



Environmental Health and Safety
Hazardous materials minimization plan

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Introduction

The Hazardous Materials Minimization Plan is designed to provide definitions of hazardous materials and information for purchasing, storing and using hazardous materials. The HMMP also provides guidelines and procedures for the reuse, reduction or elimination of hazardous wastes and disposal of hazardous materials throughout ASU's campuses. The HMMP, in conjunction with the [Chemical Environmental Management System](#), will help ASU do the following:

- Enhance compliance efforts.
- Reduce costs.
- Reduce hazardous waste.

The HMMP is intended to be used with other university Environmental Health and Safety programs, including the following:

- [Biosafety and Animal Biosafety Program](#).
- [Chemical Hygiene Plan](#).
- [Laser Safety Program](#).
- [Radiation Safety Program](#).

Definitions

The following definitions are of significance in the HMMP:

- **Hazardous material or substance:** Substances or materials that pose a potential risk to life, health or property if released because of their chemical, biological or physical nature, as [described by OSHA in 29 CFR 1910.120](#).
- **Hazardous material purchaser:** Any individual who purchases hazardous materials or directs others to perform this activity.
- **Hazardous material users:** Any university employee, principal investigator, researcher, student or visitor handling hazardous material.
- **Hazardous waste:** Solid waste with properties that make it dangerous or capable of hurting human health or the environment, as [defined by the Environmental Protection Agency in 40 CFR 261](#).
- **Inherently waste-like:** Any discarded solid waste material not excluded by regulation, variance or non-waste determination that is speculatively accumulated with or without the intention for us or recycling.

Regulatory authority and compliance

Regulatory bodies that govern hazardous materials and waste include the following:

- [U.S. Department of Transportation](#).
- [U.S. Drug Enforcement Administration](#).
- [U.S. Environmental Protection Agency](#).
- [U.S. Nuclear Regulatory Commission](#).
- [U.S. Occupational Safety and Health Administration](#).

Applicable regulations and programs related to the implementation and compliance of the HMMP are:

- [Arizona Revised Statutes, Title 49.](#)
- [Pollution Prevention Act of 1990](#), and the principles of green chemistry.
- [Resource Conservation and Recovery Act.](#)

RCRA is codified in Title 40 of the Code of Federal Regulations, parts 239 through 282. This includes the regulations for managing non-hazardous and hazardous waste from “cradle-to-grave” and is enforced by the EPA.

[Environmental Health and Safety](#) will be working with all departments to provide guidance and support to maintain compliance with environmental, health and safety regulations and improve management of hazardous materials to prevent potential instances of noncompliance. [EHS offers training](#) to avoid mismanagement of hazardous materials. This includes the following:

- Drain disposal restrictions.
- Improper management of peroxides, dioxin, or dioxin-containing materials.
- Incorrect labeling of hazardous materials or waste.
- Incorrect storage of hazardous materials.
- Incorrectly accumulating hazardous waste or inherently waste-like materials.

Roles and responsibilities

The HMMP assists departments in providing safe, compliant, environmentally sound, and more sustainable operations. Each department is expected to review, understand, and follow the guidance provided in the HMMP. The specific responsibilities of staff and personnel that use hazardous materials include department leaders, EHS, hazardous material users, purchasers, and the laboratory innovation safety team.

Departmental leaders

Department leaders, at a minimum, are responsible for the following:

- Designating the members of the safety committee.
- Participating in developing and updating the HMMP.
- Providing feedback regarding the HMMP to EHS.
- Review reports, recommendations or other input from the safety committees.

Environmental Health and Safety

EHS, at a minimum, is responsible for the following:

- Coordinating hazardous materials minimalization projects as needed or required.
- Soliciting feedback regarding the HMMP's continued improvement in its effectiveness.
- Updating the HMMP with a full review every three years and minimal changes as needed.

Hazardous material users

Hazardous material users, at a minimum, are responsible for the following:

- Confirming that safety data sheets for all chemicals are included in the Chemical Environmental Management System.
- Coordinating hazardous materials disposal and completing associated documentation.

- Coordinating laboratory start-up or close-out and equipment relocation with EHS when personnel leave or move into a laboratory. Refer to the Chemical Hygiene Plan for more information.
- Promoting an overall reduction in the usage of hazardous materials and subsequent generation of unwanted hazardous materials whenever possible.
- Verifying that the hazardous material users they supervise receive appropriate hazardous waste training and follow the procedures outlined in the HMMP.
- Working with EHS to coordinate hazard assessments for tasks involving acutely toxic or explosive chemicals and verify that the use of hazardous materials aligns with the HMMP and CHP.
- Working with EHS to maintain a current hazardous material inventory in CEMS.

