



University of Missouri – St. Louis

Laboratory Management Plan

In support of 40 CFR 262 Subpart K

November, 2013

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Approved by

Date

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Revision No.

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## List of Attachments

Attachment A: Unwanted Material Pickup Request and Hazardous Waste Container Filling Log

Attachment B: Safety Procedures for the Department of Chemistry

Attachment C: Form UM WC-1

Attachment D: Potentially Dangerous Common Laboratory Chemicals

## I. Introduction

In November, 2013, the University of Missouri – St. Louis (UMSL) notified the Missouri Department of Natural Resources (MDNR) and the Environmental Protection Agency (EPA) Region VII that they were opting into the provisions of 40 CFR 262 Subpart K, Alternative Requirements for Hazardous Waste Determination and Accumulation of Unwanted Material for Laboratories Owned by Eligible Academic Entities. A Laboratory Management Plan is required per 40 CFR 262.214. This document provides the Laboratory Management Plan (Plan) for the University of Missouri – St. Louis.

The Plan will be made available to all laboratory workers, students, and faculty or staff members at UMSL. The Plan will be reviewed periodically with affected faculty and staff members and will be revised, as necessary. The Environmental, Health & Safety Department (EHS) will maintain the Plan and will be the party responsible for revising the plan.

The following table illustrates what is and what is not a laboratory under Subpart K.

<b>What IS a laboratory under Subpart K?</b>	<b>YES</b>	<b>NO</b>
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		√

## **II. Laboratory Management Plan Requirements**

The Plan consists of two (2) parts.

### **A. Part I (40 CFR 262.214(a)(1)-(2))**

Part I of the Plan will describe the procedures for labeling containers in the laboratories, and the terminology used to identify “unwanted materials” as well as how the information associated with the container will be imparted to the experienced personnel who will transfer the container from the laboratory to the designated storage location (40 CFR 262.206(a)). Part I of the Plan will also include a description of the frequency with which UMSL personnel will remove unwanted materials from the laboratories (40 CFR 262.208(a)).

### **B. Part II (40 CFR 262.214(b)(1)-(7))**

Part II of the Plan describes the intended best practices UMSL will utilize to ensure safe management of laboratory wastes. Intended best practices will be included for the following topics

- Container labeling and management (40 CFR 262.206);
- Training for laboratory workers and students (40 CFR 262.207(a));
- Training for safe on-site transfer by trained professionals (40 CFR 262.207(d)(1));
- Removing unwanted materials from the laboratories (40 CFR 262.208(a)(1)-(2), 40 CFR 262.208(d));
- Making hazardous waste determinations (40 CFR 262.11, 40 CFR 262.209-212));
- Laboratory cleanouts (40 CFR 262.123(a)(1)-(4)), and;
- Emergency prevention.

## **III. Laboratory Management Plan: Part I**

UMSL has created an Unwanted Material Pickup Request and Hazardous Waste Container Filling Log (40 CFR 262.206(a)) for use in all laboratories (See Attachment A). This form is used for both potential hazardous waste and waste that will not be regulated as a hazardous waste. Upon generating waste and putting it into a waste container, laboratory personnel will:

- Put the date on the pickup request form. This date is the accumulation start date.

- Identify the chemical constituents and amount added. The amount added may be by volume or by weight.
- Identify if the chemicals added are new or used.
- Identify the lab number and person responsible.
- Keep the container closed unless adding waste.
- Keep the Unwanted Material Pickup Request and Hazardous Waste Container Filling Log physically with the container.
- Not add incompatible chemicals to the container.
- Not mix dissimilar waste types (i.e., metals with flammables).
- Notify EHS when the container is full and ready for pickup.

UMSL EHS personnel pick up waste containers on a regular schedule (40 CFR 262.208(a)(2)). At a minimum the waste pickups will occur on a monthly basis. Typically, EHS personnel visit the buildings with laboratories weekly and remove full laboratory waste containers, based on laboratory notifications. All containers will be collected within six (6) months of the accumulation start date.

