# BSU Laboratory Waste Management Plan


***Prepared by the:***

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# Table of Contents

## 1. Introduction and Applicability of the Regulation

The purpose of this Laboratory Management Plan (LMP) is to standardize the management of materials discarded at Ball State University (BSU) educational and research laboratories, laboratory-support wastes, and wastes from School of Art studios and workshops that are covered by the Resource Conservation and Recovery Act (RCRA) regulations under 40 CFR 262 Subpart K. Subpart K establishes an alternate process for academic institution to manage their hazardous wastes. This process differs from the one originally established by RCRA for the industrial generators of hazardous waste.

Subpart K allows more flexibility to eligible academic entities in certain areas that are unique to their operation. The Environmental Protection Agency (EPA) has determined that any institution (college or University) who wants to opt into subpart K MUST meet the following definition:

> *A private or public, post-secondary, degree-granting, academic institution, that is accredited by an accrediting agency listed annually by the U.S. Department of Education.*

BSU is an eligible academic entity under this definition and therefore can manage its hazardous wastes pursuant to Subpart K. After careful evaluation, BSU has decided to modify the management process of its hazardous waste to comply with this alternate set of regulations.

It is vital to note that the waste management process described in this *Laboratory Waste Management Plan* applies only to *Laboratories* as defined in Section 2. It does not apply to other operations, shops, or generators on the BSU Campus who will continue to follow the normal generator standards under the federal regulations at 40 CFR 262, et.seq., and the parallel State of Indiana rules.

The following Figure illustrates what IS and what IS NOT a laboratory under Subpart K and which BSU laboratories will be subject to Subpart K requirements:

| What IS a laboratory under Subpart K? | YES | NO |
|---|---|---|
| Teaching and research labs | √ | |
| Art studios | √ | |
| Photo labs | √ | |
| Field labs | √ | |
| Diagnostic labs in teaching hospitals | √ | |
| Areas that support labs (e.g. chemical stockrooms, prep rooms) | √ | |
| Chemical stockrooms that do not support labs | | √ |
| Vehicle maintenance areas | | √ |
| Custodial storage rooms | | √ |
| Machine shops | | √ |
| Print shops | | √ |
| Purchasing storage and excess | | √ |
| Service and Stores trade shops | | √ |
| Commercial photo processing | | √ |
| Power plants – Heat/Chill | | √ |
| Dining establishments | | √ |
| Sport/Recreational Facilities | | √ |

This LMP has been developed in accordance with the Subpart K requirements. It delineates the management of all regulated waste materials generated in laboratories (educational and research) and art studios or workshops within the premises of the BSU main campus in Muncie, Indiana. A revised U.S. EPA Notification Form was submitted to the Indiana Department of Environmental Management (IDEM) in August of 2013 notifying those agencies that BSU had elected coverage under Subpart K for the main campus laboratory and art operations.

## 2. Definitions

**CENTRAL ACCUMULATION AREA** means an on-site hazardous waste accumulation area subject to either 40 CFR § 262.34(a) of this part (large quantity generators); or 40 CFR § 262.34(d)–(f) of this part (small quantity generators). A central accumulation area at an eligible academic entity that chooses to be subject to this subpart must also comply with 40 CFR § 262.211 when accumulating unwanted material and/or hazardous waste.

**CHEMTRACKER i**s a web-based chemical inventory management system, hosted by Stanford University, capable of tracking chemical inventory and providing a robust environment in which to track substances and maintain compliance with all governmental regulations. The ChemTracker system is in the process of being implemented campus-wide, beginning with the laboratory-oriented Departments of the School of Science and Humanities and the School of Art.

**COLLEGE/UNIVERSITY** means a private or public, post-secondary, degree-granting, academic institution, that is accredited by an accrediting agency listed annually by the U.S. Department of Education. Ball State University meets this definition.

**ENVIRONMENTAL HEALTH AND SAFETY OFFICE (EHS)** means the Ball State University Environmental Health and Safety Office. This is inclusive of references to the EHS Environmental Specialist and Chemical Hygiene Officer who has primary responsibility for compliance with waste management and laboratory safety at Ball State University.

**ELIGIBLE ACADEMIC ENTITY** means a college or university, or a non-profit research institute that is owned by or has a formal written affiliation agreement with a college or university, or a teaching hospital that is owned by or has a formal written affiliation agreement with a college or university. Formal written affiliation agreement for a non-profit research institute means a written document that establishes a relationship between institutions for the purposes of research and/or education and is signed by authorized representatives, as defined by 40 CFR § 260.10, from each institution. A relationship on a project-by-project or grant-by-grant basis is not considered a formal written affiliation agreement. A formal written affiliation agreement for a teaching hospital means a master affiliation agreement and program letter of agreement, as defined by the Accreditation Council for Graduate

Medical Education, with an accredited medical program or medical school. Ball State University meets this definition and is an *Eligible Academic Entity.*

**LABORATORY** means an area owned by an eligible academic entity where relatively small quantities of chemicals and other substances are used on a nonproduction 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 for the purposes of the regulation and this Plan. 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.

**LAB WASTES (UNWANTED MATERIAL)** means any chemical, mixtures of chemicals, products of experiments or other material from a Laboratory, as defined, that is no longer needed, wanted or usable in the laboratory and that is destined for hazardous waste determination by a trained professional. *Lab Wastes*, the term used by BSU for *Unwanted Materials* as defined under 49 CFR 262, Subpart K, include reactive acutely hazardous unwanted materials and materials that may eventually be determined not to be solid waste pursuant to 40 CFR § 261.2, or a hazardous waste pursuant to 40 CFR § 261.3. If an eligible academic entity elects to use another equally effective term in lieu of "unwanted material," as allowed by 40 CFR §262.206(a)(1)(i); as in this case, the term, "Lab Waste", the equally effective term has the same meaning and is subject to the same requirements as "unwanted material" under this subpart as it applies to BSU.