Hazardous material purchasers

Hazardous material purchasers, at a minimum, are responsible for the following:

- Providing feedback and ideas regarding improvements to the HMMP based on their implementation of its guidelines and procedures.
- Purchasing hazardous materials as described in the HMMP, Radiation and Laser Safety Program, CHP and other policies and guidelines. This includes completing and submitting the appropriate paperwork required for purchasing hazardous materials.
- Reading and understanding the HMMP.

Laboratory Innovation Safety Team

The LIST, at a minimum, is responsible for the following:

- Coordinating recognition, awards and partnership initiatives.
- Promoting the safe and sustainable use of hazardous materials.
- Reviewing the HMMP as needed when changes are implemented.

Hazardous material determination

A hazardous material is any substance or material that poses a potential risk to life, health or property if released because of its chemical, physical or biological nature, as [described by OSHA in 29 CFR 1910.120](#). Examples of hazardous materials include chemicals that are toxic, corrosive, flammable, highly reactive, explosive or emit ionizing radiation, including consumer commodities like household cleaners and paints. [Refer to Appendix A](#) for examples of consumer commodities.

Specific information for hazardous materials may typically be obtained from a safety data sheet. [Contact EHS](#) or [refer to the CHP](#) for assistance with determining hazardous materials.

Particularly hazardous substances

Particularly hazardous substances are described in the ASU CHP. Individuals using these materials should minimize the quantity purchased, the amount used in the process and the quantity kept in storage. Refer to the list of particularly hazardous substances in [Appendix C of the CHP](#).

Hazardous material management

Hazardous material management source control is imperative to improve the cataloging of hazardous materials being ordered and to help reduce the overall quantity and toxicity of chemicals on ASU's campus.

Emergency responders need to know the hazardous materials in a laboratory or shop space when responding to an emergency on an ASU campus. The [National Fire Protection Association](#) also

recommends maintaining a current inventory of all hazardous and non-hazardous materials. An accurate inventory of hazardous materials is vital to promoting health and safety and maintaining environmental compliance.

Individuals must consider the quality and cost of purchases alongside the social and environmental factors when purchasing hazardous materials. The purchase, use, storage and disposal of hazardous material may present many challenges for ASU researchers, including health and safety risks, operational and disposal costs and increased potential for regulatory penalties.

Each intentionally made purchase will contribute to a safer work environment, promote a more sustainable campus environment, and reduce overall costs associated with maintaining compliance with environmental, health and safety regulations. Each hazardous material purchaser must understand and accept responsibility for the purchases by:

- Becoming familiar with prohibited and restricted purchases.
- Correctly tracking purchases to avoid unnecessary purchases.
- Properly managing waste materials.
- Researching less hazardous alternatives or substitutions.
- Reviewing the list of materials available in the [Chemical Exchange Program](#).

Purchasing hazardous materials

EHS has implemented several programs for targeted chemical reduction, including the mercury replacement and time-sensitive chemical reduction programs. Reagents containing arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver should not be used if a suitable alternative exists. Avoid purchasing mercury in any form, including equipment that contains mercury, peroxide formers, uranyl acetate, uranyl nitrate or compressed gas cylinders containing toxic or reactive chemicals whenever possible. [Contact EHS](#) for questions about materials likely to fit the definition of the classifications above.

Individuals should check for available hazardous materials in their inventory before purchasing additional materials. Alternative chemicals should be evaluated to determine if a less hazardous or non-hazardous material may be substituted before purchasing hazardous materials. [Refer to Appendix B](#) for more information, or [contact EHS](#) if you need assistance evaluating a less toxic or non-toxic chemical alternative.

Purchasing policy

Hazardous material purchases should only be made by trained hazardous material purchasers utilizing the [ASU Procurement Program](#) or individual departments' Purchasing Card purchasing procedures. This will help to meet the objectives of the HMMP. In addition, ASU employees must [follow the P-Card purchasing guidelines and policies for hazardous material purchases](#). By utilizing these methods of purchasing hazardous materials, the purchaser acknowledges that they:

- Accepts responsibility for any hazardous material acquired from receipt until proper disposal unless ownership is appropriately transferred to another user.
- Have read and are willing to comply with the HMMP.
- Understand the types of hazardous materials that require notification to EHS.

The purchaser should review the list of special handling requirements, restricted storage quantities and the EHS requirements for the specific hazardous material. Purchasers must also follow the prior approval process in the CHP before purchasing chemicals for new processes.

