react violently or explode. Specifically wastes which react violently with water, wastes that form potentially explosive mixtures with water, or wastes when mixed with water produces toxic fumes in a quantity to present a danger to human health or the environment. In addition wastes that contain cyanide or sulfide which when exposed to pH conditions between 2 and 12.5 generate toxic gases, wastes capable of detonation or reaction if subjected to a strong initiating source or if heated under confinement, or wastes that are readily capable of detonation or reaction at standard temperature and pressure.

Toxicity - (D004-D043) Wastes capable of leaching into the surrounding environment. Specifically, wastes that fail the Toxicity Characteristic Leaching Procedure (TCLP) test method, indicating the waste contains contaminants equal to or greater than concentration levels established in Table1, Title 40 CFR 261.24.

Listed Hazardous Waste (F, K, P & U-Codes):

- Listed Hazardous Wastes from Nonspecific Sources (F-Codes)
- Listed Hazardous Wastes from Specific Sources (K-Codes)
- Listed “Acutely Hazardous” Waste, from discarded commercial chemical products (P-Listed)
- Listed “Toxic” Waste from discarded commercial chemical products (U-Codes)

Hazardous waste will generally include: all organic solvent waste and solid residues containing those solvents; most waste acids, alkalis, and other corrosive materials; some materials containing heavy metals, explosives, highly reactive materials; and many discarded process chemicals or laboratory reagents. All aerosol cans, which are full or partially full, will be disposed of as hazardous waste. Product wastes containing greater than 24% alcohol will be regarded as ignitable material and disposed of as hazardous waste. More information on the identification and listing of hazardous waste can be found in the Code of Federal Regulations, Title 40, Part 261, and is available on the United States Government Printing Office website:

<http://www.access.gpo.gov/nara/cfr/index.html>

Defined Generator Status

Beloit College is officially considered a Conditionally Exempt Small Quantity Generator (CESQG) by the EPA and a VSQG, very small quantity waste generator by the Wisconsin Department of Natural Resources. Occasionally it is required that we assume Small Quantity Generator status because of a large chemical disposal event. In order to more efficiently, effectively, and safely manage hazardous waste we continue to act as a SQG even when we do not generate enough waste to qualify for that designation.

Becoming an SQG means that among other things, training of personnel who come in contact with hazardous materials and hazardous waste is required. Also, required are increased labeling and documentation.

Section II – Generator / Laboratory Personnel Responsibilities

A. Waste Stream Characterization, Waste Containment, Container Labeling & SAA Management

Waste Stream Analysis:

Every waste generating process in laboratories, studios, and shops should undergo a waste stream characterization. This means looking at the chemicals used in a particular process from start up to cleanup in order to determine the class of waste generated. The individual generating the waste is responsible for determining if the waste is a hazardous waste as defined by regulation. This can be done in two ways; testing the waste according to [Subpart C of 40 CFR part 261](#), or applying generator knowledge. A generator can use his/her knowledge of a waste to make a determination as to whether the waste is a characteristic hazardous waste. In order to use knowledge to characterize the waste, the generator must consider the raw materials that constitute the waste, and/or the process(es) that result in the waste being generated. The CHO can offer assistance when completing waste stream characterization. Generators should keep a copy for their records, and send a copy to the CHO. A waste stream characterization should be done whenever a generator initiates a new process.

Waste Containment:

- Waste chemicals must be collected in individual, leak proof, sealed containers. The chemicals must be compatible with container material (*e.g.* acids must not be placed in a metal container). Glass containers may be safely used for virtually anything except hydrofluoric acid, acid fluoride salts, and very strong alkalis. However, the preferred method is a compatible plastic container
- Waste chemicals must not be placed in an unwashed container, which contains any incompatible residual material, from previous chemical storage.

