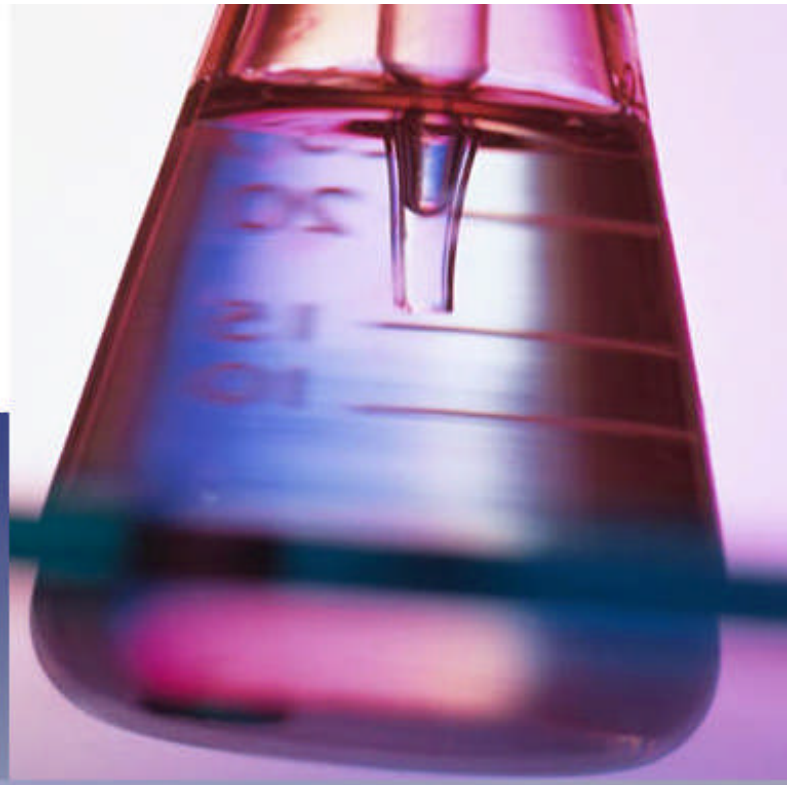
BALL STATE UNIVERSITY®

LABORATORY WASTE MANAGEMENT



Presented by the:

Environmental Health and Safety Office

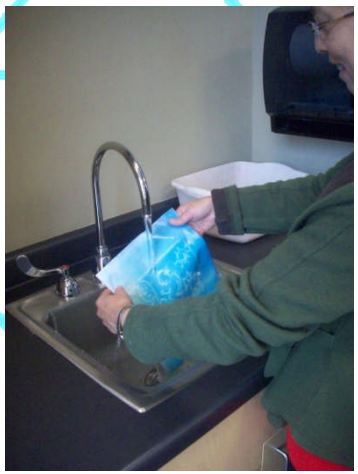
Laboratory and Studio Waste Management

BALL STATE UNIVERSITY

WASTE MANAGEMENT GUIDE

September 2011 version

Environmental Health and Safety Office
Ball State University



BSU Laboratory Waste Management Plan

BALL STATE UNIVERSITY

Prepared by the:

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August 2013

U.S. Environmental Protection Agency (EPA): Definition of Laboratory

Laboratory means an area owned by an eligible academic entity ***where relatively small quantities of chemicals and other substances are used on a non-production basis for teaching or research*** (or diagnostic purposes at a teaching hospital) and are stored and used in containers that are easily manipulated by one person. ***Photo laboratories, art studios, and field laboratories are considered laboratories.*** Areas such as **chemical stockrooms and preparatory laboratories** that provide a support function to teaching or research laboratories (or diagnostic laboratories at teaching hospitals) **are also considered laboratories.**

Note: *This waste management procedure applies only to laboratories, as defined above--not other shops, custodial, or maintenance activities on campus.*

Waste Separation

Clearly label all wastes!

Wastes should be separated by type:

Lab (Studio) Wastes:

- *Hazardous chemical wastes*; or,
- *Non-hazardous chemical wastes*

Other Wastes:

- *Autoclave Wastes*
- *Biohazard Wastes*
- *Sharps*
- *Broken Glass*
- *Special Wastes*
- *Drain Disposal*
- *General refuse*

SPECIAL WASTE DISPOSAL

Autoclave Wastes

Clearly label all wastes!

Commonly autoclaved wastes include:

- Disposable lab ware, except Pasteur pipettes, contaminated with potentially infectious (blood, body fluids, human cell culture media, bacteria culture media, viruses, recombinant DNA, etc.);
- Gloves, regardless of contaminated or not, and paper towels used for work surface or equipment decontamination must be disposed of in a clear autoclave bag or red biohazard bag;
- Pasteur pipettes should be disposed of in sharps container.;
- Culture plates;
- Culture media ;
- Animal cages and bedding from infected animals

Biohazard wastes nor autoclaved should be placed in infectious waste bags/boxes or sharps containers.

Biohazardous Wastes

- Unless to be autoclaved or chemically disinfected, all potentially infectious materials should be placed in an infectious waste container or bag
- Do not overfill the container or use for normal trash disposal;
- Do not push down on the container contents with your hands or feet.
- These wastes are routinely picked up for off-site treatment and disposal by an approved vendor.

Biohazard Box and 5 Gallon Biohazard Pail

Sharps

Clearly label all wastes!

Sharps

- All sharps, including those not potentially infective or contaminated, should be put into a proper sharps container.
- Do not fill the container more than ¾ full;
- Do not attempt to open a closed container;
- Contact the EHS Office if any injuries;
- Contact the EHS Office for removal.

Broken Glass

Clearly label all wastes!

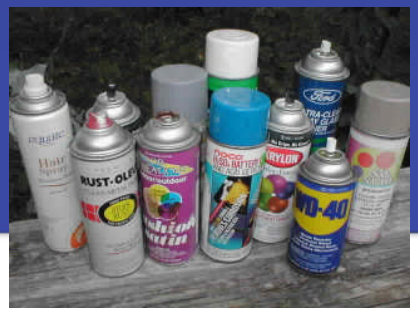
- All broken glass or other (non-infectious) sharp materials should be placed in a *Broken Glass* container
- If none are available--the broken glass should be placed in a fiber box, pail, or other protective container and labeled as "Broken Glass" and set next to, or in, a refuse container.
- Do not attempt to pick up broken glass with bare hands – use leather gloves, a broom and dustpan, tongs, or other devices.

General Refuse

- Do not put the afore-mentioned materials into regular refuse containers (in-room waste cans or dumpsters)
- Do not put liquid wastes into the waste cans unless contained – add absorbents (kitty litter, oil dry) if necessary.
- Do not put heavy items or objects with sharp edges that may tear the container liners or injure custodians into trash receptacles.
- Contact building maintenance (custodial) for any problems with regular trash pickup from building interiors (through BSU work control - 55081

Do not dispose of waste chemicals or free liquids in trash containers!