All purchases must be processed through CEMS. Specific requirements apply to receiving Table 1 chemicals as defined by the [decision tree for ordering Table 1 chemicals](#).

Orders for all hazardous materials should be shipped to CEMS Receiving [using the New Chemical Requisition Process Quick Guide](#) unless EHS authorizes you to receive hazardous materials directly. For example, packages containing Table 1 chemicals for Polytechnic, West Valley and Downtown Phoenix campuses require special shipping arrangements and must not be sent to CEMS Receiving. They must be received directly.

Purchases of most hazardous materials are processed through CEMS Receiving and will automatically be labeled with a barcode and be entered in CEMS before delivery to the purchaser. Correctly received packages are typically delivered to the end user the same day they arrive before noon or the next day if they arrive after noon. The purchaser must confirm that the material is logged into CEMS by contacting EHS and requesting an inventory barcode if a hazardous material is delivered directly to the purchaser.

Purchasing compressed gases

Only trained and approved individuals may purchase gases at ASU. Gas cylinders must be purchased through [ASU Gas Services](#). Purchasing gases with a P-Card is not authorized. [Refer to the CHP](#) for the ASU Compressed Gas Safety Program and handling policy.

Chemical Environmental Management System

All hazardous chemical inventories are managed through the Chemical Environmental Management System. Currently there are more than 165,000 containers of hazardous chemicals on the ASU campuses, according to the current database; of those, 15,656 were unique chemicals. The database contains more than 37,000 SDS for use by personnel. In addition, the program has over 2,000 active users including students, faculty and staff. Hazardous material users are expected to be familiar with CEMS. [Refer to the EHS CEMS webpage](#) for more information on CEMS training.

Hazardous materials must be appropriately labeled with a barcode sticker and electronically added to the CEMS inventory. The materials must remain in EMS until they are depleted or removed for disposal.

Initial CEMS inventory and verifications

The inventory of hazardous materials must be kept current and managed using the CEMS system. Updates to the database are critical in assessing the overall performance and improvements made regarding waste reduction and crediting the proper groups with those reductions; the EHS CEMS inventory team entered the existing — purchases before July 2022 — hazardous material inventory found on ASU campuses during the first 18 months of the CEMS implementation. The CEMS Receiving team now enters the initial hazardous chemical data for new chemical purchases made through CEMS Receiving for any purchase made on and after July 1, 2022.

It is the hazardous material user's responsibility to update the inventory when a chemical is consumed, disposed of, or distributed to another location on campus. This includes moving items from room to room and building to building, giving them to another user, emptying the container, and submitting them for hazardous waste removal. [Refer to the CEMS webpage](#) for instructions on how to accomplish these tasks.

EHS personnel will conduct inventory verifications approximately every two years in areas where hazardous materials are stored. EHS may verify areas with particularly hazardous substances and unique hazards and areas with larger quantities of hazardous materials more frequently.

EHS recommends that hazardous material users conduct voluntary inventories throughout the year to keep the inventory current and minimize the number of chemicals that must be entered or corrected during inventory verifications. EHS recommends that hazardous material users identify chemicals for disposal or the Chemical Exchange Program during voluntary inventory verifications.

Removing containers from the CEMS inventory

Hazardous material users are responsible for verifying that all hazardous materials remaining in inventory are in active use and that the CEMS database is accurate. Unwanted, consumed and waste materials must be removed from the labs regularly by scheduling a hazardous waste pickup. The chemical container must be removed from inventory by marking the container **Empty** in CEMS for any of these circumstances. The hazardous material user can accomplish this using the following methods:

1. Search for the barcode in CEMS and **Mark Empty**.
2. **Update Inventory** in CEMS, enter the barcode number and set the **Mark Empty** field to **Yes**.
3. Remove the barcode labels from the container, affix them to a sheet of paper and submit the sheet of paper to EHS staff during hazardous waste removal.

Occasionally, hazardous materials must be removed from registered spaces when a hazardous material user departs the university, or a project is completed. In these instances, it is the responsibility of the hazardous material user to remove these items and close out the inventory for the space before departure from the university or space. This process may require the user to notify EHS for disposal or redistribution to other users. The hazardous material user must complete the **Laboratory Close-Out** form in CEMS when inventory close-out is due to departure from the university.

Safety data sheet requirements

An SDS must be provided for all hazardous material purchases per [OSHA 29 CFR 1910.1200](#). All hazardous chemicals must be included in the CEMS inventory with an SDS on file. The CEMS program automatically matches an SDS for common chemicals in the database, and the SDSs will be available electronically.