- Select the smallest container available that will properly hold the material, with sufficient headspace above the surface of the liquid to allow room for expansion. Five-gallon carboys are available from the CHO. Larger or smaller containers are subject to availability and may need to be ordered. Do not use your own drums or pails without prior approval from CHO, as they may not meet US Department of Transportation or EPA requirements.
- Any containers holding a hazardous chemical or waste shall be kept securely closed, to prevent leakage of hazardous waste or escape of vapors during storage, except when it is necessary to add or remove chemicals or waste. Ensure that lids, bungs, or rims are tightly in place. The most preferred method of closure is a screw on, leak proof, cap.
- Broken or intact hypodermic needles or syringes that are contaminated by chemicals **must not** be disposed with medical waste. This includes needles that have been used in chemical laboratories **only** for chemical procedures such as the removal of a solution from a vial through a septum or adding liquid to a gas chromatograph. Collect these (chemically contaminated syringes and sharps) in a separate sharps container that is appropriately labeled with a hazardous waste label. Please place the hazardous waste label or cross out the biohazard symbol on the sharps container since it is now a hazardous waste container and not a biohazard.

Container Labeling

- All containers must be clearly identified and labeled with the proper chemical name(s) of the substance(s) at the **start** of collection. Trade names, acronyms, abbreviations, codes, or formulas **are not acceptable**.
- All chemical waste which cannot be recycled, because it is either spent, past the manufacturer's expiration date, or has been mixed or contaminated with another substance must be labeled with a **Hazardous Waste Label**.
- This label must be affixed to the container prior to adding any waste material into the container. It is also acceptable to write the words "Hazardous Waste" on the original manufacturer's label. Note the latter is only acceptable if the chemical is in its original container. Hazardous waste labels may be obtained by contacting the CHO. **Waste Labeling (or writing the words "Hazardous Waste" on the manufacturer's label) should not be completed on bottles containing unopened / un-expired pure chemicals, as these materials may be recycled (by redistribution). Please place these chemical containers in the appropriate storage area and notify the CHO of the possible redistribution.**
- The concentration of each chemical or mixture component must be identified on the label. The units of concentration must be on the label together with their numerical values. When the solute is either a liquid or gas, the concentrations must be stated as, **percent by weight** or **percent by volume** or **molar concentration**. For containers being filled with multiple concentrations of a variety of compatible materials, the chemical

concentrations can be added to the label when the container is full. It is recommended if you are adding a variety of compatible materials to the same hazardous waste container that you keep a log book nearby the SAA. **Please keep note of the generator name, date, name of chemicals added, and volumes.**

- The hazardous waste label must be completely filled out with all the laboratory contact information. (ie whomever was in charge of this SAA or the specific waste bottle)

Labeling and Disposal of Peroxide Forming Materials:

Peroxide forming chemicals such as those listed below should be dated and initialed upon receipt.

Additionally they should be dated and initialed when opened and marked with the shelf life. Storage and use should be limited to the time indicated for each class or list.

Containers which show signs of iron oxide or copper oxide should be handled with extra precaution since many metal oxides promote peroxide formation.

The most hazardous compounds - those that form peroxides without being concentrated, which can accumulate a hazardous level of peroxides simply on storage after exposure to air - are in List A. Order only a minimal volume of these chemicals since they will be thrown away three months after opening.

Compounds forming peroxides that are hazardous only when concentrated are in List B.

List C consists of vinyl monomers that may form peroxides which can initiate explosive polymerization of the monomers.

Common Compounds that Form Peroxides During Storage

Lists are illustrative not exhaustive.

List A Shelf life (open) 3 mo	List B Shelf life (open) 12 mo	List C Shelf life (open) 12 mo
(unopened) 12 mo Peroxide Hazard On Storage	(unopened) 24 mo upon inspection Peroxide Hazard On Concentration	(unopened) 24 upon inspection Hazard Due to Peroxide Initiation Of Polymerization*
Divinyl Acetylene Vinylidene Chloride Potassium Metal Sodium Amide	Ethyl Ether Tetrahydrofuran Dioxane Acetal Vinyl Ethers 2-Butanol 2-Propanol	Styrene Butadiene Tetrafluoroethylene Vinyl Acetylene Vinyl Acetate Vinyl Chloride Vinyl Pyridine

	Cyclohexene Cumene Diacetylene Dicyclopentadiene Methylcyclopentane Methyl Acetylene	Chloroprene *When stored as a liquid, the peroxide-forming potential increases and certain monomers (butadiene, chloroprene, and tetrafluoroethylene) should be considered a List A compound.
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Unidentified Waste:

The CHO will not collect substances that are unidentified (unknown). The responsibility for establishing the identity of an unknown substance rests with department wishing to dispose of it. These chemicals can be removed by a licensed hazardous waste transporter, but their disposal is much more expensive than disposing of known hazardous materials.