#### **IV. Laboratory Management Plan: Part II**

Part II of the Plan describes the intended best practices UMSL will utilize to ensure safe management of laboratory wastes.

##### **A. Container Labeling and Management (40 CFR 262.206)**

Laboratory waste containers will be labeled using the Unwanted Material Pickup Request and Hazardous Waste Container Filling Log, as shown in Part I of the Plan. The label will be affixed to the container or will be posted next to the container. The Unwanted Material Pickup Request sheet provides the following information:

- Accumulation start date;
- Name of chemicals added to the container;
- Quantities of each chemical added to the container;
- Whether the chemical added is new or has been used; and
- Responsible party.

Waste containers are provided by EHS to ensure compatibility with the range of chemicals stored. High density polyethylene containers are available for liquid laboratory waste storage. Lab packs may be in other DOT approved containers or drums. EHS personnel collect the containers and transport them to a central waste storage area. In the central waste storage area, trained personnel transfer the contents of each container into the appropriate drum (i.e. corrosive materials are transferred into an HDPE drum). The portable containers are rinsed and inspected by trained personnel. If the containers are in good condition, they are reused. If the containers are in poor condition, they are disposed.

Laboratory personnel (i.e. students, teaching assistants, research assistants, etc.) are under the supervision of faculty members. Undergraduate students are not allowed to work in the laboratories unattended; they are always supervised when conducting any work in the labs. Student safety is of primary importance in all laboratory procedures. Laboratory personnel are trained on compatibility of materials and do not combine incompatible chemicals into the waste containers. Waste containers are open in the laboratories only when adding chemical waste.

## **B. Training for Laboratory Personnel (40 CFR 262.207(a))**

Students and laboratory workers receive training in several forms.

- Annual safety training as part of the laboratory course;
- Experimental procedures as part of the laboratory course;
- Direct oversight by faculty or teaching assistants; and
- EHS routine training for proper waste handling procedures for faculty and research assistants.

In addition, a Laboratory Safety Plan is being developed and will include procedures for safe handling for each activity involving hazardous chemicals. In those laboratories where unique chemicals or hazards exist, an addendum will be added to the Laboratory Safety Plan to address the unique hazards.

## **C. Training for EHS Personnel (40 CFR 262.207(d))**

Waste is transferred from the laboratories to a central waste storage area by EHS personnel. The EHS personnel are 40 hour HAZWOPER trained. HAZWOPER training includes PPE, sampling and packaging, handling drums and containers, chemical hazard identification, and other topics designed for the safe handling of hazardous materials.

The Director of EHS, or his designee, will make the determination whether the laboratory waste meets the definition of hazardous waste or not. EHS personnel and subcontractors making the hazardous waste determination have direct experience in identifying hazardous waste and in managing hazardous waste. It is the responsibility of the Director of EHS to ensure only qualified EHS personnel are involved in handling of laboratory waste and in making the hazardous waste determination.

## **D. Removal of Unwanted Materials (40 CFR 262.208(a), (d))**

Laboratory personnel notify EHS when laboratory waste containers are full and ready for pickup. EHS personnel typically collect full containers of waste every

week. Pickups will be scheduled such that containers are collected within 6 months of the accumulation start date, regardless of volume. Laboratory personnel are responsible for the following:

- Completing the Unwanted Material Pickup Request and Hazardous Waste Container Filling Log;
- Dating the container with the first date that chemicals are added (accumulation start date);
- Notifying EHS that the container is full and ready for pickup;
- Notifying ESH when a container reaches 5 months after its accumulation start date;
- Notifying ESH if they accumulate 55 gallons of laboratory waste [based on container size and UMSL procedure, a laboratory will never reach 55 gallons of waste];
- Notify EHS whenever 1 quart of a reactive acutely hazardous chemical has been collected. Reactive acutely hazardous chemicals are limited to:
  - P006 – Aluminum Phosphide
  - P009 – Ammonium Picrate
  - P065 – Mercury Fulminate
  - P081 – Nitroglycerine
  - P112 – Tetranitromethane
  - P122 – Zinc Phosphide (concentrations > 10%).