Special Wastes



- **Aerosol Cans**
  - Discharge completely - to atmospheric pressure (no propellant) – then scrap
- **Gas Cylinders** (propane, lecture bottles, small cylinders)
  - Discharge completely (no contents or propellant) can then go as scrap metal
- **Oily Rags or Solvent Wipes**
  - Place in oily rag containers
  - Do not leave on the floor or exposed to air
  - Should be emptied every night

- **Used Oil**
  - linseed oil – handle as a hazardous waste (flammable)
  - other oils (petoleum, vegetable, vacuum pump, synthetic) – label as USED OIL, not "waste" oil – should be collected for recycling
  - Do <u>not</u> mix used oil with other liquid wastes, particularly solvents

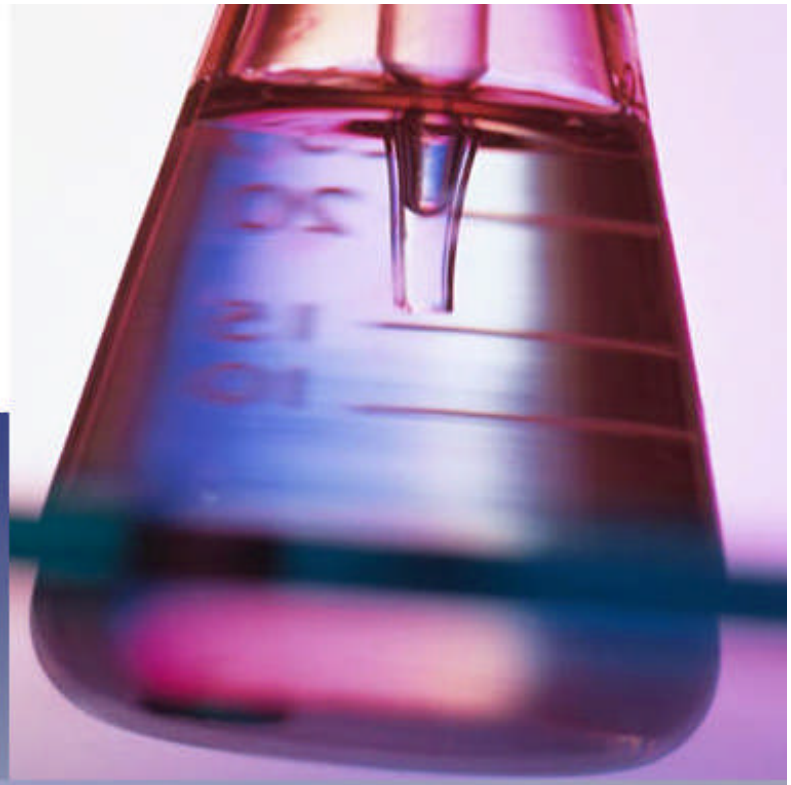
Drain Disposal

- Refer to the *Disposal of Laboratory Wastes: Requirements for Chemical Disposal to Sinks and Drains* document (available on the EHS Office website) for information on, and a listing of, those liquid wastes that may be approved for disposal to laboratory drains.
- Generally, the following materials are suitable for drain disposal:
  - They are liquids and readily water soluble (at least 3% soluble);
  - Easily biodegradable or amenable to treatment by the waste water treatment process;
  - Are simple salt solutions of low toxicity inorganic substances;
  - Are dilute organic substances of low aquatic toxicity and low concentration; and,
  - Have a pH between 5.5 and 9.5

  - There are, however, many wastes, including fats, oils, and grease, toxic substances, reactives, non-water soluble materials, and many others, that may not be disposed to the sewerage system. The above-referenced document should be reviewed before such disposal, or the EHS Office and Muncie Bureau of Water Quality must be contacted for prior assessment and approval.

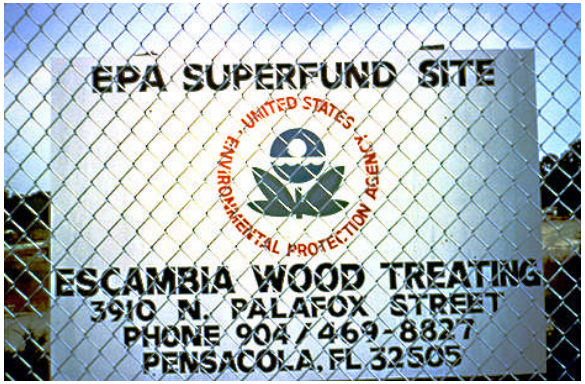
General Chemical Waste Handling

- Place waste in a proper, closable container.
  - Original or shipping container is usually fine.
  - Use larger or 5-gallon carboys, if practical.
  - Use safety cans if flammable wastes
- Label the container – *contents and any hazards!*
- No containers that are, or look like, beverage bottles or food containers!
- Keep containers closed. NO OPEN FUNNELS.
- Keep the waste in your studio/lab/workshop where it is generated.
- Secondary containment is needed if liquids near floor drains or sink drains.



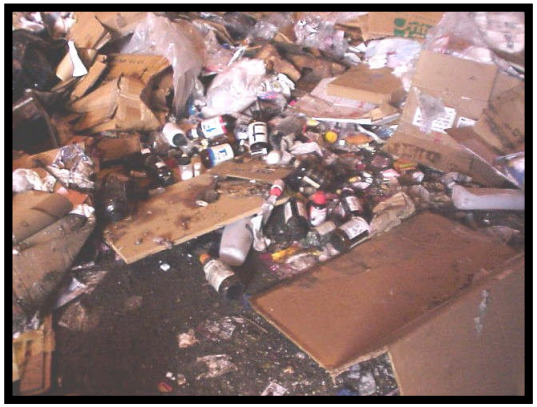
What is Hazardous Waste?

Resource Conservation & Recovery Act (RCRA)



- Enacted in 1976 by EPA as an amendment to the Solid Waste Disposal Act (SWDA)
- Main objectives:
  - Protect human health & the environment
  - conserve valuable material & energy resources
- Established "Cradle-to-grave" management and tracking of hazardous waste
- EPA inspectors have same authority as FBI/ATF - Violations serious
- Misidentification of wastes often leads to subsequent handling/disposal violations

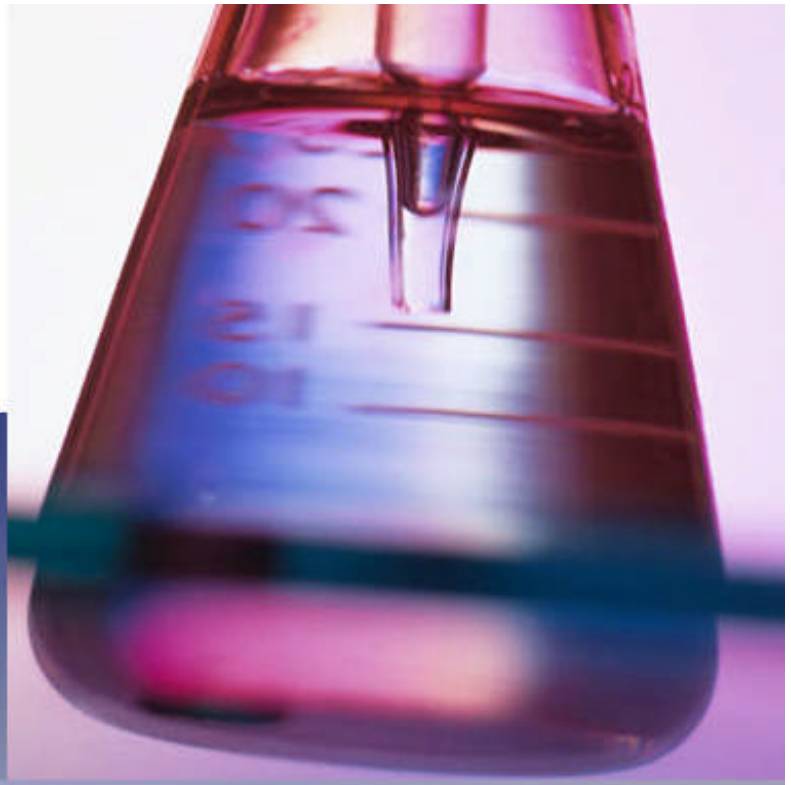
HAZARDOUS Wastes



Hazardous wastes are regulated because they present special hazards to man or to the environment if they are improperly disposed of or discarded.