Therefore, proper labeling and identification is important.

Satellite Accumulation Areas:

- Hazardous waste must be stored in a Satellite Accumulation Area (SAA), at or near the point of generation and under the control of the operator generating the waste. Typically there is a SAA in each laboratory, studio, or shop. CHO can assist with the determination of appropriate locations for satellite accumulation areas.
- SAAs should be clearly marked with signage. They should also inform personnel of emergency contact information in the event of a spill or accident. **Call Security x2355**
- Chemical wastes must be segregated by general waste type (e.g. flammables, poisons, acids, and alkalis) and arranged so that incompatible substances will not mix. Incompatibles are those combinations of substances that, when mixed, either react violently or emit flammable or poisonous gases or vapors. Below are a few general principles that must be followed for safe hazardous waste storage and chemical storage:
 1. Store acids and bases separately.
 2. Keep acids apart from cyanides or sulfides
 3. Acids should never be put into steel containers.
 4. Water-reactive, strong acids such as organic acid halides, organic acid anhydrides, inorganic acid anhydrides, and strong acidic salts must be kept apart from both alkalis and water.
 5. Oxidizing agents must be kept apart from reducing agents and organic compounds.
 6. Water-reactive agents must be stored apart from water, aqueous solutions, and acids. This includes areas of high humidity.
 7. Air-reactive materials must be packed in containers that are sealed off from the atmosphere.
 8. Explosive and shock-sensitive materials present risks that require special handling.

Consult with CHO before handling or preparing for disposal.

- Hazardous waste must be stored in secondary containment. Incompatible materials must not be stored in the same secondary containment bin.
- Containers must be arranged so that identification is readily visible.
- Do not allow spill residues to accumulate in the bottom of the SAA bins.
- As a Small Quantity Generator we are allowed to have hazardous waste containers that collect waste for one year after the start accumulation date.
- Contact CHO when containers are 75% full. This will allow CHO time to plan pick up of the waste and bring new containers if necessary.
- State and federal regulations allow up to fifty-five gallons of hazardous waste, or one quart of acutely hazardous waste, (P-list), in a Satellite Accumulation Area (SAA).
- Waste is to be moved to the CAA after one year of accumulation, regardless of volume accumulated.

Acutely Hazardous Waste Information (P-Listed Waste):

Acutely hazardous wastes are listed in [40CFR261.33\(e\)](#). They may be a commercial chemical product, off-specification commercial product, spill residues of an acutely hazardous material, or a substance is the sole active ingredient of a formulation (*e.g.* pesticides). The list of acutely hazardous waste is available online or by contacting CHO.

Laboratory Inspections:

- Waste containers should be inspected often for signs of leakage, corrosion or any other forms of deterioration.
- Check to ensure that all containers are capped and properly labeled. These inspections need only be visual and do not have to be documented.
- Any containers found to be leaking or deteriorating must have their contents transferred into a new container. Contact CHO if this is necessary.
- Any spillage that occurs when adding waste to the container should be cleaned up immediately.

B. Request for Waste Removal

Request for Waste Pick-up / Removal

Hazardous waste collection is performed by CHO on a routine basis and can be requested via phone or email. With either method, the requestor must include the following information:

- **Requester:** The name of the person submitting the request. This person should have knowledge of the waste in the event that the CHO has questions.
- **Telephone #:** A contact number for the requester or someone else with knowledge of the waste.
- **Substance Location:** Include the building name and room number. In addition, if the SAA is not readily apparent, the specific location of the waste container should also be noted in the event that CHO performs the waste pick-up when no lab personnel are present.
- **Chemical Name:** Use full chemical names. Do not use formulas or abbreviations. Include all the constituents of each waste container.
- **Quantity:** Include the number of containers of waste and their volumes.