**LABORATORY CLEAN-OUT** means an evaluation of the inventory of chemicals and other materials in a laboratory that are no longer needed or that have expired and the subsequent removal of those chemicals or other unwanted materials from the laboratory. A cleanout may occur for several reasons. It may be on a routine basis (e.g., at the end of a semester or academic year) or as a result of a renovation, relocation, or change in laboratory supervisor/ occupant. A regularly scheduled removal of unwanted material as required by 40 CFR § 262.208 does not qualify as a laboratory clean-out.

**LABORATORY WORKER** means a person who handles chemicals and/or unwanted material in a laboratory and may include, but is not limited to, faculty, staff, post-doctoral fellows, interns, researchers, technicians, supervisors/managers, and principal investigators. A person does not need to be paid or otherwise compensated for his/her work in the laboratory to be considered a laboratory worker. Undergraduate and graduate students in a supervised

classroom setting are not laboratory workers.

**NON-PROFIT RESEARCH INSTITUTE** means an organization that conducts research as its primary function and files as a nonprofit organization under the tax code of 26 U.S.C. 501(c)(3).

**REACTIVE ACUTELY HAZARDOUS UNWANTED MATERIAL** means an unwanted material that is one of the acutely hazardous commercial chemical products listed in § 261.33(e) for reactivity.

**TRAINED PROFESSIONAL** means a person who has completed the applicable RCRA training requirements of 40 CFR § 265.16 for large quantity generators, or is knowledgeable about normal operations and emergencies in accordance with 40 CFR § 262.34(d)(5)(iii) for small quantity generators and conditionally exempt small quantity generators. A trained professional may be an employee of the eligible academic entity or may be a contractor or vendor who meets the requisite training requirements.

**WASTE VENDOR** means, for purposes of this Plan and RCRA hazardous waste management on the Ball State Campus, the chemical waste vendor retained by BSU to assist in hazardous waste determinations, bulking, packaging, labeling, and transportation for proper off-site disposal of hazardous and non-hazardous chemical and biological wastes. The *field chemists* employed by this contractor meet the minimum qualifications as *trained professionals* under this Laboratory Waste Management Plan.

**WORKING CONTAINER** means a small container (i.e., two gallons or less) that is in use at a laboratory bench, hood, or other work station, to collect unwanted material from a laboratory experiment or procedure.

## 3. Part I: Enforceable Requirements

### 3.1 Container Labeling

This section will explain the minimum requirements for labeling containers used to store Lab Wastes (unwanted materials) in BSU laboratories and art studios/workshops. The requirements established in this section are compulsory and must be applied in all academic laboratory and art departments.

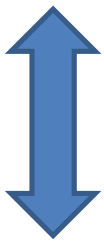
Please refer to Section 2.10 for the definition of LAB WASTE. BSU has decided to include in this definition of unwanted materials all chemical substances that are expired, used, or generated due to experiments, artwork, or educational demonstrations unless determined otherwise by the laboratory or art studio worker, or until a formal determination is performed by the BSU Environmental Specialist or Chemical Hygiene Officer.

A label (or one or more labels) will be used to identify unwanted materials in the laboratories, except provided otherwise hereunder. All containers used to store unwanted materials **MUST** be labeled. At a minimum they will contain the following information:

**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)

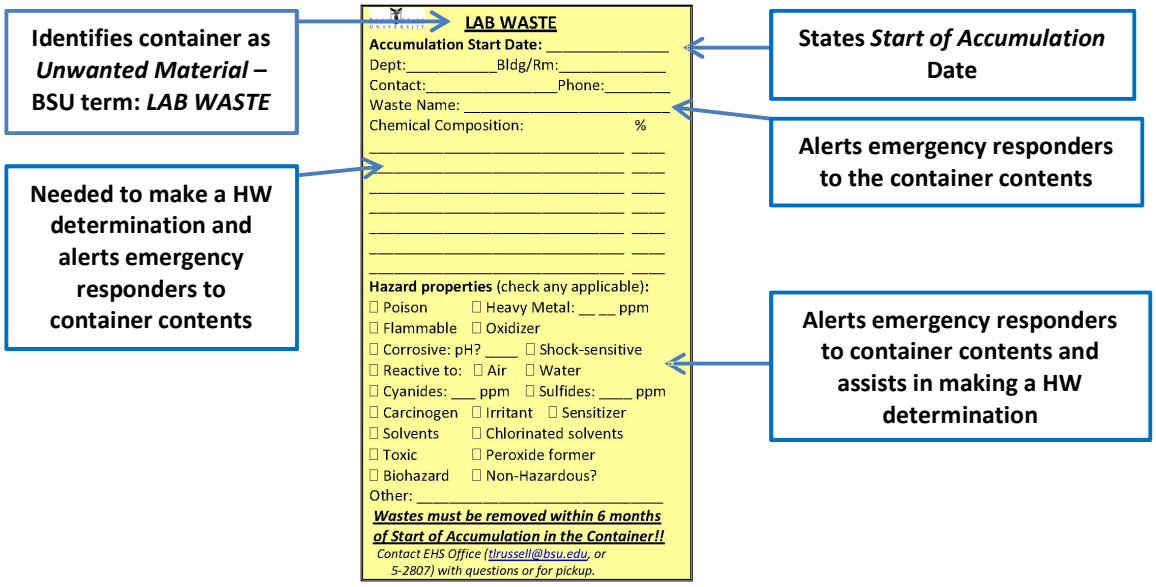


**All waste containers must also have the following information either directly on the container, or associated with the container label:**