EHS personnel are responsible for the following:

- Providing chemically compatible waste storage containers;
- Training on the Unwanted Material Pickup Request and Hazardous Waste Container Filling Log;
- Picking up waste containers upon notification from laboratory personnel (includes full containers and containers that have reached 6 months from the accumulation start date, regardless of volume);
- If a laboratory has exceeded 55 gallons of laboratory waste, EHS will collect the material within 10 calendar days;
- If a laboratory has exceeded 1 quart of any reactive acutely hazardous chemical, EHS will collect the material within 10 days; and
- Providing trained personnel to transport the laboratory waste to the central waste storage location.

#### **E. Hazardous Waste Determinations (40 CFR 262.211, 40 CFR 262.209-212)**

The Director, Environmental, Health & Safety, or his designee, is responsible for making the hazardous waste determination. The hazardous waste determination will be made in the Hazardous Waste Storage Area.

Trained EHS personnel collect the full laboratory waste containers periodically. Trained EHS personnel will collect laboratory waste within 10 days of any laboratory collecting in excess of 55 gallons of waste, or 1 quart of the defined reactive acutely hazardous chemicals. The laboratory waste containers are transported directly to the central waste storage area where they are stored until being shipped off site.

The Director of EHS or his designee determines whether the laboratory waste meets the definition of hazardous waste or not. The determination is made within 4 days of the material being transferred to the central storage area. If the laboratory waste is hazardous waste, the words "hazardous waste" will be included on the container label.

Trained EHS personnel may transfer the laboratory waste contents to a larger container (55 gallon drum) prior to shipping off site for treatment. All containers of waste to be shipped off will include all of the required markings prior to shipping off site. All hazardous waste shipments will include a hazardous waste manifest, and required certifications.

#### **F. Laboratory Cleanouts (40 CFR 262.213(a))**

One time per 12 month rolling period, each laboratory may conduct a cleanout following these steps.

- The eligible laboratory will contact EHS to schedule the clean-out.
- The laboratory cleanout is limited to unused commercial chemical products still in their original packaging.
- EHS will schedule the laboratory cleanout to ensure proper lab pack containers are available and that materials are properly packed.
- Laboratory personnel will provide documentation that will include the laboratory number, beginning and ending dates for cleanout, and a list of materials removed from the lab. The material list will include the chemical name (and concentration, if applicable) and the quantity.
- If the volume collected exceeds 55 gallons (or 1 quart for reactive acutely hazardous materials) the laboratory cleanout must be completed within 30 calendar days from the start of the laboratory cleanout.
- EHS personnel will transport the laboratory cleanout materials to the central waste storage area for final packaging. All hazardous waste materials will be shipped off site from the central storage area.

If the laboratory has generated any unwanted material prior to the laboratory cleanout, that material must be tracked separately and counted toward the hazardous waste generator status.

If a laboratory conducts more than one cleanout during a 12-month period, the waste generated will count towards the hazardous waste generator status and all waste



must be removed within 10 days of exceeding 55 gallons (or 1 quart of reactive acutely hazardous material).

## G. Emergency Prevention

UMSL procedures and practices are designed with student safety as the top priority. Although UMSL does not anticipate needing emergency response to spills or incidents in the laboratories, standard practices are in place to ensure student safety in the event emergency response is required.

Attachment B provides an example of the emergency response and notification program developed for the Chemistry Department. Similar emergency response procedures have been established for other laboratory areas. The response and notification forms are posted in each laboratory for quick reference. All injuries are to be reported to the UMSL Police (Institutional Safety) for response and documented using form UM WC-1, which is sent to Human Resources. Attachment C contains form UM WC-1.