Example:

Water 50%, Acetonitrile 30%, Methanol 20%	2 X 5 gallon cans
Water 50%, Acetonitrile 30%, Methanol 20%	4 X 1 gallon bottles
Acetone 100%	3 X 1 liter bottles
Hydrochloric Acid 90%, Mercuric Chloride 5% Lead Citrate	5% 1 X 100 ml

- If CHO supplies you with 5-gallon waste cans or pails, be sure to note how many replacement containers are needed. Note any additional information about the waste that you feel may be pertinent.
- In the event that waste containers to be collected are intermingled with containers that you want to keep, it is helpful if you mark which containers that are being offered for disposal.
- Remember that CHO will not accept unknown materials. All waste containers must be labeled and their contents identified.
- All waste containers must have a tightly fitting cap that will not leak during transport. Be certain that you have the correct cap for your bottle. The bottles of various chemical manufacturers all have differently threaded caps that are not interchangeable with one

another. **Improperly capped waste bottles will leak and will not be picked up by the CHO.**

Request for Hazardous Waste Disposal can be sent by one of these two methods

- Via Phone to: **608-363-2388**
- Via Email: ballous@beloit.edu
- Typically, the pick-up will occur within 2 to 5 working days after the request. Manage your waste accordingly. Do not wait to submit a request until your waste containers are completely full.

Section III – CHO Responsibilities

A. Waste Handling, Storage, and Shipment

Waste Handling & Storage

- When hazardous waste is picked up by the CHO each container will be checked to ensure it is properly labeled and sealed.
- During each laboratory pick-up, an inspection of hazardous waste management will be performed. A copy will be left in the lab or with the lab contact, which outlines the necessary corrective actions.
- All waste containers are brought back to the CAA-Central Accumulation Area in the basement of the Science Center. If chemicals cannot be transported safely then a hazardous waste pickup will be scheduled for that specific SAA.
- Hazardous waste, which is brought to the CAA, is written into a log that will later be transcribed into a spreadsheet.
- The flammable solvents are often consolidated (i.e. bulked) by the licensed waste vendor or CHO prior to shipping.
- The other “lab pack” waste is segregated by waste type and stored in the CAA.
- The “lab pack” items are segregated according to their classification until a sufficient amount is available for packing. Prior to shipping, compatible “lab pack” items are packed into a drum or other container by the licensed waste vendor or CHO.

Waste Shipment

- The CHO will make all arrangements for proper offsite disposal hazardous waste.
- All drums require the proper hazardous waste (RCRA) and DOT labeling.
- The licensed waste vendor or CHO completes the Hazardous Waste Manifest Form and packing slips.
- A **Hazardous Waste Manifest Form** is utilized for each shipment and the returned copies (from the Disposal / Transfer Site) are retained in files managed by the CHO.

B. Waste Inspections

Storage Location Inspections

- The CAA will be inspected on a weekly basis by the CHO or other properly trained professional.
- Records of these inspections will be maintained by the CHO
- The CHO must be made aware of your SAA when it is established in order to perform monthly inspections.

C. Training

Hazardous Materials Training

- Individuals involved in the handling of hazardous materials and/or generation of hazardous waste will be trained within 90 days of employment. Training in hazardous materials management will include details on use, storage and disposal of waste. This training can be done via group or one on one presentation by the CHO. It can also be accomplished via power point presentation available through the CHO via email. This training is followed up with testing, and records of training are maintained by Human Resources.
- Additional training in the Chemical Hygiene Program for Laboratory & Studio personnel is provided in the same manner.
- DOT General Awareness training is provided for those individuals directly involved in the shipping or receiving of hazardous materials.

Section IV – Miscellaneous Information

Treatment, Drain Disposal, Empty Containers & Waste Minimization

A. Waste Treatment, Drain Disposal, Empty Containers.

General Information

Research and instruction in laboratories/studios continually produces small amounts of aqueous wastes. In such cases, workers must decide whether to pour particular solutions down the drain or keep them for pick-up by the CHO. This guide will help them make such decisions.

