Department of Environmental Health & Safety

Hazardous Materials Management Plan

1. Mission

The University of Denver is committed to the fundamentals of environmental responsibility at the community, national, and international level with the goal of continually striving to maintain the amounts of hazardous waste to as low as reasonably achievable. Hazardous waste will be controlled by the management of chemical procurement, chemical storage, and chemical disposal, providing for optimal waste minimization, and ensuring regulatory compliance.

2. Authority

- United States Environmental Protection Agency (EPA)
- United States Nuclear Regulatory Commission (NRC)
- Colorado Department of Public Health & Environmental (CDPHE)

3. Requirements

The EPA regulates waste under the Resource Conservation and Recovery Act (RCRA). The regulation can be found in 40 CFR Parts 240-299. The NRC regulates the use and disposal of radioactive materials through 10 CFR Part 20. Additionally, the Colorado Department of Public Health & Environment (CDPHE) under the Hazardous Materials and Waste Management Division provides state regulations, 6 CCR 1007-3, regarding hazardous waste and the management of radioactive materials.

The goals of RCRA are to:

1. Protect the public from the hazards of pollution.
2. Conserve energy and natural resources by recycling and recovery.
3. Reduce or eliminate waste.
4. Clean up waste, which may have spilled, leaked, or been improperly disposed.

There are four major programs in RCRA. The most significant for the University of Denver is *Hazardous Waste* (Subtitle C). This part requires EPA to develop and manage a program that identifies wastes that are hazardous and set standards for safely managing this waste from the moment it is generated, through storage, transportation, recycling, treatment, and ultimate disposal. This waste process is called "cradle to grave". Hazardous waste is defined by the EPA as "by-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed." Hazardous waste possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity), or appears on special EPA lists.

RCRA requires facilities that generate or manage hazardous waste to certify that they have a waste minimization program in place that reduces the quantity and toxicity of hazardous waste

generated to the extent economically practicable. The benefits of waste minimization include environmental protection, enhanced worker health and safety, and sound economics and business.

Hazardous waste generators include a wide spectrum ranging from large manufacturing companies to small businesses. Considering the varied environmental risk, RCRA has developed three hazardous waste generator categories: Large Quantity Generators (LQG), Small Quantity Generators (SQG), and Very Small Quantity Generators (VSQG). The generator status is based on the amount of generated waste on a monthly basis. Those limits are as follows:

- LQG – greater than 1,000 kilograms (kg) of hazardous waste per month.
- SQG - between 100 kg and 1000 kg of hazardous waste per month.
- VSQG – less than 100 kg of hazardous waste per month and less than 1 kg/month of acute hazardous waste.

In accordance with 40 CFR Part 262 LQGs and SQGs are required to:

- Identify and track volume of waste.
- Obtain an EPA ID number.
- Comply with accumulation and storage requirements.
- Prepare waste for transportation.
- Provide formal training to personnel.
- Track the shipment and receipt of waste.
- Meet recordkeeping and reporting requirements.

The requirements for VSQGs are much less stringent and do not include the above mandates. VSQGs must:

- Identify their hazardous waste.
- Comply with storage limit requirements.
- Never accumulate more that 1000 kg at any time.
- Ensure waste treatment or disposal.

The NRC and CDPHE regulate the use and disposal of radioactive materials through licensing, to ensure the protection of the public and the environment. This includes the regulation of mixed waste, which is waste that contains both radioactive and hazardous waste. These regulations differ from those regarding chemicals in many significant ways, the primary one being disposal by decay, which is storage until the radioactive material has undergone at least 10 half lives of decay. Decay in storage is only appropriate for radioisotopes that have a short half-life of around 100 days.

4. University of Denver Waste Generator Status

The University of Denver maintains a status of SQG. Evaluation of this status is an on-going process based on waste accumulation rates and weights of materials in storage pending disposal. If waste quantities exceed the SQG limits the requirements for LQG will be implemented immediately.

5. Responsibilities

All University of Denver personnel are responsible for assuring that all waste discarded in campus dumpsters or compactor units are free of untreated infectious waste, special waste, hazardous waste, regulated radioactive waste, regulated pharmaceutical waste, and other miscellaneous liquid or semi-liquid wastes. Listed below are responsibilities for the respective position:

Certified Hazardous Materials Manager (CHMM)

- Documenting the removal of wasted chemicals from off the University of Denver campus.
- Providing an inventory of hazardous chemicals to the City and County of Denver Fire Department.
- Safely removing hazardous chemical waste upon request.
- Responding to chemical spills in which environmental impacts may exist.
- Maintaining radiological licensing.
- Providing technical assistance on the proper storage and disposal of hazardous chemicals.
- Evaluate the purchase of chemicals that are on the Hazardous Materials Notification List (see below).
- Performing annual lab inspections.