The hazardous waste (RCRA) regulations are very stringent due to past chemical waste disposal abuses.

The difference between a *hazardous* waste and a *nonhazardous* chemical waste can be very small – due to a physical characteristic of the waste, concentration of a constituent, the particular chemicals in the waste, or the process that generated the waste..

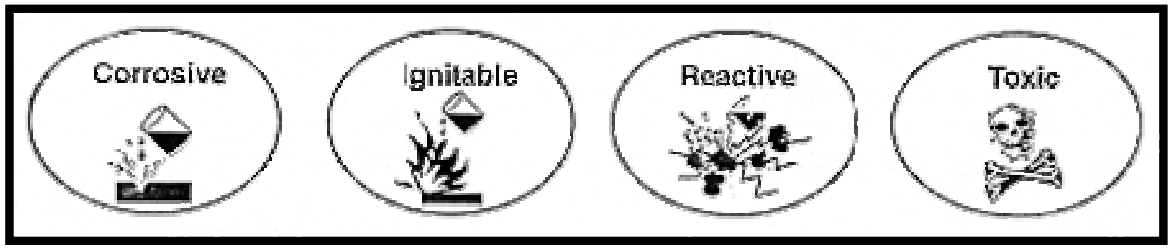


So… is <u>your</u> waste a hazardous waste?

You Might Have A Hazardous Waste If ....

The Compound Or Solution meets a Characteristic of Hazardous Waste:

- Ignitable
- Corrosive
- Reactive
- Toxic



Or, if it is “Listed” as a Hazardous Waste.

F	K	P	U
Non-specific Source wastes	Source- specific wastes	Acutely hazardous wastes	Toxic wastes

Hazardous Waste: Exception

- **Universal waste** *(batteries; lamps; mercury from thermometers) – These wastes have* ***lesser requirements--if they are to be recycled****. They must be labeled as "Universal Wastes" and be removed for recycling within one year of their accumulation or "removal from service".*

Characteristic Wastes

- D001 – Ignitable Wastes
- D002 – Corrosive Wastes
- D003 – Reactive Wastes
- D004 to D043 - TCLP Wastes

  (Toxicity Characteristic Leaching Procedure)

Let's look briefly at what makes a particular waste fall into one of these characteristics that make it a *hazardous waste*.

What Is An Ignitable Waste?

- It is a liquid and is capable of burning or causing a fire. This material will have a flash point **<u>below 140º F</u>.**
- It is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes.
- It is an ignitable compressed gas.
- It is an oxidizer or explosive

D001 Waste

Examples include *acetone, gasoline, organic peroxides, industrial alcohols, chlorates, permanganates*.

What Is A Corrosive Waste?

- The material is a liquid or solid and is capable of eroding materials and human tissue.
- These materials have a pH of **2** or less **or 12.5** or **greater**
- It is a liquid and corrodes steel at a rate greater than 0.250 inch per year
- Examples: *Alkaline cleaners, some chlorides, fluorides, and acids & bases*.

D002 Waste

What Is A Reactive Waste?

Waste that is:

- Capable of reacting dangerously with air and water
- When mixed with water could cause an explosion
- Could release poisonous fumes,
- Capable of detonation or explosive reaction at STP
- Forbidden explosives
- Is shock sensitive.

D003 Waste

Examples include *peroxides, picric acid, isocynates, cyanides, sulfides, and chlorine.*

What Is A Toxic Waste?

- Material is capable of poisoning humans.
- Contains concentrations of arsenic, barium, cadmium, chromium, lead, mercury, selenium, or silver
- Contains a pesticide or other organic toxin – cresols, chloroform, benzene, TCE
- Wastes are determined to be "**Toxic**" if they fail the **TCLP Test (a leachate test)**.

D004-D043 Wastes

Listed Wastes

- *F-listed wastes* are from non-specific sources
  - Example: halogenated solvents used to degrease equipment; or, discarded chlorophenol formulations
- *K-listed wastes* are from specific industrial sources
  - Example: *K009: Distillation bottoms from the production of acetaldehyde from ethylene*
  - Assume BSU generates no K-listed hazardous wastes.
- *U-listed wastes* are toxic wastes
- *P-listed wastes* are acutely hazardous wastes

Once a RCRA listed hazardous waste always a RCRA listed hazardous waste.

What Is A Listed Waste?

- **The F-list** (non-specific source wastes). Solvents that have been used in cleaning or degreasing operations. The F-listed wastes are known as wastes from non-specific sources. These include halogenated and non-halogenated chemicals such as methylene chloride, TCA, TCE, MEK, ethyl ether, xylene, acetone, benzene, chlorinated fluorocarbons, and many others used as solvents.
- Possible examples from laboratories or studios (metalworking, sculpture, painting, printing, etc.):
  - Spent solvent wastes (F001 - F005).
  - Wastes from electroplating and other metal finishing operations (F006 - F012, and F019)

What Is A Listed Waste?

- **P- and U-listed wastes:** These two lists designate certain commercial chemical products as hazardous when spilled or disposed. These unused chemicals may become wastes in a number of ways. Some can be spilled while in use, others are intentionally discarded if out of specification, others are just unused “orphan” or expired chemicals.
- They must meet all three of the following criteria: (1) The formulation must contain at least one chemical on the P or U list; (2) The chemical in the waste must be unused; and (3) the chemical in the waste must be in the form of a commercial chemical product (CCP), which is a chemical that is of technical (commercial) grade, 100% pure, and the only active ingredient in the formulation.
- Hundreds of chemicals are included on both the P- and U-lists. (*contact the EHS Office for guidance on these waste identifications*).

Examples of P-Listed Wastes

Allyl alcohol	Osmium tetroxide
Ammonium vanadate	Phenylthiourea
Arsenic acid	Potassium cyanide
Arsenic trioxide	Sodium azide
Carbon disulfide	Sodium cyanide
2,4-Dinitrophenol	Thiosemicarbazide
Fluorine	Vanadium oxide
Nitric oxide	Vanadium pentoxide

P-listed chemicals (acutely hazardous wastes) are fairly common in BSU labs – but should be avoided whenever possible. Generating over 1 kg of a "P" waste in a single month is a problem.

