



Environmental Health and Safety

Hazard Communication Program

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Table of contents

<u>Introduction and purpose</u>	3
<u>Scope and application</u>	3
<u>Responsibilities</u>	4
<u>Environmental health and safety</u>	4
<u>Deans, directors and chairs</u>	5
<u>Employees</u>	5
<u>Vendors, contractors and visitors</u>	5
<u>Identification of hazardous materials</u>	6
<u>Inventory of hazardous materials</u>	6
<u>Labels and other warnings</u>	8
<u>Safety data sheets</u>	9
<u>Employee information and training</u>	12
<u>Trade secrets</u>	12
<u>Emergency procedures</u>	14
<u>Outside contractors</u>	14
<u>Accident reporting</u>	15
<u>Audits</u>	15
<u>Program evaluation</u>	16
<u>Record keeping</u>	16
<u>Appendix A: Definitions</u>	18
<u>Appendix B: OSHA Standard, 29 CFR § 1910.1200</u>	24
<u>Appendix C: GHS Pictograms and Hazard Classes</u>	25
<u>Appendix D: Job Hazard Analysis Form</u>	27

Introduction and purpose

On March 20, 2012, the Occupational Health and Safety Administration, or OSHA, revised the Hazard Communication Standard, HAZCOM to align the regulation with the provisions of the Globally Harmonized System of Classification and Labeling of Chemicals, or GHS. These changes will impact all users of hazardous chemicals at the University. The Hazard Communication Standard has been in place since 1983 and was designed to ensure manufacturers and importers evaluate the chemicals they produce and that this information concerning the hazards are transmitted to employers and employees through labels and Safety Data Sheets or SDS. The standard also addresses chemical inventories, written plans and training. This program identifies the University's approach to compliance with the GHS update to HAZCOM.

Scope and application

ASU is classified as a non-manufacturing employer where employees use a variety of hazardous chemicals (in smaller quantities compared to industry) during their employment. Therefore, the Hazard Communication Standard ("Employee Right-To-Know") applies to any ASU facility or department that uses hazardous chemicals.

Hazardous chemicals are defined by OSHA as any chemical which poses a physical hazard or a health hazard. This is determined by information in the SDS. At ASU, we address the requirements of these regulations through this written Hazard Communication Program and our Laboratory Safety Program. Any use of Hazardous Chemicals other than in a laboratory registered with EHS is covered by this program. Laboratory uses of Hazardous Chemicals are addressed through [EHS 104 Hazardous Laboratory Chemicals](#). This exemption to this program and other are described below.

The ASU Hazard Communication Program covers all use of hazardous materials on campus except the following:

- Asbestos – or procedures applicable to asbestos management, refer to the ASU [Asbestos Management Program](#).
- Biological Hazards (for procedures applicable to biological hazards, refer to the ASU [Biosafety Program](#)).
- Foods, drugs, or cosmetics intended for personal consumption by employees while in the workplace.
- Hazardous waste. For procedures applicable to hazardous waste, refer to the ASU [Hazardous Waste Management Compliance Guidelines](#).
- Household Consumer Products – OSHA does not require a SDSs be provided to purchasers of household consumer products when the products are used in the workplace in the same manner that a consumer would use them, i.e.; where the duration and frequency of use is not greater than what the typical consumer would experience. Employees who are required to work with hazardous chemicals in a manner which results in a duration and frequency of exposure greater than what a normal consumer would experience have a right to know about the properties of those hazardous chemicals.
- Ionizing and non-ionizing radiation (for procedures applicable to radiation safety please refer to, the [Office of Radiation Safety](#)).
- Laboratory Reagents (for procedures applicable to laboratories, refer to the

ASU Chemical Hygiene Program available at [lab registration](#) | [Business and Finance](#).

- Pesticides.
- Tobacco or tobacco products.
- Wood or wood products.
- Work operations where employees only handle substances in sealed containers that are not opened.

The standard requires ASU to:

- Acquire and distribute Safety Data Sheets, or SDS, for each chemical used.
- Determine employee exposure to hazardous chemicals.
- Develop a written hazard communication Program.
- Ensure hazard identification.
- Establish a file of the chemicals used.
- Establish record keeping procedures.
- Inform employees of identified potential hazards.
- Maintain a container labeling system.
- Provide training and information on safe work practices.