**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)

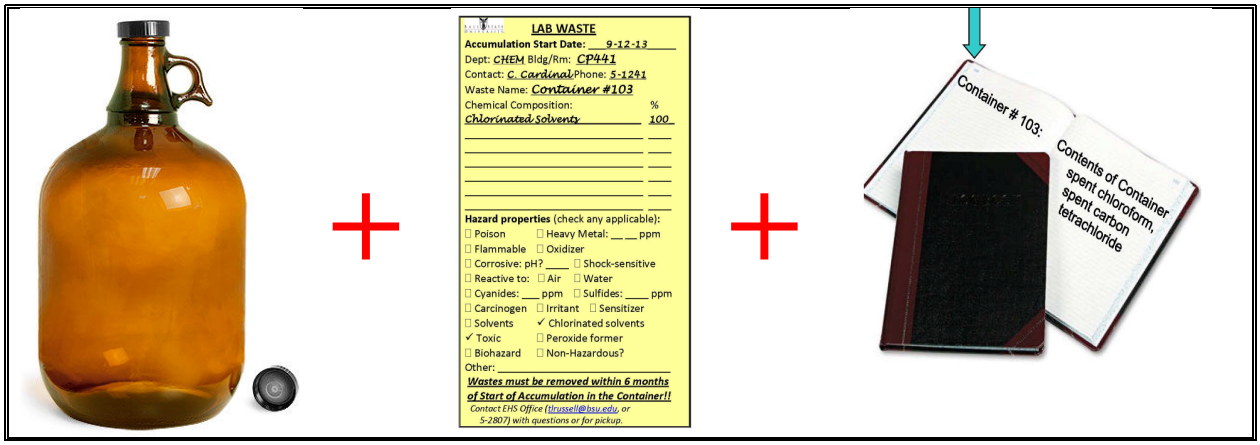
The preferred method for conveying the above-required information is through the use of a standard BSU Lab Waste Label which exhibits all of the necessary information, including the words *LAB WASTE*, and the *Start of Accumulation Date*, as well as information adequate to both inform emergency responders of the hazards presented by the waste, and sufficient to make a hazardous waste determination. The latter information is provided through both a listing of the waste components, and a checklist of hazard properties presented by the waste.




The Lab Waste label should be applied directly to the container if possible, but if not possible due to size or visibility restrictions, it may be applied to a tag that is then attached to the container or placed on an outer container accommodating the subject waste container.

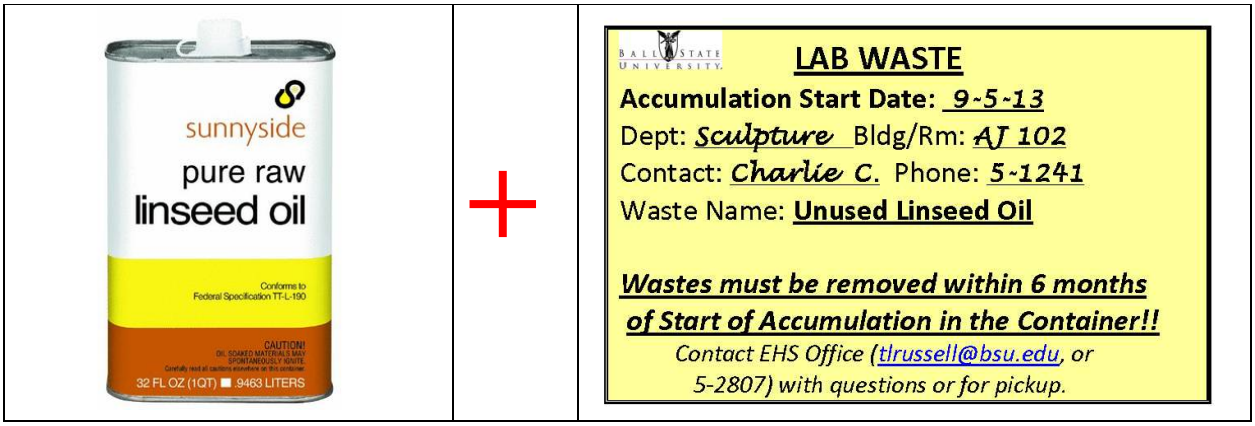
### *ASSOCIATED WITH* INFORMATION:

If adequate information to make a hazardous waste determination is not, or cannot be displayed on the *BSU Lab Waste Label*--the trained laboratory, studio, or stock room personnel may utilize a reference system that allows tracking the information back to a specific container such as a spreadsheet, log book, electronic storage, or barcoding system as in the example below.




**The label still shows the required LAB WASTE statement and information for emergency responders (as well as accumulation start date). Additional information for waste characterization, though, is here *associated with* the container rather than *affixed to* the container. Accumulation start date could also be in the log book or other reference source.**

**ORIGINAL LABEL OPTION:** The original manufacturer label may be used. This label must be located in the original container and continue to exhibit the container contents. However, it is important to clarify that it can only be used as an alternate label if it is in good condition. Good condition means that is clearly readable, all warnings and contents are visible, and remain accurate and applicable to the contained material that is now a waste. The laboratory worker must add the word LAB WASTE to the container and the *accumulation start date*. This is NOT an approved option if any chemical materials other than the ones stated on the original label are stored in the container. The information to be *Associated With the Label*, must still be provided—either on the container itself, or associated with the container.




**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.**

## 32 Method of Removal of Lab Wastes

Waste containers, regardless of the remaining capacity of the container, must be removed for disposal within required timeframes, or based on total quantities accumulated in a particular laboratory, stock room, or studio:

**Time Limit (6 Month):** Unwanted materials will be removed from the laboratory using a *rolling 6 months* approach; that is, each container must be removed within 6 months from the container's accumulation start date.

**Quantity Limits:** Regardless of the above time limit for the accumulation of Lab Wastes in a particular laboratory or studio, if either of the following total waste quantity limits are exceeded, the wastes must be removed expeditiously:

- **55-Gallon Maximum:** If a particular laboratory, studio, or support area accumulates a total volume of unwanted material in excess of 55 gallons: All containers of unwanted material in the laboratory, studio, or support area will be removed within 10 calendar days of the date that 55 gallons was exceeded.
- **P-Listed Waste Maximum – 1 Quart:** If a laboratory accumulates more than 1 quart of any of the following six (6) P-listed reactive acutely hazardous lab wastes: All containers of reactive acutely hazardous unwanted material must be removed from the laboratory within 10 calendar days of the date that 1 quart was exceeded.