Examples of U-Listed Wastes

Acetaldehyde	1,4-Dioxane
Acetone	Ethyl acetate
Acetonitrile	Ethyl ether
Aniline	Formaldehyde
Benzene	Methyl alcohol
Bromoform	Methylene chloride
1-Butanol	Phenol
Chloroform	Toluene

U-listed (toxic) chemicals are commonly found in BSU labs. Again, though, just because a P or U listed constituent is present in a given chemical does not mean that compound or solution is a hazardous waste when disposed or spilled – it must be the original 100% or sole active ingredient of the product or material.

Caution: Mixing Wastes

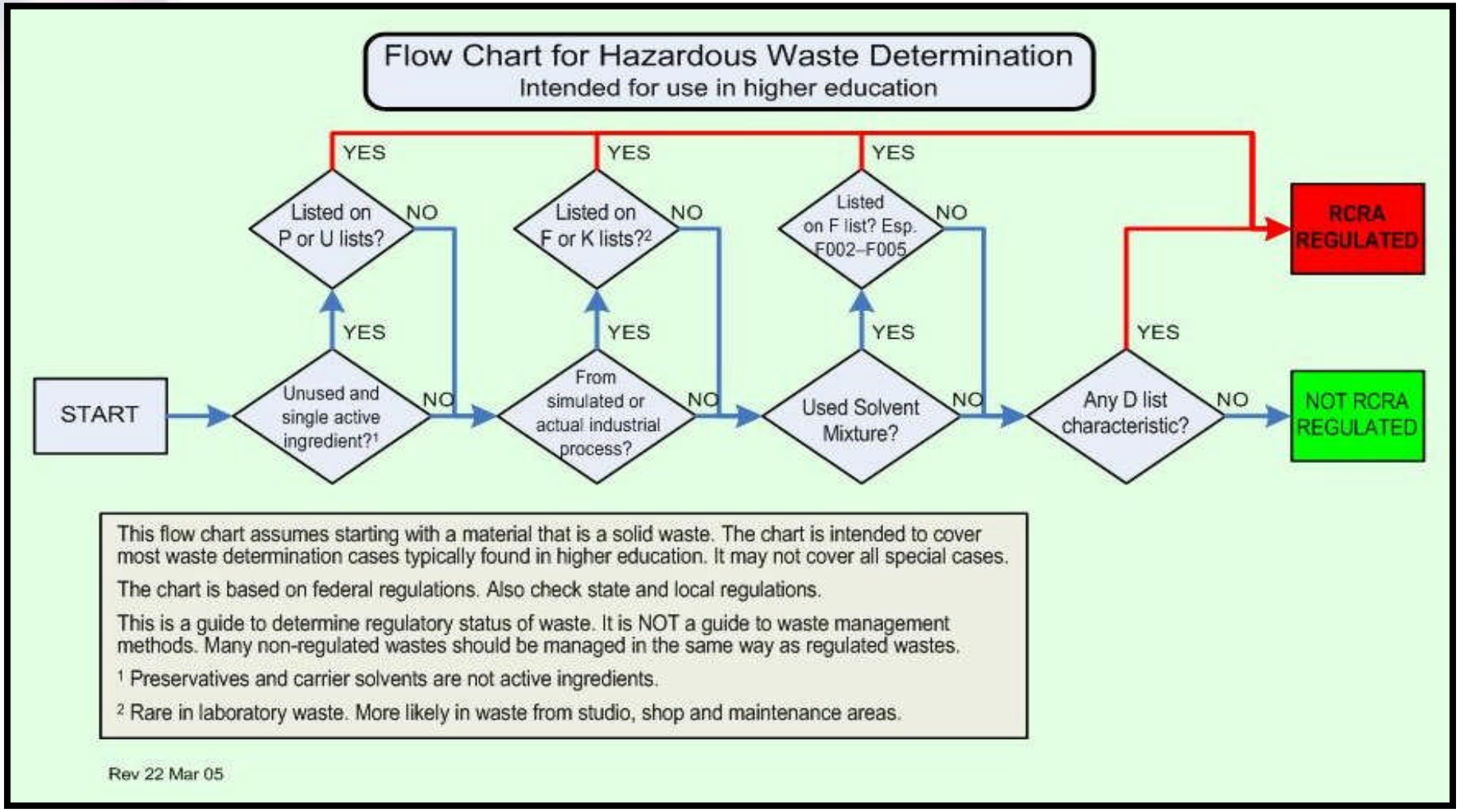
1. If you mix a hazardous waste with a nonhazardous waste--you may be making the entire mixture a hazardous waste.

2. If you mix a listed hazardous waste with a nonhazardous waste (or a characteristic hazardous waste) you may be making the entire mixture a listed hazardous waste.

Figure III-6: The Mixture Rule

Any amount of nonhazardous solid waste	+	Any amount of listed hazardous waste	=	**Listed hazardous waste**
Any amount of nonhazardous solid waste	+	Any amount of listed hazardous waste that is listed solely for exhibiting the characteristic of ignitability, corrosivity, and/or reactivity	=	**Nonhazardous waste if mixture does not exhibit any characteristic**

Hazardous Waste Determination Process



The good news…

- Ball State University recently elected to be covered by Subpart K of the hazardous waste regulation - a new alternative RCRA regulation designed specifically for academic laboratories.
- The BSU Hazmat "team" will now decide whether your waste is a RCRA-regulated hazardous waste, a non-regulated hazardous waste, a non-hazardous waste, or a non-regulated waste.
- So, even though you may no longer need to make the final waste type determination--you still needed to know the basic hazardous waste criteria we just covered so that you can relate the necessary information.

Ball State Hazardous Waste Lab (and Studio) Management

- You also need to know to handle potentially hazardous wastes properly – proper containers and labeling, not to mix with other wastes, etc.
- It is this approach (Subpart K) that is described in the following slides for the identification and handling of hazardous wastes from labs and studios.
- Subpart K is not available to industry and does not apply to our shops, maintenance, or custodial wastes – only those wastes generated in a laboratory!

Rationale for the Academic Labs Rule (Subpart K)

- Teaching and research labs differ from industry in the following ways:
  - Hazardous waste generation pattern is different
    - Hundreds of different hazardous wastes that vary over time
    - Small amounts of each hazardous waste
    - Many individuals generating hazardous waste in many labs (i.e., many points of generation)
  - Individuals generating the hazardous waste are often students, who
    - Have inherently high turnover (thus difficult to train)
    - Lack the expertise or interest mandated in industry

Lab Wastes

The provisions of Subpart K are intended to bring about safer management of hazardous waste in academic laboratories by:

- Requiring hazardous waste determinations to be made by "trained professionals", rather than students, faculty, or researchers.
- Requiring hazardous waste to be removed from the laboratory every six months (or when a container is full).
- Allowing eligible academic entities the flexibility to decide when and where on-site hazardous waste determinations are made.
- Offering incentives for removing old and expired chemicals that may pose risks from the laboratories.
- Requiring a *Laboratory Waste Management Plan* to be developed. That plan has been developed is available on the BSU EHS Website.

Lab Wastes

Lab Wastes Can be Either:

- *Non-hazardous Wastes;*

  or,

- *Hazardous Wastes*

This determination will be made later by a "trained professional" based on the completed waste label.