At a teaching and research institution, there will be a variety of chemicals used in the laboratories. Some of these chemicals may be susceptible to degradation over time, and may be unstable under specific conditions. Chemicals may react alone or with other chemicals liberating heat, toxic gases, or explosive conditions. Alkali metals like sodium, potassium, and lithium react violently with water releasing large amounts of energy and hydrogen gas. Shock sensitive materials may include organic nitrates and many peroxides. Organic peroxides are sensitive to light, heat, and shock and are all highly flammable. Peroxide formers can form peroxide, especially after exposure to air. Peroxide formers may include aldehydes and ethers. Attachment D contains a list of potentially dangerous chemicals commonly used in labs that may be present.

All dangerous or potentially dangerous chemicals are handled with extreme caution, and under the supervision of faculty or graduate students. Any chemicals suspected of having formed peroxides, or suspected of being unstable, are left in place in the laboratory. EHS is notified and makes arrangements for trained personnel to remove any potentially dangerous chemical from the lab.

Unknown or unlabeled chemicals needing disposal will be communicated to EHS and managed in the laboratory using the Unwanted Material Pickup Request and Hazardous Waste Container Filling Log. EHS is responsible for contracting the proper packaging and disposal of unlabeled chemicals.

**ATTACHMENT A**

**UNWANTED MATERIAL PICKUP REQUEST**

**AND HAZARDOUS WASTE CONTAINER FILLING LOG**



**ATTACHMENT B**

**SAFETY PROCEDURES FOR THE**

**DEPARTMENT OF CHEMISTRY**

SAFETY PROCEDURES FOR THE DEPARTMENT OF CHEMISTRY  
PLEASE POST IN ALL LABORATORIES

This brief procedure provides some steps for teaching assistants to follow in case of an accident.

Initial Action

Shout for help! Send someone to the phone and call the police (x**5155**). (Do not move an injured person unless such movement is necessary to prevent further injury.)

- 1) **PERSON ON FIRE OR SPLASHED WITH CORROSIVE CHEMICAL:** In the event that any individual has been splashed with a burning solvent or corrosive chemical or has any clothing on fire, the affected area must be doused quickly with running water to avoid serious injury. This action should be performed immediately by the person(s) closest to the victim. Unless only a small area (such as the hand) is affected, a safety shower should be used. Remove any clothing that has been contaminated with chemicals. Do not use neutralizing chemicals, creams, lotions, ointments, or salves. Call 5155.
- 2) **CORROSIVE SUBSTANCE IN EYE:** Get the injured person to the nearest eye wash as quickly as possible and irrigate the eye with plenty of water for no less than 10-15 minutes. After an initial few minutes of irrigation, have the person remove any contact lenses and then continue to irrigate the eye. The injured person should be encouraged to keep his/her eyes open as much as possible during the irrigation which may require he/she hold the eye lid. Finally, place a loose (no pressure) clean bandage or cloth over the eye. Call 5155.
- 3) **MINOR CUTS AND PUNCTURES:** Encourage bleeding, wash with running water, and wrap in a clean towel until proper treatment can be secured. If the student can walk, escort him/her to the University Health Center, Room 131 MSC, for first-aid. If you want more assistance, call the Campus Police 5155.
- 4) **SEVERE BLEEDING:** Elevate the injury above the heart and apply a clean pad or cloth directly to the wound with firm pressure. Call 5155.
- 5) **ELECTRIC SHOCK:** Immediately shut off current. Otherwise, separate the victim from the electrical source, being careful to insulate yourself adequately. Call 5155.
- 6) **BREATHING STOPPED:** Give mouth-to-mouth resuscitation until someone arrives and have them call 5155.
- 7) **INGESTION OF CHEMICALS:** Encourage the victim to drink large amounts of water. Determine as much as possible about what was ingested. Call 5155.