  To ensure compliance with this requirement, the 6 P-listed reactive acutely hazardous Lab Waste materials are:

  - *P006 – Aluminum phosphide*
  - *P009 – Ammonium picrate*
  - *P065 – Mercury fulminate*
  - *P081 - Nitroglycerine*
  - *P112 - Tetranitromethane*
  - *P122 – Zinc phosphide (> 10%)*

Laboratories that generate more than 55 gallons of unwanted materials, or 1 quart of reactive acutely unwanted materials, will need to mark on the subject containers the date the threshold volume of unwanted material is reached. The Department, or the EHS Office, must be immediately contacted in order to remove the accumulated waste within the required 10 day timeframe. The laboratory workers, instructors, researchers, or graduate

assistants assigned to each generation point are responsible to comply with all EPA/IDEM requirements and those established by the EHS Office. It is the science or art department's responsibility to ensure compliance with all federal, state, and EHS requirements, including appropriate labeling, use of correct containers, notification times, and requests for Lab Waste removal.

## 3.3 Hazardous Waste Determinations for Unwanted Materials

Once the unwanted materials are removed from the laboratory by a *trained professional*, the hazardous wastes determination will be made in the Central Accumulation Area (CAA) within four (4) days of the unwanted materials arriving at this location. All RCRA applicable requirements for small quantity generators including those on 40 CFR 262.34(d), 262.34(f) and 40 CFR 265 Subpart I will be observed in the CAA. The hazardous waste determination may also be made by a *trained professional* while the unwanted material is at the source (laboratory, art studio, etc.) where the waste was generated, or at the time the material is removed. The contracted BSU waste vendor also provides *trained professionals* in the person(s) of field chemists to aid in the hazardous waste determinations and disposition and disposal of Lab Wastes.

**Note:** Pursuant to 40 CFR 262.215, *Unwanted Material That is Not Solid or Hazardous Waste,* if Lab Waste (or unwanted material) does not meet the definition of solid waste in §261.2, or hazardous waste in §261.3, it is no longer subject to the RCRA hazardous waste regulations or this Lab Waste Management Plan--but must be managed in compliance with other applicable regulations.

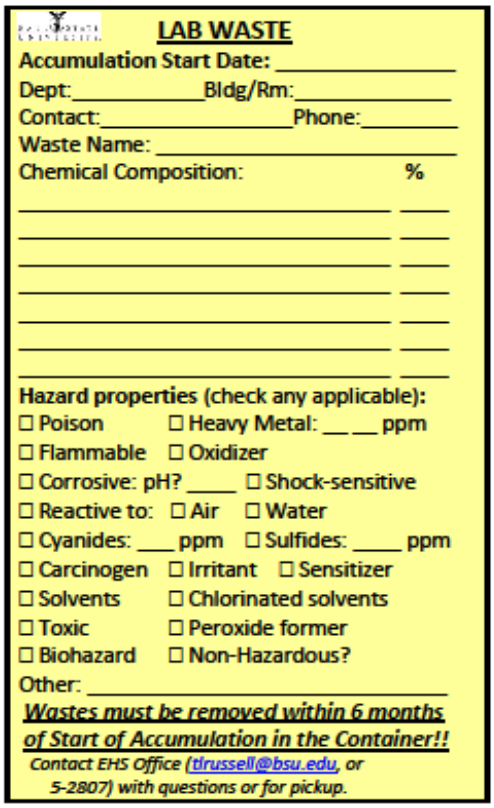
# 4. Part II – Non-Enforceable Requirements (Best Management Practices)

## Best Management Practices (BMP)

This section of the document will discuss the *Best Management Practices* that will be applicable to all areas that generate unwanted material. The selection, implementation, and verification of these BMPs will be the primary responsibility of the Department or location generating the Lab Wastes. EHS will provide technical support and assistance to the various Schools and Departments, laboratories, studios, workshops, and associated support functions. The following procedures are not directly enforceable by the U.S. EPA, IDEM, or other regulatory authorities, but need to be followed to ensure compliance with the *Enforceable* procedures established in Section 3 of this *Laboratory Waste Management Plan*. Oversight of these BMPs and procedures will be performed by the BSU EHS Office. A checklist is provided in Appendix C to assist laboratory and studio personnel in following these practices.

## 4.1 Container Labeling and Management

Ball State University will use, whenever possible, the following label for all LAB WASTES generated by laboratory operations and art activities. This label meets, as discussed in Section 3, meets or surpasses all of the required EPA/IDEM criteria for labeling of *Unwanted Materials (Lab Wastes)*.



**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.*

**Instructions for completing the LAB WASTE Label are provided below. You should contact a *trained professional* in your Department or the EHS Office if you have any questions on the label.**

Contact the EHS Office (285-2807, or tlrussell@bsu.edu) if your Department, lab, or studio needs an initial or additional supply of these labels.

## LAB WASTE LABEL INSTRUCTIONS

**Accumulation Start Date:** This is the date that wastes are first placed into the container – or, if transferring waste to a new container (larger, different type, etc.), the *start of accumulation date* from the original waste container.

**Dept.:** Name of the Department in which the waste was generated; e.g., Biology, Art-Metalworking, etc.

**Bldg./Rm.:** The Building and Room in which the waste is being, or was, generated; e.g., WQ 007, CP441, etc.

**Contact:** The name of the lab or studio worker, student, instructor, or researcher responsible for the generated waste and container.

**Phone:** The phone number (or, email if preferred) of the Contact person responsible for the waste.

**Waste Name:** Common name for the waste material. A few examples:

| | | |
|---|---|---|
| Formalin | Magnesium hydroxide | Lead chromate |
| Acetone | Sulfuric acid | Expired test kit |
| Extraction solvents | Water test ampoules | Vacuum pump oil |
| Diethyl Ether | Mixed caustics | Expired amines |
| Algal culture media | Unused benzene | Ethidium bromide |
| Contaminated ethanol | Sodium azide | Calcium flakes in mineral oil |
| Waste ceramic glaze | Linseed oil | Paints (oil-based) |

If the waste is expired, excess, or an unused chemical or compound for another reason, that information should be added to the Waste Name, e.g., *expired* formic acid, or *unused* methyl hydrazine).