LAB WASTE

Accumulation Start Date: _____

Dept:_____Bldg/Rm:_____

Contact:_____Phone:_____

Waste Name: _____

Chemical Composition: %

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

Hazard properties (check any applicable):

☐ Poison ☐ Heavy Metal: __ __ ppm

☐ Flammable ☐ Oxidizer

☐ Corrosive: pH? ____ ☐ Shock-sensitive

☐ Reactive to: ☐ Air ☐ Water

☐ Cyanides: ___ ppm ☐ Sulfides: ____ ppm

☐ Carcinogen ☐ Irritant ☐ Sensitizer

☐ Solvents ☐ Chlorinated solvents

☐ Toxic ☐ Peroxide former

☐ Biohazard ☐ Non-Hazardous?

Other: _____

Wastes must be removed within 6 months of Start of Accumulation in the Container!!

Contact EHS Office (tlrussell@bsu.edu, or 5-2807) with questions or for pickup.

Lab Wastes: Label Contents

All containers of Lab Waste ("unwanted materials") must be labeled with:

Affixed or Attached to the Container:

1. The words **"Lab Waste"**; and,

2. Information to alert emergency responders to the contents of the container (e.g., name or list of chemicals or hazard classes)

All waste containers must also have the following information either directly on the container, or associated with the container label:

Associated With Container Label – May be Affixed or Attached if Desired:

3. Information sufficient to make a Hazardous Waste determination; and,
4. Accumulation start date (of the waste in the container)

Lab Wastes: the Container Label

Identifies container as *Unwanted Material* – BSU term: *LAB WASTE*

Needed to make a HW determination and alerts emergency responders to container contents

Completing the BSU Lab Waste form meets all of the EPA container label requirements

LAB WASTE

Accumulation Start Date: _____

Dept:_____Bldg/Rm:_____

Contact:_____Phone:_____

Waste Name: _____

Chemical Composition: %

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

Hazard properties (check any applicable):

☐ Poison ☐ Heavy Metal: __ __ ppm

☐ Flammable ☐ Oxidizer

☐ Corrosive: pH? ____ ☐ Shock-sensitive

☐ Reactive to: ☐ Air ☐ Water

☐ Cyanides: ___ ppm ☐ Sulfides: ____ ppm

☐ Carcinogen ☐ Irritant ☐ Sensitizer

☐ Solvents ☐ Chlorinated solvents

☐ Toxic ☐ Peroxide former

☐ Biohazard ☐ Non-Hazardous?

Other: _____

Wastes must be removed within 6 months of Start of Accumulation in the Container!!

Contact EHS Office (tlrussell@bsu.edu, or 5-2807) with questions or for pickup.

States *Start of Accumulation* Date

Alerts emergency responders to the container contents

Alerts emergency responders to container contents and assists in making a HW determination

Lab Wastes: Example

1. **Start Date** – date when waste is first added to container (if combining containers – the earliest date prevails);
2. **Contact person** – who generated or knows the waste?
3. Give common **waste name**;
4. Provide **contents and estimated percentage;** and,
5. Check known/likely **hazards.**

LAB WASTE

Accumulation Start Date: 9-12-13

Dept: CHEM Bldg/Rm: CP441

Contact: C. Cardinal Phone: 5-1241

Waste Name: Spent Solvent/Cleaner

Chemical Composition:	%
Acetone	30
Methanol	25
Acetic Acid	10
Water	35

Hazard properties (check any applicable):

☐ Poison ☐ Heavy Metal: __ __ ppm

✓ Flammable ☐ Oxidizer

✓ Corrosive: pH? 3.8 ☐ Shock-sensitive

☐ Reactive to: ☐ Air ☐ Water

☐ Cyanides: ___ ppm ☐ Sulfides: ____ ppm

☐ Carcinogen ☐ Irritant ☐ Sensitizer

✓ Solvents ☐ Chlorinated solvents

✓ Toxic ☐ Peroxide former

☐ Biohazard ☐ Non-Hazardous?

Other: _____

Wastes must be removed within 6 months of Start of Accumulation in the Container!!

Contact EHS Office (tlrussell@bsu.edu, or 5-2807) with questions or for pickup.

Lab Wastes - Referenced

LAB WASTE

Accumulation Start Date: 9-12-13

Dept: CHEM Bldg/Rm: CP441

Contact: C. Cardinal Phone: 5-1241

Waste Name: Container #103

Chemical Composition:	%
Chlorinated Solvents	100

Hazard properties (check any applicable):

- ☐ Poison ☐ Heavy Metal: __ __ ppm
- ☐ Flammable ☐ Oxidizer
- ☐ Corrosive: pH? ____ ☐ Shock-sensitive
- ☐ Reactive to: ☐ Air ☐ Water
- ☐ Cyanides: ___ ppm ☐ Sulfides: ____ ppm
- ☐ Carcinogen ☐ Irritant ☐ Sensitizer
- ☐ Solvents ✓ Chlorinated solvents
- ✓ Toxic ☐ Peroxide former
- ☐ Biohazard ☐ Non-Hazardous?

Other: _____

Wastes must be removed within 6 months of Start of Accumulation in the Container!!

Contact EHS Office (tlrussell@bsu.edu, or 5-2807) with questions or for pickup.

Must still have at least LAB WASTE identity and hazard information for emergency responders on the container itself – start of accumulation date and HazWaste information may be "associated" or "referenced"

Lab Wastes: Original Container

+

BALL STATE UNIVERSITY

LAB WASTE

Accumulation Start Date: *9-5-13*

Dept: *Sculpture* Bldg/Rm: *AJ 102*

Contact: *Charlie C.* Phone: *5-1241*

Waste Name: **Unused Linseed Oil**

Wastes must be removed within 6 months of Start of Accumulation in the Container!!

Contact EHS Office (tlrussell@bsu.edu, or 5-2807) with questions or for pickup.

Here you can cut off part of the LAB WASTE label if you like –still need to show that and the Accumulation Start Date, etc. The material hazards (flammability, etc.) and contents should already be on the original container label.

Lab Wastes: Hazard Checklist

Poison: A waste that either exhibits ***Toxic*** hazards as defined below, or is otherwise designated a ***Poison*** based on shipping labels on the constituent containers, on Safety Data Sheets, or container labels related to the contents of the waste container.

Heavy Metal: This refers to the 8 RCRA metals – Arsenic (As), Barium (Ba), Cadmium (Cd), Chromium (Cr), Mercury (Hg), Lead (Pb), and Selenium (Se), and Silver (Ag). If present in the waste in appreciable amounts, name the metal and its approximate concentration.

Flammable: Liquids having a flashpoint of less than 140°F. For solids--may cause a fire through friction; show a burning rate faster than 2.2 mm (0.087 inches) per second; or any metal powders that can be ignited and react over the whole length of a sample in 10 minutes or less. Naphthalene, matches, aluminum powder, and magnesium are examples of flammable solids.