Typically, unwanted chemicals are collected for disposal. This is done in accordance with steps described above. Certain materials are suitable for drain disposal. These should be carefully considered to ensure they do not cause damage to the plumbing system or cause other problems such as odors in a building. The materials, which are suitable for drain disposal, are listed in the tables that follow. Other materials are prohibited from drain disposal without prior approval from the CHO. If you have questions about the suitability of other materials for drain disposal, or about the proper disposal of any laboratory material, please contact the CHO at 608-363-2388

Drain disposal of dilute acids and alkalis

Acids and alkalis, which have been rendered neutral by the process may be discarded by drain disposal. Neutralization should be done in small quantities (i.e. no larger than 1 liter). This should be done as part of the process generating the waste. It is inappropriate to collect a quantity of waste, from multiple sources, and conduct batch neutralization process.

Proper care must be taken to adjust solutions to a pH of between 6 and 9. Generally, 1N hydrochloric acid can be used to neutralize alkaline materials and 1N sodium hydroxide can be used to neutralize acid materials. When creating these 1N solutions, remember to SLOWLY add the acid to the water or the alkali to the water, not vice versa. After checking the pH with pH paper, drain disposal is properly done in the following manner:

- a. Protective gear (gloves, laboratory apron, and safety goggles) must be worn.
- b. Before pouring the solution, turn on the tap to get a good flow of water to wash it down. Make sure that the sink and drain lines are washed free of any substances that will generate noxious gases when mixed with the solutions. These substances include cyanides, sulfides, bisulfides, sulfites, bisulfites, nitrates, and nitrites.
- c. Pour the solution down the drain slowly, making sure that before, during and after pouring, the tap is turned on to provide a strong flow of water that aids in washing it down the drain.

Table 1
DRAIN-DISPOSABLE SUBSTANCES

Solutions Adjusted to a pH of 6 to 9		Polyhydrox - Alcohols
Hydrobromic acid	Sodium hydroxide	1,2-Propylene glycol
Hydrochloric acid	Potassium hydroxide	Glycerol (glycerine)
Hydriodic acid	Ammonium hydroxide	Mannitol
Nitric acid	Potassium carbonate (potash)	Sorbitol
Phosphoric acid	Sodium carbonate (soda ash)	
Phosphorous acid	Sodium pyrophosphate	
Sulfuric acid	Trisodium phosphate	
Acetic acid		
Formic acid		

All Vitamins	All Naturally Occuring Amino Acids	All Sugars
L(+)-Ascorbic acid (Vitamin C)	Alanine	Arabinose
Choline	Cysteine	Fructose
Inositol	Glycine	Galactose
Nicotinic acid (niacin)	Histidine	Glucose
Pantothenic acid	Leucine	Lactose
Pyridoxine (Vitamin B6)	Lysine	Maltose
Riboflavin (Vitamin B2)	Serine	Sucrose
Thiamine (Vitamin B1)	Tryptophan	
	Tyrosine	

Chemicals* Commonly Used (No pesticides of any kind)		
Acetylsalicylic acid (aspirin)	Casein	Sodium bicarbonate
Alum (Sodium aluminum sulfate)	Citric acid (sour salt)	Sodium bisulfate
Ammonium alum (Ammonium aluminum sulfate)	Corn syrup	Sodium bitartrate
Borax (sodium tetra-Borate decahydrate)	Dextrin	Sodium carboxy-methylcellulose

Boric acid	Gelatin	Sodium chloride
Calcium chloride	Magnesium sulfate (Epsom salt)	Sodium citrate
Calcium phosphate, monobasic	Potassium aluminum sulfate (potassium alum)	Sodium dihydrogen phosphate
Calcium superphosphate	Potassium bitartrate (Cream of tartar)	Sodium hypochlorite
Calcium triple superphosphate		Sodium mono- hydrogen phosphate
		Sodium nitrate
		Sodium potassium tartrate (Rochelle salt)
		Sodium silicate
		Sodium sulfate (glauber's salt)
		Urea

* For any chemical containing sodium, the corresponding potassium or ammonium (salt) compound may be substituted.