**Chemical Composition:** List the known or approximate chemical composition of the wastes in the container. The percentage present should equal 100. Example:

| **Chemical Composition:** | **%** |
|---|---|
| *Acetone* | *30* |
| *Hexane* | *40* |
| *Xylene* | *20* |
| *Organic solids* | *10* |

**Hazard Properties (check all that are applicable to the waste):** The following relates the basic physical or health properties of the hazard categories listed. This information is necessary both to declare the hazards of a waste, but also to aid in determining whether or not the waste material is a *Hazardous Was*te for handling and disposal purposes. Often the hazard class can be found by checking the Safety Data Sheet(s) or original containers for the chemical constituents in the waste.

> ***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.

***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.

**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.

**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.)

***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 acetal, acrylonitrile, butadiene, cyclohexene, cyclopentene, decalin, diacetylene, dicyclopentadiene, dioxane, ethylene glycol diethyl ether, furan, isopropyl ether, methyl isobutyl ketone, methyl acetylene, methyl cyclopentane, methyl methacrylate, styrene, sodium amide, tetrahydrofuran, tetrahydronapthalene, vinyl acetate, vinyl acetylene, vinyl chloride, and vinyl ethers.

**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.

**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*.

It is the responsibility of the laboratory or studio worker, Instructor, Principal Investigator, or manager within the laboratory or studio to prepare the label(s) completely and verify that labels are placed on all containers of lab wastes stored in the laboratory, studio, 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.

## WASTE REMOVAL:

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

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

However, BSU will maintain at least one Central Accumulation Area for the temporary storage and staging of Lab Wastes and other waste materials on the BSU campus between the quarterly scheduled pickups for off-site treatment and disposal. Trained personnel from your Department may be available to remove wastes at any time when containers are full, if total waste quantities are approaching the limits, or the 6-month removal deadlines are approaching. EHS personnel may also be contacted to remove Lab Wastes if the laboratory or studio places a request for removal by emailing the BSU Environmental Specialist at tlrussell@bsu.edu or by calling 285-2807.

The removal of Lab Wastes from a laboratory is parallel to, but different from, a *Laboratory Clean-Out* procedure. The clean-out process can only be implemented once a year per laboratory or generation area. Refer to **Section 4.2.2** to come for the *Laboratory Clean-out Process*.

## LAB WASTE CONTAINERS

The selection of the containers used to hold unwanted materials will be based on the hazardous characteristic of the Lab Waste material. The requirements of the containers for subsequent transportation are established by the Department of Transportation (DOT).

Two distinct classes of containers will be used in the laboratory to hold Lab Wastes—*Working*, and *Non-working containers*. Working containers are defined as: "small containers (i.e., two gallons or less) that are in use at a laboratory bench, hood, or other work station, to collect unwanted material from a laboratory experiment or studio procedure. Working containers may remain open until the end of the procedure or shift, or until it is full, at which time the working container must either be closed or the contents emptied into a separate container that is then closed. Non-working containers are those into which unwanted materials will be deposited and will remain closed except when adding or removing unwanted materials. Working containers will not exceed one (1) gallon while non-working containers shall not exceed the five (5) gallon mark. The use of larger containers (15-55 gallon) may be approved on a case-by-case basis by the EHS Office.

As stated above, Lab Waste containers must be kept closed at all times unless adding, removing, or bulking waste, or:

1. When venting of a container is necessary;
2. For the proper operation of laboratory equipment, such as with in-line collection of unwanted materials from high performance liquid chromatographs; or,
3. To prevent dangerous situations--such as build-up of extreme pressure.

For the safe and suitable handling of all unwanted materials, but especially of the potentially hazardous waste materials that are generated in the laboratories and some art studios or workshops, it is essential to select the appropriate containers. The following provides guidelines for the appropriate selection of containers to be used for the handling of unwanted materials at the laboratories:

- The most appropriate container for the different types of lab wastes should be used.

- Separate containers for non-hazardous lab wastes, biomedical, and radioactive waste mixtures, among others should be used.
- Under no circumstances is the use of food, beverage, or household containers suitable for the storage of lab or studio wastes!
- Separate containers for liquids, solids, and gases should be used.
- Containers that are compatible with the properties of the materials to be contained, considering possible secondary reactions should be used.
- Plastic and glass containers should be used for lab waste handling. These can either be new or reused containers of chemical substances used in the laboratories.
- Containers must be clean and free of polluting agents, and must have their original caps or closures.
- Plastic containers should be made of polyethylene (HDPE or LDPE), polypropylene, polystyrene (PET), polymers of vinyl, or TEFLON, such as polytetrafluoroethylene (PTFE) and fluorinated ethylene propylene (FEP).
- Glass containers of chemical substances can be reused (i.e. soda lime) or glasswork made especially for laboratory use by known brands, such as Pyrex, Kimax, Corning, and Kimble. Glass non-working containers for liquid unwanted materials can range in size from 500 ml up to 3.78 L (1 gallon). Preferably, 2.5 liters and 1 gallon containers must have an ear-like handle. The use of glass containers with a capacity superior to 1 gallon will not be allowed.
- Plastic non-working containers for liquid lab wastes can range in size from 500 ml up to 5 gallons. Containers with a capacity that surpasses 5 gallons will only be allowed in those laboratories where the volume of 5 gallons is attained in 5 days
- Plastic or glass containers for solid lab wastes can range in size from 250 g up to 2.2 Kg (5 pounds). The use of containers with a capacity that exceeds 2.2 Kg (5 pounds) will not be allowed.
- Metal containers should never be used for corrosive or aqueous lab wastes. These metal containers will not be used as secondary containments for liquid wastes. Polyethylene containers must not be used for chlorinated solvents.
- Use separate containers for unwanted materials that can be recycled or that can easily be treated in the laboratory (for example: basic neutralization of acids and strong bases) to prevent excessive waste generation.
- Avoid, when possible, mixing chlorinated and non-chlorinated solvents or extraction agents in the same waste container.
- Avoid mixing oil-based and water-based solvents, paints, and coatings in the same container.