LAB WASTE

Accumulation Start Date: _____

Dept:_____Bldg/Rm:_____

Contact:_____Phone:_____

Waste Name: _____

Chemical Composition: %

_____ ___

_____ ___

_____ ___

_____ ___

_____ ___

_____ ___

_____ ___

Hazard properties (check any applicable):

☐ Poison ☐ Heavy Metal: __ __ ppm

☐ Flammable ☐ Oxidizer

☐ Corrosive: pH? ___ ☐ Shock-sensitive

☐ Reactive to: ☐ Air ☐ Water

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☐ Solvents ☐ Chlorinated solvents

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☐ Biohazard ☐ Non-Hazardous?

Other: _____

Wastes must be removed within 6 months of Start of Accumulation in the Container!!

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Lab Wastes: Hazard Checklist

LAB WASTE

Accumulation Start Date: _____

Dept:_____Bldg/Rm:_____

Contact:_____Phone:_____

Waste Name: _____

Chemical Composition: %

_____ ____

_____ ____

_____ ____

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_____ ____

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☐ Solvents ☐ Chlorinated solvents

☐ Toxic ☐ Peroxide former

☐ Biohazard ☐ Non-Hazardous?

Other: _____

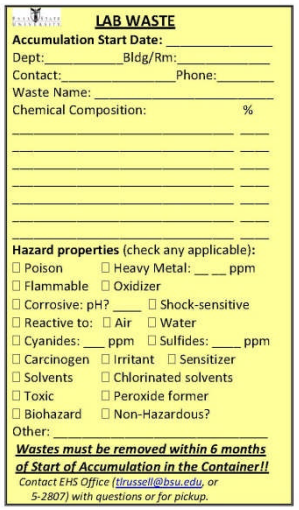
Wastes must be removed within 6 months of Start of Accumulation in the Container!!

Contact EHS Office (tlrussell@bsu.edu, or 5-2807) with questions or for pickup.

Oxidizer: Any compound that spontaneously evolves oxygen at room temperature or under slight heating. The term includes such chemicals as chlorates, perchlorates, nitrates, and permanganates. Peroxide-formers should be checked separately where indicated.

Corrosives: Acids and bases or mixtures having a pH less than or equal to 2 or greater than or equal to 12.5, and materials that burn the skin or dissolve metals. Examples are strong mineral acids (chromic, sulfuric, hydrochloric, or nitric) strong alkalis (potassium hydroxide, sodium hydroxide), rust removers, and acid or alkaline cleaning fluids. Specify the pH of the waste where indicated if known or a potential hazard. The presence of perchloric or hydrofluoric acid should also be noted in the *Waste Name* or *Other* category.

Lab Wastes: Hazard Checklist



LAB WASTE

Accumulation Start Date: _____

Dept:_____Bldg/Rm:_____

Contact:_____Phone:_____

Waste Name: _____

Chemical Composition: %

_____ ___

_____ ___

_____ ___

_____ ___

_____ ___

_____ ___

Hazard properties (check any applicable):

☐ Poison ☐ Heavy Metal: __ __ ppm

☐ Flammable ☐ Oxidizer

☐ Corrosive: pH? ____ ☐ Shock-sensitive

☐ Reactive to: ☐ Air ☐ Water

☐ Cyanides: ___ ppm ☐ Sulfides: ____ ppm

☐ Carcinogen ☐ Irritant ☐ Sensitizer

☐ Solvents ☐ Chlorinated solvents

☐ Toxic ☐ Peroxide former

☐ Biohazard ☐ Non-Hazardous?

Other: _____

Wastes must be removed within 6 months of Start of Accumulation in the Container!!

Contact EHS Office (tlrussell@bsu.edu, or 5-2807) with questions or for pickup.

Reactivity: A waste material, other than an explosive, which will vigorously polymerize, decompose, condense, or become self-reactive and undergo other violent chemical changes, including explosion, when exposed to heat, friction or shock, or in the absence of an inhibitor, or in the presence of contaminants or in contact with incompatible material. Check if the material is air or water reactive. Also, check and provide the concentration of any **cyanides** or **sulfides** in the waste. a waste is hazardous if it is a cyanide- or sulfide-bearing waste which generates toxic gases or vapors at a quantity sufficient to present a health or physical danger.

Carcinogen: Any substance or agent capable of causing or producing cancer in mammals, including humans. A chemical is considered to be a carcinogen if it has been listed as such by the International Agency for Research on Cancer (IARC), by the National Toxicology Program (NTP) (latest edition), or if it is regulated by OSHA as a carcinogen.

Lab Wastes: Hazard Checklist

Irritant: A chemical/material that causes a reversible inflammatory effect on living tissue, and may cause soreness, redness or discomfort.

Sensitizer: A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

Solvents: Identify if the waste contains materials that were used as a solvent or extraction fluid – either **halogenated** (methylene chloride, chloroform, trichloroethylene, dichloroethylene, Tetrachloroethylene, 1,1,1-trichloroethane, carbon tetrachloride, chlorinated fluorocarbons, etc.); **or non-halogenated** (Xylene, acetone, ethyl acetate, ethyl benzene, ethyl ether, methyl isobutyl ketone, n-butyl alcohol, cyclohexanone, and methanol, etc.)

LAB WASTE

Accumulation Start Date: _____

Dept:_____Bldg/Rm:_____

Contact:_____Phone:_____

Waste Name: _____

Chemical Composition: %

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

Hazard properties (check any applicable):

☐ Poison ☐ Heavy Metal: __ __ ppm

☐ Flammable ☐ Oxidizer

☐ Corrosive: pH? ____ ☐ Shock-sensitive

☐ Reactive to: ☐ Air ☐ Water

☐ Cyanides: ___ ppm ☐ Sulfides: ____ ppm

☐ Carcinogen ☐ Irritant ☐ Sensitizer

☐ Solvents ☐ Chlorinated solvents

☐ Toxic ☐ Peroxide former

☐ Biohazard ☐ Non-Hazardous?

Other: _____

Wastes must be removed within 6 months of Start of Accumulation in the Container!!

Contact EHS Office (tlrussell@bsu.edu, or 5-2807) with questions or for pickup.

Lab Wastes: Hazard Checklist

LAB WASTE
Accumulation Start Date: _____
Dept:_____Bldg/Rm:_____
Contact:_____Phone:_____
Waste Name: _____
Chemical Composition: %
_____ ___
_____ ___
_____ ___
_____ ___
_____ ___
_____ ___
_____ ___
Hazard properties (check any applicable):
☐ Poison ☐ Heavy Metal: __ __ ppm
☐ Flammable ☐ Oxidizer
☐ Corrosive: pH? ____ ☐ Shock-sensitive
☐ Reactive to: ☐ Air ☐ Water
☐ Cyanides: ___ ppm ☐ Sulfides: ____ ppm
☐ Carcinogen ☐ Irritant ☐ Sensitizer
☐ Solvents ☐ Chlorinated solvents
☐ Toxic ☐ Peroxide former
☐ Biohazard ☐ Non-Hazardous?
Other: _____
Wastes must be removed within 6 months of Start of Accumulation in the Container!!
Contact EHS Office (tirussell@bsu.edu, or 5-2807) with questions or for pickup.