Empty Container:

Any hazardous waste/material remaining in an empty container or an inner liner removed from an empty container is not subject to RCRA regulation (§261.7(a)). A container or inner liner removed from an empty container that has held hazardous waste is considered empty if all wastes have been removed using practices commonly employed to remove materials from that type of container (e.g., pouring, pumping, and aspirating); and

1. no more than 2.5 centimeters (1 inch) of residue remains on the bottom of the container; or inner liner
2. no more than 3 percent by weight of the total capacity remains in a container or inner liner if the container is less than or equal to 110 gallons in size; or
3. no more than 0.3 percent by weight of the total capacity of the container remains in the container or inner liner if the container is greater than 110 gallons in size (§261.7(b)(1)).

Container should then be rinsed thoroughly with water and thrown away in regular garbage. Rinse water may be disposed of down the drain unless it is an "acutely" hazardous chemical (P-List). Rinsate from "acutely" hazardous chemicals must be collected and disposed of as hazardous waste.

B.. Waste Minimization

Chemical Reuse

Unused and unopened chemicals being disposed of as waste due to a change in research or discontinuation of a specific research protocol should be redistributed to other laboratories that can utilize the chemical. Sharing unused chemicals will reduce the amount of chemical waste generated. Specific applicable chemicals (typically stable compounds with a long shelf life) will be picked up by the CHO and segregated in the CAA. These chemicals are inventoried with their new location.

Inventory Control

Each laboratory/studio/shop is encouraged to maintain an appropriate inventory of chemicals in their laboratory as a method to reduce unnecessary purchase and disposal. The following methods can reduce the amount of chemicals in a laboratory and minimize waste generated from expired or unwanted excess chemicals:

- ✓ Check your inventory and storerooms before ordering.
- ✓ Purchase smaller containers of chemicals or fewer containers of chemicals.
- ✓ Avoid purchasing larger quantities of chemicals to save on raw material costs. (Chemical disposal costs are often much higher than the initial purchase cost.)
- ✓ Rotate stock of chemicals in use to ensure the older chemicals are used before the newer chemicals.

Substitution of Less Hazardous Chemicals

In some instances, chemicals that are more environmentally friendly may be substituted for traditionally used chemicals.

Examples:

Propylene glycol	instead of	Ethylene glycol
Ethyl alcohol	instead of	Methyl alcohol
Alcohol thermometers	instead of	Mercury thermometers
Alconox, Pierce RBS35 and Nochromix	instead of	Chromic acid cleaning solutions
Detergent and hot water	instead of	Organic solvent cleaning solutions

Microscale (in the laboratory)

Microscale chemistry is a pollution prevention method that decreases the amount of chemical waste generated during laboratory experiments. Standard chemistry procedures are re-written for individual experiments and specialized microscale equipment is utilized to perform the work. In some cases, the amount of a particular chemical needed for an experiment has been decreased by as much as 99 percent. Microscaling has the following benefits:

- Reduce chemical waste produced at the source.
- Improve laboratory safety by decreasing potential exposure to chemicals and reducing fire and explosion hazards.
- Improve air quality due to greatly reduced volumes of solvents and other volatile substances used.
- Reduce laboratory costs for chemical purchase and disposal.
- Reduce the time required to perform experiments due to shorter chemical reaction times.
- Decrease the amount of storage space necessary for chemicals.
- Encourage students to think about waste minimization.
- Decrease disposal costs for the university.
- Increase environmental awareness for the university.

This Hazardous waste policy is designed to provide guidance for everyone at Beloit College regarding the proper disposal of hazardous waste. If anyone has additional questions regarding hazardous waste disposal they are encouraged to contact the Chemical Hygiene Officer at 608-363-2388

Section V – Additional types of waste

Universal Waste Management, PCB Management, Asbestos

Universal Waste:

Universal waste is a category of hazardous waste that poses less of a risk to human health and the environment. Universal wastes include lamps, batteries, intact mercury containing devices, cathode ray tubes, some pesticides, and antifreeze. As the name suggests, these types of waste are universally generated, in nearly every type of business or industry, in schools, and in private homes. They are separated from recycling and landfill wastes by Beloit College employees, most notably the housekeeping and maintenance staff from the Physical Plant

These branches of the Physical Plant identify, package and relocate most universal wastes to a central receiving area where the material is either later picked up by an outside vendor or relocated to another location (Central Accumulation Area) in the Science Center.