Please refer to **Appendix A** of this Lab Waste Management Plan for suggested glass and plastic containers.

EHS will provide technical guidance and assistance to all areas. Prior to their removal from the laboratory these containers must be clean and properly labeled in accordance with section 3.1 and 4.1 of this Plan. Labels that are not in good condition should be replaced.

All non-working containers holding Lab Wastes in liquid form will be kept in a designated area in the laboratory or studio. In addition, the cabinets used to store chemicals must be classified in accordance with their chemical properties. Incompatible chemicals will be stored separately to prevent any chemical reaction. In the selection and acquisition of chemical storage cabinets, their characteristics must be considered.

Lab Wastes, like all chemicals, must be stored in accordance with local and International Fire Code standards and not exceed the maximum quantities allowed in a particular room or control area. No chemicals, including wastes, should be stored on the floor or in a manner that obstructs aisles or exits. Please refer to **Appendix B** for tips regarding the proper handling of Lab Waste containers, ranging from waste characterization to inspection.

### 4.2 Training for Laboratory Workers

All laboratory workers, including students, must be trained. The training must be commensurate with their duties so the employees, technicians, faculty, researchers, assistants, and students understand the requirements in this Plan and can implement them. The following classifies laboratory workers relative to the level and nature of training to be provided:

| Laboratory/Studio Workers | Level of Training* | Training Methods |
|---|---|---|
| Students | Lab Safety Training | Powerpoint Presentation/Videos |
| Graduate/Teaching Assistants | Lab Safety Training | Powerpoint Presentation/Videos |
| Equipment Technician | Lab Safety Training | Powerpoint Presentation/Videos |
| Laboratory Technician | Lab Safety Training | Powerpoint Presentation/Videos |
| Laboratory Manager | Lab Safety Training | Powerpoint Presentation/Videos |
| Instructor | Lab Safety Training | Powerpoint Presentation/Videos |
| Faculty | Lab Safety Training | Powerpoint Presentation/Videos |
| Researcher | Lab Safety Training | Powerpoint Presentation/Videos |
| Lab Waste Coordinators / Trained Professionals | Lab Safety Training and Waste Management | Presentation by BSU EHS Environmental Specialist/Chemical Hygiene Officer |

**The training to be provided to School of Art workers and students engaged in studio and workshop endeavors includes the same module on Lab Waste Management. This training is entitled, "Art Studio and Workshop Safety Training".*

The BSU Lab (and Art Studio) Safety Training includes a module on Lab Waste generation and handling and the procedures contained in this *Lab Safety Management Plan*. This training is applicable to all BSU science laboratory and art studio workers.

Different methods are planned for the development and deployment of the laboratory workers' training programs – these may include recorded presentations by Powerpoint or video, or classroom training, as well as laboratory-specific training. The training schedule and content will be prepared or approved by the BSU Environmental Health and Safety (EHS) Office and/or the BSU Laboratory Safety and Security Committee. The main training method for laboratory workers at present is classroom training. All laboratory workers, including staff and students, must be trained in laboratory and studio safety, and the laboratory and art studio safety training sessions include a section and discussion on waste management, including the content of this *Laboratory Waste Management Plan*. The training also covers the safe transportation and movement of chemicals, which would encompass laboratory and studio wastes. The departments are responsible for coordinating the necessary training for their laboratory and art studio workers and students every term. Normally, the first training of the term will be classroom based. For those laboratory workers unable to attend classroom training, web based or recorded training opportunities will be made available.

While training records are not required for Small Quantity Generators such as BSU under RCRA Subpart K, it is intended that the various science and art departments utilizing laboratories and studios will maintain such records as part of their overall employee/student safety training records.

### 4.3 Training for *Trained Professionals*

The *Lab Waste Coordinators* identified in the preceding Table are considered to be *Trained Professionals* under the Subpart K RCRA regulations as they may make hazardous waste determinations in the laboratory or studio settings or may accompany or oversee the transfer of Lab Wastes to the CAA upon removal. Additional training is provided to these individuals by the BSU EHS Environmental Specialist who is a Certified Hazardous Materials Manager and also serves as the Chemical Hygiene Officer. The Environmental Specialist also serves as a *Trained Professional* and is considered qualified and trained for that function. Both to comply with the requirements of Subpart K and to ensure the safe on-site transfers on laboratory wastes, only trained professionals will:

1. Accompany the transfer of Lab Wastes (unwanted material) when they are removed from the laboratory, studio, or support area; either for consolidation in another laboratory or chemical stockroom, or taken to the CAA; and,

2. Make the hazardous waste determination, pursuant to §262.11, for Lab Wastes (unwanted materials).

The Environmental Specialist/Chemical Hygiene Officer from the EHS office already receives training in RCRA, OSHA HAZWOPER, Hazard Communication, DOT Hazardous Materials, OSHA Laboratory Safety Standard, the BSU Chemical Hygiene Plan, and other regulatory programs, documents, plans, and requirements. Training will continually be refreshed and expanded as necessary using classroom, video presentations, web-based, and other training methods.

### 4.4 Removing Unwanted Materials from the Laboratory

As previously mentioned, the principal method to remove unwanted material from the laboratory will be time based, using a 6 month rolling approach. (Refer to Section 3.3)

To ensure that a container does not exceed the six month limit in the laboratory, a BSU Lab Waste label, or one of the expressed options allowed in Section 3.1, any of which include display of the accumulation start date on the container, will be required. Having this information on each container will allow for the time a container of unwanted material remains in a laboratory to be monitored. Once the container is nearing its six time limit in the laboratory, or is otherwise ready to be picked up, a trained professional in the Department or the EHS Office will be notified. The trained professional will then proceed to transfer, or oversee the transfer, of the container from the laboratory, studio, workshop, or associated area where it was generated to the CAA and make the hazardous waste determination.