Environmental Health & Safety (EH&S) Director

- Maintaining the Hazardous Materials Management policy and associated forms and the environmental management web page.
- Evaluate the purchase of chemicals that are on the Hazardous Materials Notification List (see below).
- Responding to chemical spills in which potential exposures occur.

Principle Investigator (PI) or Authorized Person

- Approving requisitions for chemicals.
- Notifying Hazardous Materials Management and the EH&S Director of purchases of chemicals on the Hazardous Materials Notification list.
- Ensuring hazardous chemical waste is properly labeled and stored, i.e., segregated by compatibility.
- Maintaining an accurate chemical inventory in the lab.

- Evaluating the condition and amount of hazardous waste during each monthly lab inspection, as required by the Chemical Hygiene Program (CHP).
- Requesting the removal of hazardous waste, as needed, to Hazardous Materials Management.
- Ensuring safe and proper procedures, including disposal, are followed in the event of a spill.
- Ensuring the proper authorities are notified in the event of a spill. This may include notification to emergency services at 911, Campus Safety at ext. 1-3000, Hazardous Materials Management for proper disposition of the material, and the EH&S Director for personal exposure evaluation. See Spills section below.

6. Chemicals inventory

The PI or Authorized Person will maintain an accurate inventory of chemicals in the lab or work area. Hazardous Materials Management will maintain a compilation of chemical inventories for the labs and applicable work areas and provide a comprehensive list, annually, to the Denver Fire Department.

7. Chemical procurement

A Hazardous Materials Notification List has been compiled that includes the EPA P-List of acutely hazardous chemicals and certain toxic chemicals as identified by cancer research agencies. The purpose of the notification list is to track certain hazardous chemicals being purchased by the university and to mitigate the generation of hazardous waste. The OSHA Lab Standard requires additional employee protection for work with particularly hazardous substances. The Standard specifically lists three categories of chemicals as particularly hazardous, including select carcinogens, reproductive toxins, and substances with a high degree of acute toxicity. Select carcinogens include any substance which is:

1. Regulated by OSHA as a carcinogen.
2. Identified by the National Toxicology Program (NTP) as "known to be carcinogen".
3. Identified by the International Agency for Research on Cancer (IARC) under Group 1 as "carcinogenic to humans.

Prior to making a chemical purchase, the PI must evaluate the associated hazards of chemicals to be purchased and to determine if the chemical product or any of its components are identified on the Hazardous Materials Notification List. Written notification (Hazardous Chemical Purchase Notification) is required to be submitted to the Hazardous Material Management and the EH&S Director for the purchase of materials identified on the Hazardous Materials Notification List. PI's are responsible for generating as little hazardous waste as reasonably achievable and are therefore encouraged to procure chemicals only in amounts that will be used in the near future. No maximum purchase limit is established but as a general guideline five pounds or about 2200 grams may be considered to be excessive. The Certified Hazardous Materials Manager or the EH&S Director may contact the PI to discuss potential environmental issues or health and safety risks associated with the request. The cost associated with disposing of hazardous waste may be charged to the respective department if subsequent amounts of wastes are determined to be excessive.

The PI's are encouraged to seek small quantities of chemicals from other laboratories on campus. While exchanging chemicals within the labs is not always possible or feasible, this practice will

help reduce inventories. Additionally, prior to procuring a chemical the PI should have a Standard Operating Procedure (SOP) in place that describes the associated hazards, controls to be implemented, and the proper handling, storing, and disposal procedures for the chemical.

The PI must also ensure that the manufacturer or vendor sends the applicable Safety Data Sheet (SDS) to the laboratory in which the chemical will be used. No container of chemicals should be accepted without a proper identification label or a SDS.

8. Chemical Waste

The process of accumulating waste begins with the critical step of categorizing the waste. Hazardous Material Management should be contacted regarding waste determinations in accordance with regulatory requirements that stipulate proper storage and disposal practices. A written notification (Waste Removal Request form) must be submitted to Hazardous Material Management to remove wasted chemicals from the lab.