Toxic: A waste having the capacity to cause death, illness, or diminished function. A material that meets one or more of the following criteria should be considered toxic:

- Has a published LD_{50} equal to or less than 0.5 g/kg of body weight.
- Has a published LC_{50} equal to or less than 1000 ppm.
- Has an OSHA permissible exposure limit (PEL) or ACGIH Threshold Limit Value (TLV) equal to or less than 5000 ppm.
- Has an OSHA PEL or ACGIH TLV equal to or less than 10 mg/m^3.

Peroxide Formers: Organic peroxides are very unstable carbon-based chemicals that contain the characteristic peroxide (-O-O-) bond. Peroxides can be formed when commonly used laboratory chemicals with the potential to form peroxides react with air, moisture, or impurities. Organic peroxides are extremely sensitive to shock, sparks, heat, friction, impact, and light. These include acrylonitrile, butadiene, cyclohexene,, ethylene glycol diethyl ether, furan, isopropyl ether, methyl isobutyl ketone, vinyl acetate, vinyl chloride, and vinyl ethers.

Lab Wastes: Hazard Checklist

LAB WASTE
Accumulation Start Date: _____
Dept:_____Bldg/Rm:_____
Contact:_____Phone:_____
Waste Name: _____
Chemical Composition: %
_____ ____
_____ ____
_____ ____
_____ ____
_____ ____
_____ ____
_____ ____

Hazard properties (check any applicable):
☐ Poison ☐ Heavy Metal: __ __ ppm
☐ Flammable ☐ Oxidizer
☐ Corrosive: pH? ____ ☐ Shock-sensitive
☐ Reactive to: ☐ Air ☐ Water
☐ Cyanides: ___ ppm ☐ Sulfides: ____ ppm
☐ Carcinogen ☐ Irritant ☐ Sensitizer
☐ Solvents ☐ Chlorinated solvents
☐ Toxic ☐ Peroxide former
☐ Biohazard ☐ Non-Hazardous?
Other: _____

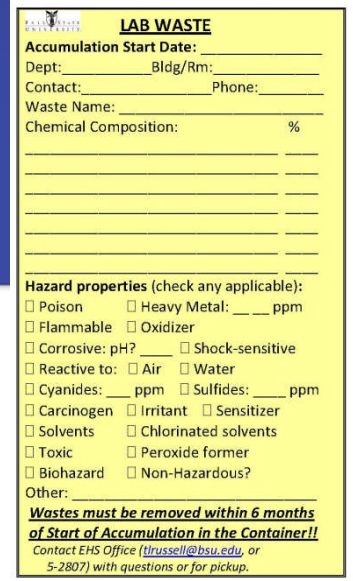
Wastes must be removed within 6 months of Start of Accumulation in the Container!!
Contact EHS Office (tlrussell@bsu.edu, or 5-2807) with questions or for pickup.

Biohazard: An agent of biological origin (e.g., all infectious organisms, their toxins, allergens of biological origin, and genetic fragments) that has the capacity to cause ill-effects in humans.

Explosive: The term "explosive" or "explosives" includes any chemical compound or mechanical mixture which, when subjected to heat, impact, friction, shock, detonation or other suitable initiation, undergoes a very rapid chemical change with the evolution of large volumes of highly heated gases which exert pressures in the surrounding medium. The term applies to materials that either detonate or deflagrate. Explosive wastes do not appear as a label hazard as such materials should be immediately brought to the attention of the BSU EHS Office for proper handling.

Other: Can include any other hazard not listed.

Lab Wastes: Hazard Checklist



LAB WASTE

Accumulation Start Date: _____

Dept:_____Bldg/Rm:_____

Contact:_____Phone:_____

Waste Name: _____

Chemical Composition: %

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

Hazard properties (check any applicable):

☐ Poison ☐ Heavy Metal: __ __ ppm

☐ Flammable ☐ Oxidizer

☐ Corrosive: pH? ____ ☐ Shock-sensitive

☐ Reactive to: ☐ Air ☐ Water

☐ Cyanides: ___ ppm ☐ Sulfides: ____ ppm

☐ Carcinogen ☐ Irritant ☐ Sensitizer

☐ Solvents ☐ Chlorinated solvents

☐ Toxic ☐ Peroxide former

☐ Biohazard ☐ Non-Hazardous?

Other: _____

Wastes must be removed within 6 months of Start of Accumulation in the Container!!

Contact EHS Office (tlrussell@bsu.edu, or 5-2807) with questions or for pickup.

Non-Hazardous: Many chemicals and compounds would not constitute hazardous wastes, only a very few examples include neutralized caustics (pH between 5 and 10), collagen, cytosine, nutrients, starches, cellulase, many biologicals and media, salines, potassium thiosulfate, plasmin, calcium citrate, pectrin, and many others. If a trained individual, based on knowledge of the waste contents and characteristics can determine that the waste is not a RCRA Hazardous Waste, this class may be checked. Normally, this determination will be made following removal of the waste by the Chemical Hygiene Officer or field chemists employed by BSU's waste vendor personnel. However, if you are sure the waste is innocuous it may be checked as Non-Hazardous here--or separately disposed as solid waste or to the sewer as described in the *BSU Waste Management Guide*.

Lab Wastes: Handling

1. Label properly!

2. Use compatible containers in good condition;

3. Do not exceed 55 gallons (220 lbs) of waste in particular lab (1 qt. of P-lists);

4. Do not exceed 6 months beyond the *start of accumulation date;*

5. All personnel and students in labs must have this basic training;

6. Only fully "trained persons" may remove the wastes or make hazardous waste determinations

7. EHS has ten (10) days to remove the wastes after container is full or 6 months.

BALL STATE UNIVERSITY | Environmental Health and Safety Office, North Service Building | Contact: Tom Russell, CHMM, 765-285-2807, tlrussell@bsu.edu

Chemical Waste / Lab Waste Management in Laboratories and Art Studios/Workshops

This checklist is for managing *Lab Wastes* (Chemical Wastes) in science education and research laboratories, and art studios and workshops, on the main campus of Ball State University. Other generators of chemical wastes (maintenance shops, housing, dining, etc.) must follow the general chemical and hazardous waste handling procedures for waste generators under U.S.EPA/IDEM hazardous waste regulations.

- ☐ Determine that the material is unwanted and is not going to be reused at any time.
- ☐ Determine the container the Lab Waste will be stored in – contact the EHS with questions or if acceptable containers are needed:
  - This container must be in good condition and compatible with the waste.
  - Large volumes of waste should be stored in U.S. DOT approved Hazardous Material shipping containers.
- ☐ Apply a BSU *Lab Waste* label (yellow) to the container at the time of first filling and complete the label fully and accurately:
  - Ensure a descriptive chemical name is printed on the label (no acronyms).
  - Ensure location and contact name is printed on the label.
  - Ensure the *accumulation start date* is printed on the label.
  - Ensure the waste components and hazards are recorded on the label.
- ☐ Use secondary containment (trays or cabinets) to segregate containers according to hazard class and compatibility.
- ☐ Ensure each container is closed at all times (except when adding Lab Wastes). See *working container* and *inline system policies* for more information.
- ☐ Ensure you do not exceed 1 kg. (2.2 lbs) of any of the following acutely hazardous materials: *Aluminum phosphide, Ammonium picrate, Mercury fulminate, Nitroglycerein, Tetranitromethane, or Zinc phosphide >10%.*
- ☐ Ensure that you do not exceed the smaller of 55-gallons or 220 lbs of Lab Waste.
- ☐ Ensure that any Lab Wastes are removed by EHS within 6 months of the *start of accumulation date* on any container – contact the EHS for pickup.
- ☐ Ensure that all personnel and students who manage Lab Wastes have training.
- ☐ Ensure all personnel and students working in the Lab Waste generation and storage areas know emergency and spill procedures:
  - Post emergency/spill/injury procedures near the lab/studio door.
  - Ensure everyone working in the area is familiar with the location and operation of emergency eye washes, showers, fire extinguishers, spill control equipment.
- ☐ Contact the EHS Office to request removal of any Lab Waste containers that are nearly full or upon approaching 6 months of storage, whichever comes first.
- ☐ **Do not dilute or dispose of Lab Wastes via drain/sewer, in trash, dumping on The ground, or by evaporation.**