If the 55 gallon of unwanted material or one quart of acutely reactive unwanted material volume limit is reached in the laboratory, the laboratory worker will immediately notify the Department's trained professional or the EHS Office to alert them of the volume being exceeded. EHS personnel will assign priority status to the laboratory to ensure that the unwanted materials are removed within ten calendar days.

The removal of most Lab Wastes, however, will be associated with the quarterly chemical waste pickups which are announced throughout the university 2-3 weeks prior to the date of

the scheduled waste pickup by BSU's chemical waste contractor. The subject departments, shops, or areas then notify the EHS Office of the location, quantity, and nature of the wastes they plan to have ready for pickup on the scheduled dates. The majority of these wastes are than gathered by *trained professionals* in the EHS Office or the various departments for transport to the CAA in Cooper Science Hall (or at temporary CAAs at other locations on the BSU premises). In this way, the largest volume of Lab Waste hazardous waste determinations can be made in coordination with the BSU chemical waste vendor's trained professionals upon, or within 4 days of, their arrival at the CAA. Wastes that are removed, or arrive at the CAA, before that time will be characterized by the EHS or a department trained professional.

BSU promotes consolidation of compatible unwanted materials, allowing containers to be reused whenever possible. The label of the consolidation container must reflect its contents and the earliest accumulation date of the generated substance.

Only trained professionals may transfer unwanted materials between laboratories or from a laboratory to a chemical stock room for consolidation. Areas consolidating unwanted materials will be subjected to the Subpart K requirements, including the time and volume limits.

### 4.5 Making Hazardous Waste Determination

Unwanted materials will be moved only by EHS authorized personnel to the Central Accumulation Area (CAA). Only the EHS Office and those departments having one or more trained professionals have access to the CAA. Once the unwanted material is moved to the CAA, the hazardous waste determination will be made within four days of the material arriving at the CAA. Within this four-day time frame, EHS personnel can determine that the material is eligible for re-use, recycling, or may be handled as a non-hazardous waste. Those wastes which are determined to constitute hazardous wastes will be labeled as such on the container, along with the relevant EPA hazardous waste code(s). After the hazardous waste determination is made, all applicable requirements in the CAA will continue to apply and be observed as usual.

### 4.6 Laboratory Clean-out Procedures

Performing a Laboratory Clean-out procedure is NOT mandatory and will be directly influenced by the availability of funding to carry out a clean-out. The EHS office, its waste contractor, or the responsible science or art department, will evaluate the laboratory inventory of

chemicals and other materials which are no longer needed or that have expired, in order to determine the subsequent removal of those chemicals or other unwanted materials. Conducting a clean-out will be considered for one of the following reasons: It may be on a routine basis (e.g., at the end of a term or academic year); as a result of a renovation, relocation, or change in laboratory or studio supervisor/occupant; or a change in the research or studio art endeavor.

The clean-out process allows for the redistribution of the chemicals. If a laboratory worker makes a determination that a chemical can be used in another laboratory, it would be considered a product and thus not regulated under RCRA. However, if such determination is made after it is removed from the laboratory, the clean-out chemical would be regulated as an unwanted material until it is redistributed from the CAA to another laboratory for further use

The laboratory clean-out process allows the disposal or redistribution of chemical products in a 30 calendar day period. Once a clean-out has been declared, waste resulting from unused commercial chemical products will not be counted toward generator status. Generator status will not be affected by the volume of waste generated during this process. The 30 day period will start when EHS personnel in coordination with laboratory or studio personnel begin sorting through and evaluating the inventory of laboratory chemicals, making the corresponding unwanted materials determination. This process will be led by EHS personnel which will develop the clean-out schedule.

Clean-outs may only be performed once every twelve (12) months per laboratory. At the conclusion of the laboratory clean-out, all unwanted materials must be removed from the laboratory.

All records pertaining to a laboratory clean-out including the laboratory being cleaned out, the date the laboratory clean-out begins and ends, and the volume of hazardous waste generated during the laboratory clean-out will be kept in the EHS office. These records will be maintained for a period of three years from the date the clean-out ends.

## 4.7 Emergency Preparedness

To ensure a quick response in case of an emergency occurring in a BSU laboratory or studio, emergency contact information will be posted in every laboratory, studio, and associated support area on or near the entry doorway. This list will include contact information for both emergency responders on campus and off campus. Evacuation routes will also be posted for every laboratory.

An inventory of all chemical materials in BSU laboratories and art studios will be kept in ChemTracker. This information is continually being updated and is available to campus administrators and emergency responders through the EHS office. Chemicals that might become dangerous over time, such as peroxide formers, are assigned a one year expiration date from the date they are first added to the inventory. Once the year time limit is reached, the system will require the user to visually inspect the material, and allows for a one-year extension of the expiration date only if the container and content are in good condition. If either the container or content show signs of deterioration, or the possible development of peroxides, the laboratory worker will notify the EHS and follow the procedure to have the container removed from the laboratory as a Lab Waste

All Laboratories should have an adequate spill response kit. All laboratory personnel must be familiar with this equipment and know how to deploy it. In addition all personnel must be familiar with the Campus spill response procedures and emergency management (Refer to EHS Spill Response Plans and the BSU Emergency Response Plan).

## 4.8 Laboratory Waste Management Plan Availability

This plan will be made available to laboratory workers, students, or any others at the University who request it. The Plan will also be maintained on the EHS Office website.