A. FLUORESCENT, MERCURY AND SODIUM VAPOR LIGHT BULBS AND TUBES

1. All light bulbs and tubes, with the exception of incandescent bulbs shall be properly handled and packaged by the Housekeeping and Maintenance Staff or other properly trained individuals.
 2. Old, burned out lights shall be placed in a size appropriate box that the lights originally came in or a box of equal size that will completely contain the bulb, in case of breakage.
 3. Unwanted bulbs that are no longer being used can not be located in any room or area without proper containment.
- The box used for the containment of the expired bulbs shall be of cardboard or fiberboard construction
 - The box used for containment will also be labeled with a Universal Waste Label noting the contents (i.e. florescent tubes,) or have the words “Universal Waste” plus contents written in clearly visible handwriting on the front of the container.

BROKEN FLUORESCENT BULBS (a revised EPA recommended procedure)

Fluorescent light bulbs contain a very small amount of mercury sealed within the glass tubing. EPA recommends the following clean-up and disposal below.

Before Clean-up: Air Out the Room

- Have people and pets leave the room, and don't let anyone walk through the breakage area on their way out.
- Open a window and leave the room for 15 minutes or more.

Clean-Up Steps for Hard Surfaces

- Carefully scoop up glass pieces and powder using stiff paper or cardboard and place them in a sealed plastic bag.
- Use sticky tape, such as duct tape, to pick up any remaining small glass fragments and powder.
- Wipe the area clean with damp paper towels or disposable wet wipes. Place towels in the plastic bag.
- **Do not use a vacuum or broom to clean up the broken bulb on hard surfaces.**

Clean-up Steps for Carpeting or Rug

- Carefully pick up glass fragments and place them in a sealed plastic bag.
- Use sticky tape, such as duct tape, to pick up any remaining small glass fragments and powder.
- If vacuuming is needed after all visible materials are removed, vacuum the area where the bulb was broken.
- Remove the vacuum bag (or empty and wipe the canister), and put the bag or vacuum debris in a sealed plastic bag.

Clean-up Steps for Clothing, Bedding and Other Soft Materials

- If clothing or bedding materials come in direct contact with broken glass or mercury-containing powder from inside the bulb that may stick to the fabric, the clothing or bedding should be thrown away. Do not wash such clothing or bedding because mercury fragments in the clothing may contaminate the machine and/or pollute sewage.
- You can, however, wash clothing or other materials that have been exposed to the mercury vapor from a broken CFL, such as the clothing you are wearing when you cleaned up the broken CFL, as long as that clothing has not come into direct contact with the materials from the broken bulb.
- If shoes come into direct contact with broken glass or mercury-containing powder from the bulb, wipe them off with damp paper towels or disposable wet wipes. Place the towels or wipes in a glass jar or plastic bag for disposal.

Disposal of Clean-up Materials

- Immediately double bag all clean-up materials in appropriately sized plastic bags. If a zip lock bag is not immediately available close and seal whatever bag you have as good as possible.
- Label the bag with a Hazardous Waste label or the words “Hazardous Waste-Broken Fluorescent Bulb-may contain Mercury”
- Contact the Chemical Hygiene Officer or Campus Safety so the bag can be placed into the Central Accumulation Area.
- Wash your hands after disposing of the plastic bags containing clean-up materials.

B. BATTERIES

Batteries, including automobile, alkaline, nickel-cadmium, lithium, nickel metal hydride, mercury, and lead acid are also handled as universal wastes by Physical Plant personnel, ISR personnel, as well as academic faculty and staff.

1. Batteries should be sorted by type and placed in plastic bags before being placed in a battery recycling bin. This will save time when they are taken for

recycling and could prevent incompatible materials from coming in contact with one another.

2. Batteries are periodically collected by the CHO or a representative of the CHO.
 3. They are then sorted and sent for disposal or recycling depending on type.
- The box used for the containment of the batteries should be plastic in case of oxidation or leakage from the batteries.
 - The box used for containment will also be labeled with a Universal Waste Label noting the contents (i.e. used batteries) or have the words “Universal Waste” plus contents written in clearly visible handwriting on the front of the container.

C. Mercury Containing Thermostats

Spent mercury containing thermostats are regulated as universal waste.