Environmental Health and Safety Office, Ball State University, North Service Building, 3401 North Tillotson Avenue, Muncie, Indiana 47306, http://cms.bsu.edu/about/administrativeoffices/facilities/ehs

Lab Wastes: Handling

8. Be sure all waste containers are always kept closed; EXCEPT:

- When adding, removing, or bulking Lab Wastes; or,
- A *Working Container* may be open until the end of the procedure or work shift (must then be closed); or,
- When venting of a container is necessary;
- For the proper operation of lab equipment – in-line collection of waste from HPLC; or,
- To prevent dangerous situations, such as build-up of pressure; and,
- Must be 2 gallon or less capacity.

BALL STATE UNIVERSITY
Environmental Health and Safety Office
North Service Building
Contact: Tom Russell, CHMM
765-285-2807
tlrussell@bsu.edu

Chemical Waste / Lab Waste Management in Laboratories and Art Studios/Workshops

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- ☐ Determine that the material is unwanted and is not going to be reused at any time.
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  - This container must be in good condition and compatible with the waste.
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  - Ensure a descriptive chemical name is printed on the label (no acronyms).
  - Ensure location and contact name is printed on the label.
  - Ensure the *accumulation start date* is printed on the label.
  - Ensure the waste components and hazards are recorded on the label.
- ☐ Use secondary containment (trays or cabinets) to segregate containers according to hazard class and compatibility.
- ☐ Ensure each container is closed at all times (except when adding Lab Wastes). See *working container* and *inline system policies* for more information.
- ☐ Ensure you do not exceed 1 kg. (2.2 lbs) of any of the following acutely hazardous materials: *Aluminum phosphide, Ammonium picrate, Mercury fulminate, Nitroglycerein, Tetranitromethane, or Zinc phosphide >10%.*
- ☐ Ensure that you do not exceed the smaller of 55-gallons or 220 lbs of Lab Waste.
- ☐ Ensure that any Lab Wastes are removed by EHS within 6 months of the *start of accumulation date* on any container – contact the EHS for pickup.
- ☐ Ensure that all personnel and students who manage Lab Wastes have training.
- ☐ Ensure all personnel and students working in the Lab Waste generation and storage areas know emergency and spill procedures:
  - Post emergency/spill/injury procedures near the lab/studio door.
  - Ensure everyone working in the area is familiar with the location and operation of emergency eye washes, showers, fire extinguishers, spill control equipment.
- ☐ Contact the EHS Office to request removal of any Lab Waste containers that are nearly full or upon approaching 6 months of storage, whichever comes first.
- ☐ **Do not dilute or dispose of Lab Wastes via drain/sewer, in trash, dumping on The ground, or by evaporation.**

Lab Wastes: "P" Wastes

P- Listed Materials

Now, under Subpart K, there are only six (6) acutely hazardous (P-listed) wastes limited to < 1 quart.

Acutely hazardous waste (P-listed material) must be removed from lab within 6 months or when a 1-quart limit is reached.

The 6 are:

1. P006 – Aluminum Phosphide
2. P009 – Ammonium Picrate
3. P065 – Mercury Fulminate
4. P081 – Nitroglycerin
5. P112 – Tetranitromethane
6. P122 – Zinc Phosphide >10%

Lab Wastes: Lab Cleanouts

Laboratory Cleanouts

- Control your inventory- Reduce where possible;
- Subpart K allows a particular laboratory a "once per year" Laboratory Cleanout;
- Best to keep chemicals in their original manufacturer containers;
- Only allowed one per rolling 12-month period;
- EH&S has 30 days (rather than 10 days) from the time the cleanout begins to remove the chemicals from the laboratory;
- The laboratory department can perform the cleanout--or schedule it for EHS and our waste vendor to perform

Lab Wastes: Lab Cleanouts

Laboratory Cleanouts Documentation

- Identify the lab/room being cleaned out;
- An inventory of the chemicals must be provided;
- The date(s) the laboratory clean-out begins and ends;
- The total volume of hazardous waste generated;
- Records must be kept for at least 3 years.
- If done properly, the increased waste volume will not affect our hazardous waste generator status.

Lab Wastes: Responsibilities

Remember:

It is the responsibility of the student, laboratory worker, instructor, Principal Investigator, or manager within the laboratory, studio, or workshop to prepare the label(s) completely and verify that labels are placed on all containers of lab wastes stored in the laboratory, or associated storage or preparation room. In order for the container to be removed from a laboratory or studio it must be identified with the required information.

LAB WASTE

Accumulation Start Date: _____

Dept:_____Bldg/Rm:_____

Contact:_____Phone:_____

Waste Name: _____

Chemical Composition: %

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

_____ ____

Hazard properties (check any applicable):

☐ Poison ☐ Heavy Metal: __ __ ppm

☐ Flammable ☐ Oxidizer

☐ Corrosive: pH? ____ ☐ Shock-sensitive

☐ Reactive to: ☐ Air ☐ Water

☐ Cyanides: ___ ppm ☐ Sulfides: ____ ppm

☐ Carcinogen ☐ Irritant ☐ Sensitizer

☐ Solvents ☐ Chlorinated solvents

☐ Toxic ☐ Peroxide former

☐ Biohazard ☐ Non-Hazardous?

Other: _____

Wastes must be removed within 6 months of Start of Accumulation in the Container!!

Contact EHS Office (tlrussell@bsu.edu, or 5-2807) with questions or for pickup.

Lab Waste Pick-Ups

The EHS Office schedules quarterly waste pickups across the campus on the following academic calendar schedule:

Mid-August (after the 2nd Summer Session-before Fall Term)
December (during Winter Break)
March (during Spring Break)
May (after Spring term-before 1st Summer Session)

However, BSU maintains Central Accumulation Area for the temporary storage and staging of Lab Wastes between the quarterly scheduled pickups for off-site treatment and disposal.

Call the BSU EHS Office for pickup of waste of any type whenever necessary – 5-2807 or tlrussell@bsu.edu

Questions?

Contact:

Tom Russell, CHMM, REHS
Environmental Specialist/Chemical Hygiene Officer
Environmental Health and Safety Office
Ball State University
North Service Building
3401 North Tillotson Avenue
Muncie IN 47306
765-285-2807 or tlrussell@bsu.edu

And/or visit the Ball State University EHS Website to review related waste handling information