## Appendix A

### Suggested Containers for Handling of Lab Wastes

HDPE Narrow-Mouth Bottles

HDPE Wide-Mouth Oblong Bottles

Wide-Mouth LDPE Bottles

Wide-Mouth Polypropylene Bottles

Higher temperature resistance than LDPE or H DP E

HDPE Round Bottles Rigid, translucent bottles are suitable for storing a variety of items including liquids, solids, and chemicals

Wide-Mouth PTFE Bottles

Amber Wide-Mouth HDPE Bottles

Reduces UV light transmission to protect light-sensitive liquids

Amber Narrow-Mouth HDPE Bottles

Protect light-sensitive materials during sampling, shipping or storage

Narrow-Mouth Field Sample Bottles

Clear Standard Wide Mouth Bottles with PTFE-faced PE-lined Caps

Good for storing dry materials and specimens

Certified Clean Amber Boston Rounds

Clear Boston Rounds with PTFE Faced PE-lined Caps

LDPE Boston Rounds

Safety-Coated Amber Boston Rounds

Amber Wide-Mouth Packers with PTFE Faced PE-lined Caps

HDPE Cylinder Rounds

Amber Wide-Mouth Packers

Amber Glass Jugs

Clear Glass Jugs

HDPE Jugs

Safety Waste Jug

Polyethyene

Red Metal or Plastic Safety Can
Used for solvent waste [5 gallon, 2.5 gallons, 1 gallon]

High Density Polyethene Containers
[5 gallons, 12.2 gallons]

Polyethylene Drum
[55 gallon, Closed head]
Used for large volumes of liquid corrosive wastes

Metal 55 gallon, closed head drum
Used for large volumes of non-corrosive liquids

Metal Drums
[55 gallons, 30 gallons, 10 gallons]

5 Gal Pail

5 Gal Poly drum

## Appendix B

# Management of Lab Waste (Unwanted Material) Containers

The guidance in this Appendix was obtained from the ***Best Management Practices Handbook for Hazardous Waste Containers*** developed for the Environmental Protection Agency (EPA) Region 6, for the Compliance Assurance and Enforcement Division of EPA Region 6 and adapted by the BSU Environmental Health and Safety Office to fit the university's academic environment.

**Tips for Waste Characterization**

1. Look at a Safety data sheet (SDS) if it is available either for the product as a whole or its individual components or constituents. Some information areas on the MSDS to look for are physical property, reactivity, fire and explosion hazard, and special protection information.
2. If a product being used in a process meet some or more hazardous characteristics, the waste generated may exhibit some of the same characteristics.
3. Be aware of any changes in a process which could alter the composition of the waste generated.

**Tips for Waste Characterization of Containerized Waste**

1. Pay attention to marking/labeling which may indicate that a material is flammable, corrosive, etc.
2. Always check with your supervisor before handling unknown containers, or containers which you feel are labeled or marked incorrectly.
3. Look at a material safety data sheet (MSDS) if it is available.
4. If waste is in a plastic container it is a good indication the waste may be corrosive.
5. Special methods and equipment may be required to manage wastes which are:
    a. Corrosive
    b. Combustible
    c. Flammable
    d. Oxidizer
    e. Poison
    f. Toxic
    g. Reactive

**Tips for Container Selection**

1. Consult a corrosion resistance guide to determine if the container and waste are compatible.
2. Refer to the U.S. Department of Transportation Hazardous Material website and references for listings of acceptable container types and packaging for the hazardous material.

**Tips for Safely Putting Wastes in Containers**

1. Make sure you know which wastes are reactive and/or incompatible. Keep these wastes away

from each other. Put them in separate containers.
2. Make sure the container cannot be harmed by the waste.
3. If you rinse out containers onsite, be aware that rinse water generated from container washing must be contained and characterized prior to disposal. Those that contained "P" or "U"-listed constituents must be triple rinsed with suitable solvents prior to disposal or re-use.
4. If you frequently reuse containers, consider "assigning" wastes to certain containers. This will allow you to reuse the container without washing.
5. Use a funnel to prevent spills, and do not use the same funnel for all wastes.
6. Certain chemicals may need room for expansion, or they may require zero headspace depending on the characteristics of the waste and storage conditions (e.g., temperature fluctuations)

**Tips for Marking/Labeling Containers**

1. Have all personnel use the same method (e.g., prepared labels) to label containers. Make sure all handlers know how to label the containers to convey the identity and nature of the wastes contained therein.
2. Besides the start date and the words "Lab Waste," include information about contents e.g., toxic, reactive, incompatible).
3. Apply DOT labels to the container when waste is first placed in the container. The label will be in place for shipment and provides information about the waste to drum handlers.
4. Before reusing containers, make sure all old markings/labels are washed off or blacked out.

**Tips for Safely Managing Containers**

1. Do not store wastes next to a sink or drain in the event of a leak from the container or spillage to the drain.
2. Provide secondary containment (a tub or bucket) for liquid wastes where possible.
3. Use a funnel or hose to add or transfer wastes to containers. This will prevent spills. Remember to rinse the funnel and characterize the rinse water (a dedicated funnel would not have to be rinsed).
4. If you notice a leak, or a container is in poor condition, transfer the waste to a new container immediately.
5. Keep containers cool and dry.
6. Make sure all container storage areas are clearly marked -- keep ignitable/reactive wastes in their own area.
7. Don't stack ignitable/reactive wastes.
8. Don't push, roll, or drag containers. Use the right equipment to move the containers and drums.
9. Make sure the containers are easy to reach -- keep an open aisle space so that people and

equipment can move freely.

**Tips for Conducting Inspections**

1. Be thorough. Check the tops of containers to look for waste residue or corrosion.
2. Look or walk all the way around containers – check the entire container or waste storage or use area.
3. Check containment areas, fume hoods, floors, cabinets, benches, etc. for stains.
4. Note anything unusual in lab or studio area -- even if it might not be a problem.
5. If problems are found, get the problem taken care of immediately – contact BSU Work Control or the EHS Office.

## Appendix C

### Lab Waste Management Checklist

| BALL STATE UNIVERSITY | Environmental Health and Safety Office<br>North Service Building | Contact: Tom Russell, CHMM<br>765-285-2807<br>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