All hazardous waste will be stored appropriately in approved containers, dated, and adequately capped. Chemical waste will be appropriately labeled and segregated from incompatible materials. The following labeling procedures must be followed:

- Each container must have a label when waste is first placed in it.
- Fill out in pencil (due to chemical resistance).
- Include name, room #, building, and department or unit.
- List all components of commingled waste.
- Record the pH of aqueous wastes.

Containers of chemicals which are not identified present a significant health and safety hazard, as well as a potential costly resolution. Hazardous Material Management should be immediately contacted if unidentified containers are found.

The waste accumulation area should be stored in areas without floor drains. Accumulation areas which have one or more 5 gallons containers must have a secondary containment that is capable of containing at least 5 gallons.

Mixing incompatible wasted chemicals is dangerous and should be avoided to mitigate regulatory issues and costs. Personnel must ensure it is safe and acceptable to mix wasted chemicals together in a single container for disposal (commingling). The following URL should be referenced to determine what wasted chemicals can be mixed: http://www.coleparmer.com/techinfo/ChemComp.asp?from=home. Storage classifications can be obtained from the Safety Data Sheet (SDS) or directly from the manufacturer.
Hazardous Materials Management can be consulted for questions about proper segregation of chemical waste. Hazardous Materials Management must be contacted prior to the generation of mixed waste, defined by EPA as waste that contains both radioactive and chemically hazardous waste.

The PI or Authorized Person will perform weekly inspections of each container in which hazardous wastes are accumulated to verify proper labeling and that containers are not leaking, bulging, or incompatible with the waste stored in them. The inspection must also be documented in a log book giving the date of inspection and the name of the person making the log entry. The size of the container has no influence on whether this inspection is performed. State law also

requires that the container be properly capped between additions to the container. The University further requires that the proper chemical names and volumes of items added to a waster container be documented in the log.

Disposing hazardous waste into the building sanitary drainage and sewer systems can potentially cause system damage and may be a violation of regulations. Hazardous Material Management must be contacted for an evaluation to determine if a certain type of hazardous waste can be poured into the sink or sanitary drain. Contact the Hazardous Materials Management for disposal of waste. Waste containers should be no larger than 5 gallons.

9. Spills

The best means to control spills is the use of preventive measures, including the implementation of safe handling provisions that must be described in the applicable SOP, per the CHP. The SOP provides for proper controls, including the use of PPE, for routine use and for contingencies such as a spill. The SOP must identify the appropriate response for an accident or spill. Factors such as the chemical toxicity or flammability, the quantity involved, and the consequences of the event determine the significance of the hazard. Certain events may require emergency services (911) and Campus Safety (1-3000) to be notified or the University of Denver Critical Incident Management Plan (CIMP) to be implemented. Minor spills may only require the response of lab personnel, but personnel should thoroughly understand steps to be taken beforehand.

After a chemical spill occurs, the health and safety of personnel is paramount. For small spills a good practice is to follow the SWIM method. S-Stop; W-Warn; I-Isolate; M-Minimize.

1. Stop the spill. This may involve simply placing a tipped bottle upright or closing a valve.
2. Warn others. Call co-workers to assist you.
3. Isolate the area. Protect the area to keep personnel away.
4. Minimize exposure during cleanup.

Hazardous Materials Management, likewise, must be notified for spills that affect the environment, such as entrainment into the sanitary sewer system or soil infiltration. Hazardous Materials Management will provide assistance regarding the proper storage or disposal of the spilled chemical.

Depending on the nature of the spill hazard, i.e., duration of exposure, airborne concentration of the contaminant, the EH&S Director must be immediately notified to assess potential personal exposures and the appropriate controls to protect personnel during remediation.

10. Training

Specific, formalized training is required for LQGs and SQGs while no specified training requirements exist for VSQG. At a minimum, personnel working with chemicals must attend OSHA required lab safety training, provided by the EH&S Director. Required personnel training can be found on the Risk Management web site. Hazardous Materials Management will provide familiarization training on hazardous waste issues, including radioactive waste. The PI or supervisor is responsible for ensuring (with documentation) personnel have received training and have read and understand this policy.

11. Documentation and Reporting

SQGs have specific requirements for keeping records of the amount of hazardous waste generated. In addition, as a matter of prudent practice, weights and volumes of hazardous waste generated will be recorded and maintained by Hazardous Materials Management on an on-going basis. Decisions regarding whether or not the contents of a container should be classified as "Hazardous Waste" should be left to Hazardous Materials Management.

12. Hazardous Materials Management Plan Changes

December 5th, 2023 - Minor Revisions