Use and storage of hazardous materials

The primary objective of the HMMP is to minimize the number and amount of chemicals stored in laboratories across university campuses. The use and storage of hazardous chemicals are regulated activities and critical aspects of overall management. Chemicals should be stored based on compatibility and segregate incompatible chemicals. Please [refer to Appendix G of the CHP](#) for more information regarding chemical incompatibilities and proper chemical use and storage at ASU.

All hazardous material users must understand and follow the elements of ASU's hazardous material storage practices.

Hazardous material disposal

The [Arizona Department of Environmental Quality](#) regulates hazardous waste through [A.R.S. 49.901-973](#). All hazardous material users who produce hazardous waste are required to manage their waste according to the guidelines outlined in the [CHP](#) and [Hazardous Waste Management Compliance Guidelines](#). These documents provide information on the storage, labeling and disposal requirements of hazardous, universal and non-hazardous wastes.

The university makes every effort to create opportunities to control hazardous materials and reduce waste generation to support ASU's efforts to minimize costs, control liability, and maintain a sound environmental program. EHS recommends the following methods:

- **Chemical evaluation:** Carefully evaluate the need to purchase chemicals before ordering them or determine if other alternatives are available.
- **Chemical Exchange Program:** Make used and unused chemicals available for other hazardous material users.

- **Environmental management:** Make every effort to reduce the volume and toxicity of the solid waste stream, increase reuse and recycling efforts, and promote pollution prevention at the university.
- **Periodic inventory evaluation:** Evaluate laboratory reagents for current use and transfer them to a virtual stockroom or disposal.
- **Purchasing control:** Purchase materials only in amounts required for use in planned teaching or research.

Hazardous material security

Security of hazardous material is an integral part of an effective health and safety program and a requirement for certain radioactive materials, biological select agents and [Department of Homeland Security-listed chemicals](#). Hazardous material users should make sure that lab doors are locked when unattended.

[Refer to the CHP select agent toxins section](#) for more information.

Hazardous material minimization

Minimizing hazardous material generated by ASU's hazardous material users provides the university with positive environmental and financial outcomes. This includes saving money in hazardous materials disposal costs, minimizing liability and reducing possible regulatory requirements of the university. Hazardous material minimization involves various strategies to reduce the consumption or toxicity of hazardous materials used by the university.

Source reduction

Source reduction is any practice that reduces the amount of any hazardous substance, pollutant, or contaminant from entering any waste stream or otherwise being released to the environment before recycling, treatment, or disposal. You can accomplish this by substituting with less hazardous materials, purchasing hazardous materials in smaller quantities, targeting chemicals for reduction, and modifying laboratory processes.

Recommended minimization practices and programs

Recommended practices to minimize hazardous material at the university include process modification to eliminate the need for the hazardous material, material substitution to a less hazardous material or the purchase of hazardous material quantities that are below regulatory storage thresholds. ASU recommends that materials purchase should be consumed within the first year. The university also encourages purchasers to consider purchasing materials that can be used by multiple groups who can share the resource.

Reuse or recycling of hazardous material is encouraged when technically feasible. Reuse and recycling occur when the material can be used for a different process, the same process or reclaimed.

Other university programs that aid in reducing or minimizing hazardous material and waste include the Chemical Exchange Program, Green Labs Program, Mercury Thermometer Exchange Program and Time-Sensitive Chemical Program.

Chemical Exchange Program

ASU allows hazardous material users to donate and send unused and unopened chemicals to other chemical users. The program delivers these chemicals to other labs, reducing waste by diverting chemicals from disposal. The Chemical Exchange Program steps are carried out in CEMS. Follow the Chemical Exchange Program steps in CEMS to donate unused or unopened chemicals.

Hazardous material users can do the following:

1. **Donate** used chemicals destined for disposal to other groups that can use the material,
2. **Adopt** chemicals placed into surplus by searching for the available surplus chemicals and requesting the adoption,
3. **Exchange** hazardous material between campuses or buildings with EHS assistance and updating the container location in the CEMS inventory.
4. **Place** chemicals from their inventory for adoption in surplus.

Green Labs Program

ASU assists labs with conserving energy and reducing waste by encouraging education and implementing sustainable lab practices. The program helps support sustainability at ASU by promoting practices that the lab may already be performing and offers Green Lab Certification recognition by the university.

Complete the following steps to obtain a certification:

1. Verify that the lab has a current EHS laboratory registration.
2. Agree as a lab group to pursue a certification.
3. Designate a Green Lab Coordinator.
4. Complete the self-assessment application and determine the lab's goals.
5. [Complete and email the application to Green Labs.](#)

Mercury Thermometer Exchange Program

The Mercury Thermometer Exchange Program has been in place for 20 years, significantly reducing mercury use and waste on campus.