### Subsequent Action

As soon as possible following the initial response, the Teaching Assistant or any designated individual should request that all work in the laboratory stop and then call the Campus Police 5155 and provide the following information:

- 1) Give your name and title
- 2) Identify victim's location (e.g., Benton Hall, floor and room number)
- 3) Briefly describe the nature and severity of the injury/accident. Provide as much information as possible including what chemicals may have been involved. Police response will depend on your assessment of the severity of the accident. If you think an ambulance is needed, say so. The police will respond regardless.
- 4) The staff member in charge of the labs should be informed for minor injuries and the student should be accompanied to the University Health Center, Room 131 MSC.
- 5) The accident should be reported to the Chemistry Office, 315 Benton Hall or to the Chemistry Storeroom, 5653.

In case of accidents where no bodily injury is involved:

- 1) Fire. Evacuate the laboratory; Call campus patrol 5155
- 2) Floods: Call Physical Plant 6300 or 5155.

For every accident or injury (minor or major) fill out a Departmental Accident Report Form (available in the Chemistry Office) and submit it to the Chemistry Office as soon as possible.

**ATTACHMENT C**

**FORM UM WC-1**

**ATTACHMENT D**

**POTENTIALLY DANGEROUS**

**COMMON LABORATORY CHEMICALS**



### Example Peroxide Formers:

Acetal	Ethylene Glycol Dimethyl Ether
Cyclohexane	Isopropyl Ether
Decahydronaphthalene	Methyl Acetate
Diacetylene	Sodium Amide
Dicyclopentadiene	Tetrahydrofuran
Diethylene Glycol	Tetrahydronaphthalene
Dimethyl Ether	Vinyl Ethers
Dioxane	Vinylidene Chloride
Divinyl Acetylene	1,4-Dioxane
Ether	

### Example Oxidizers:

Inorganic nitrates, nitrites, permanganates, chlorates, perchlorates, iodates, periodates, persulfates, chromates, hypochlorites, peroxides and perborates.

Ammonium perchlorate	Ammonium permanganate
Barium peroxide	Bromine
Calcium chlorate	Calcium hypochlorite
Chlorine trifluoride	Chromium anhydride
Chromic acid	Dibenzoyl peroxide
Fluorine	Hydrogen peroxide
Magnesium peroxide	Nitrogen trioxide
Perchloric acid	Potassium bromate
Potassium chlorate	Potassium peroxide
Propyl nitrate	Sodium chlorate
Sodium chlorite	Sodium perchlorate
Sodium peroxide	

### Example Water Reactive Chemicals:

Alkali metals, metal powders, borane, carbides, Grignard reagents, metal hydrides, and metal phosphides

### Example Pyrophoric:

Metal alkyls and aryls, nonmetal alkyls, phosphorus.

### Example Shock Sensitive:

acetylene	fulminate of mercury	nitroguanidine
acetylides of heavy metal	fulminate of silver	nitroparaffins
amatex	ethylene oxide	nitrourea
amatol	ethyl-tetryl	organic nitramines
ammonal	fulminating gold	ozonides
ammonium nitrate	fulminating mercury	pentolite
ammonium perchlorate	fulminating platinum	perchlorates of heavy metals
ammonium picrate	fulminating	silver peroxides
azides of heavy metals	gelatinized nitrocellulose	picramic acid
baratol	guanyl	picramide
calcium nitrate	guanyl nitrosamino	picratol
chlorate salts	guanyltetrazene	picric acid
copper acetylide	hydrazine picryl	sulphonic acid
cyanuric triazide	nitrated carbohydrate	silver acetylide
cyclotrimethylenetrinitramine	nitrated glucoside	silver azide
dinitrophenol	nitrogen triiodide	tetranitromethane
dinitrophenyl hydrazine	nitrogen trichloride	
dinitrotoluene	nitroglycerin	
ednatol	nitroglycide	
erythritol tetranitrate	nitroglycol	