1. These items should be placed in two plastic zip-lock bags and labeled with a universal waste label (or the words Universal Waste “Mercury Thermostat”)
2. These waste materials are should be picked up or brought to the CHO as soon as possible for storage in the CAA.

D. Consumer Electronics

Items such as computers, television, VCR's, stereos and other items, which contain circuit boards, are considered consumer electronics by the universal waste regulations. Contact ISR for disposal options.

PCB Management:

What are PCB's?

Polychlorinated biphenyls (PCB's) are a synthetic chlorinated hydrocarbon that was widely used as dielectric fluid and plasticizer due to their fire resistance and chemical stability. However, research showed that PCB's persist in the environment and accumulate in fatty tissues of people and animals. In addition, PCB's are linked to chronic reproductive effects, gastric disorders, and skin lesions in laboratory animals and are a suspected human carcinogen. Consequently, PCB's were banned from sale in 1979.

Regulatory Requirements

In 1990, the Federal Environmental Protection Agency mandated that tracking systems be established for the control of PCB wastes. The rule required disposers and commercial storers of PCB's to...

1. obtain an EPA identification number, and improve documentation, and
2. improve record keeping requirements

What type of products might contain PCB's?

Before federal regulations limited PCB production, PCBs were commonly used in a variety of commercial products, including:

- Transformers
- Large, high- and low-voltage capacitors
- Fluorescent light ballasts
- Gaskets and dampening felt
- Liquid-cooled electric motors
- Vacuum pumps
- Microscopy mounting media and immersion oil
- Roofing Mastics
- Radio Transmission Equipment
- Hydraulic systems
- Heat-transfer systems
- Liquid-filled cable
- Switches
- Voltage regulators
- Adhesives
- Microwave ovens
- X-Ray Equipment
- Electromagnets

LIGHT BALLASTS

As of 03/01/2010 Beloit College no longer has any buildings with light ballasts known to contain PCB's

TRANSFORMERS

As of 03/01/2010 Beloit College no longer has transformers known to contain PCB's

CAPACITORS

Room 210 in the Science Center contains approximately 90lbs of PCB containing materials. A full inventory is in process. PCB containing materials are being separated and labeled properly.

This laboratory must meet the following storage requirements:

- All PCB items in the lab are to be stored in secondary containment. This includes PCB items stored in refrigerators.
- If PCB items in storage contain PCB levels of 50 ppm or greater, the storage container/area must be marked with the PCB label. These are available from the CHO.
- If any PCB items used in the lab contain PCB levels of 50 ppm or greater, the door(s) to the lab must be marked with the PCB label. These are available from the CHO.

Manifest Requirements

When PCBs are removed from Beloit College, the College becomes the generator of PCB waste and is now required to complete a waste manifest for the "cradle to grave" tracking of that material if it contains more than 50 ppm. The PCB manifest system is similar to the RCRA required manifests. The PCB tracking system requires use of a RCRA manifest forms, that the forms be completed in there entirety and that all of the records are maintained.

Leak Detection

A. Inspections

The CHO shall check PCB articles, containers, equipment and other items every **30 days**. The inspection results will be made available to the Physics Department and Campus Safety.

B. Leakage and Spillage

Any leaking PCB article or container must be immediately removed from stock by the CHO and transferred to the CAA for disposal.

Any spilled material shall be immediately cleaned up using the appropriate absorbent material or other means of containment and disposed of properly.

Inventory

A yearly inventory of all PCB containing material will be conducted and the results made available to the Physics Department, Physical Plant, and Campus Safety.

ASBESTOS

If an asbestos-containing material is disturbed or discovered (via cutting, sawing, drilling, prying, or routine tasks), the Physical Plant office should be notified immediately.

The dust and debris from this ACM must be inspected and/or remediated by personnel trained in the proper techniques to accomplish the clean-up without further contamination of the indoor environment.

The Physical Plant Director will be responsible for engaging the proper personnel to perform the clean-up. This may involve in-house personnel for small-scale incidents and/or an independent asbestos licensed contractor, if deemed necessary.

To report a possible asbestos-related incident, or if you have any questions or concerns regarding asbestos at Beloit College please contact;

Physical Plant Director
Michael Brady
608-363-2200