ASU encourages hazardous material users to exchange their mercury-filled thermometer with an alcohol or mineral spirits thermometer. This eliminates accidental breakage and hazardous spills of mercury.

Hazardous material users can request mercury thermometers or equipment pickup by submitting the hazardous waste pickup form in CEMS or [contact EHS](#). The user must note in the form's comment section if they would like an alcohol thermometer for replacement.

Time-Sensitive Chemical Program

ASU encourages safe work practices with time-sensitive chemicals and enforces time-based disposal requirements established by the CHP. This eliminates the reduction of time-sensitive chemicals stored past their expiration and the significant hazards and costs associated with their stabilization and disposal.

Types of time-sensitive chemicals monitored by the program include:

- **Antidotes:** Chemicals that mitigate exposure to toxic chemicals present a hazard after expiration and cannot serve their function.
- **Multi-nitro chemicals:** Chemicals with multiple nitro groups typically stabilize with a solvent but become shock-sensitive explosives when desiccated.
- **Peroxide-forming chemicals:** Chemicals stored in mild conditions that react with oxygen to form dangerous and unstable products, inexplosive, shock-sensitive crystals.

EHS will notify hazardous material users via email of expiring time-sensitive chemicals on the following schedule:

- Three months before the expiration of an antidote. EHS will advise users to obtain a replacement.
- Three months before the maximum shelf life of multi-nitro and peroxide-forming chemicals. EHS will direct users to arrange for disposal by submitting a hazardous waste removal request.

The chemical hygiene officer will send reminder emails after expiration if preventative action is not taken.

Sustainability

Sustainability is a significant component of the university's mission and institutional identity. ASU's comprehensive sustainability approach focuses on operations, academics, research and community engagement. This stems from an ingrained and expanding culture of sustainability and a focus on innovation and solutions to the world's economic, environmental and social challenges.

The HMMP is developed to support and encourage these solutions. It was established with objectives for using, storing and disposing of hazardous material to promote sustainable policies and practices in operations, research, curriculum and engagement. Recommendations for "green" chemical substitution, waste minimization, hazardous material chemical exchange and toxic material reduction guidelines are examples of how sustainability can be incorporated into every research and education practice.

Refer to the [Environmental Health and Safety, University Sustainability Practices](#) and [Zero Waste](#) webpages for more information on sustainability and hazardous material management.

Training

The success of the HMMP rests on the collaboration of the ASU community. The HMMP is intended to be a living document that can be modified as needed and at previously mentioned intervals.

Training is an integral part of safety in the ASU community. EHS provides training for the management of hazardous materials and safe work practices. At a minimum, each hazardous material user should [complete the following trainings, as applicable](#):

- EHS Fire Safety Annual Training.
- EHS Hazardous Waste for Facilities Management.
- Hazardous Waste Management.
- Laboratory Safety Information and Training.
- Seeds of Sustainability Training.

Hazardous material users should [review the CHP](#) and [EHS webpage](#), discuss with their principal investigator and [use the Training Determination Tool](#) to identify the other training required for their scope of work.

References

- [CEMS inventory](#).
- [Chemical Hygiene Plan](#).
- [Decision Tree for Purchasing Table 1 Chemicals](#).
- [Workday](#).

Appendix A

Consumer commodities

A consumer commodity is a hazardous material packaged and distributed in a quantity for an individual to use for personal care or household use as [defined in 16 CFR 503.5](#).

Examples include the following:

- Acetone nail polish remover.
- Aerosol cans such as hairspray.
- Automotive batteries.
- Batteries.
- Chemical bug spray.
- Chemical polishes.
- Chemical waxes.
- Cleaning supplies.
- Cosmetics.
- Drain openers.
- Dry ice.
- Fireworks.
- Hand sanitizer.
- Herbicides.
- Hydrogen peroxide.
- Inks.
- Insecticides.
- Lighters.
- Perfumes.
- Pesticides.
- Safety matches.
- Some beers.
- Some medicines.
- Some paint thinners.
- Some paints.
- Some photographic chemicals.

Appendix B

Guidance for hazardous material substitutions

OSHA and the EPA guide making informed chemical substitutions. [Refer to the EPA Safer Chemical Ingredients List](#) and [OSHA Transitioning to Safer Chemicals toolkit](#) for hazard assessment and substitution information.

[Email EHS](#) or call 480-965-1823 for questions or more information.