Responsibilities

Environmental Health and Safety

The Department of Environmental Health and Safety, or EHS, is charged with the overall responsibility to develop and implement a Hazard Communication Program for ASU. HAZCOM ensures regulatory compliance and provides employees with the information and training needed to protect them while using hazardous chemicals. EHS is responsible for the following:

- Conducting audits and evaluations of program effectiveness.
- Maintaining master chemical inventories for each campus.
- Maintaining training records.
- Providing technical assistance and training materials to departments.
- Serving as liaison to regulatory agencies.
- Supporting Departmental Safety Committees as requested.

Deans, directors and chairs

The Dean, Director or Chair for each department and/or college or their designees are responsible for the following:

- Department.
- Ensuring participation of affected employees in EHS required training programs.
- Ensuring that prior to the initiation of work, any outside contractor or vendor provides the area department and/or unit with an SDS for each chemical being used during the work project and that a copy of each SDS is available at the location for each chemical being used entire duration the chemical is in use.
- Establishing and implementing department specific information and training programs as recommended by EHS.
- HAZCOM.
- Maintaining required SDS and ensuring availability to employees.
- Notifying all vendors and contractors working in locations under their control of hazardous chemicals that are in the area, making SDS available to them and obtaining written acknowledgment of receipt of this information.
- Providing to EHS an inventory or Master List of hazardous chemicals used within their organizations.
- Utilizing the Sunrise system for all hazardous chemical purchases.

Employees

- Assist supervisor in implementing recommendations for improving safety.
- Attend initial and follow-up hazard communication training as required.
- Ensure proper labeling of hazardous chemicals.
- Know the location and use the information provided in the SDS.
- Report potential hazards, accidents and near-misses to supervisor immediately.

Vendor, contractor and/or visitor

- Complying with all applicable EHS regulations and ASU Policies related to their activities related to their purchase order, contract or any other agreement with ASU.
- Informing each ASU department of any hazardous chemicals they may be using during the performance of their work.
- Notifying their ASU contact of their activities and reviewing any information provided related to Hazardous Chemicals in use at ASU.
- Providing SDS and related hazard information to their ASU contact prior to utilizing any Hazard Chemical associated with their activities at ASU.

Identification of hazardous materials

The responsibility for determining whether a chemical is hazardous lies with the chemical manufacturer or importer of a chemical. End-users and/or supervisors may rely on the evaluation received from these suppliers, in the form of SDSs and warning labels. A chemical inventory shall include a list of chemicals, including compressed gascylinders, used in the workplace covered by HAZCOM and can be prepared by documenting the names of chemicals that have a warning label indicating a potential hazard (e.g., 4 flammable or corrosive). In addition to chemicals in containers, other substances generated in work operations such as welding fumes and some dusts shall also be listed in the inventory.

All identified chemicals must have a corresponding SDS available in a binder or electronically. The binder or electronic file must be identified with the acronym SDS on the spine or file name or folder and be located in an area accessible to all employees at all times, regardless of work shift.

Inventory of hazardous materials

A list of the hazardous chemicals known to be present using a product identifier that is referenced on the appropriate safety data sheet will be maintained by each individual work area – such as a shop or lab. Departments that employ individuals who may be exposed to hazardous chemicals in the course of their job duties shall prepare a chemical inventory. The designated department shall maintain a current chemical inventory. A copy of the prepared chemical inventory shall be forwarded to Environmental Health and Safety at and updated at least annually. Environmental Health and Safety shall compile and maintain the Master Chemical Inventory for ASU. An example hazardous chemical inventory form can be found [here](#).

Chemical inventories shall be placed with a copy of the written Hazard Communication Program and stored in the Safety Data Sheet binder(s). This information shall be accessible to all employees at all times. A copy of the chemical inventory is to be forwarded to EHS and updated at least annually.

The following list identifies, but is not limited to, some types of potentially hazardous chemical that may be present in the workplace:

- Acids.
- Adhesives.
- Aerosols.
- Battery Fluids.
- Bleach.
- Catalysts.
- Caustics.
- Cleaning Agents.
- Coatings.

- Compresses Gases.
- Degreasing Agents.
- Dusts.
- Etching Agents.
- Flammables.
- Foaming Resins.
- Fungicides.
- Gasoline.
- Glues.
- Greases.
- Herbicides.
- Industrial Oils.
- Inks.
- Insecticides.
- Janitorial Supplies.
- Kerosene.
- Lacquers.
- Lye.
- Paints.
- Pesticides.
- Plastics.
- Process Chemicals.
- Resins.
- Sealers.
- Shellacs.
- Solders.
- Solvents.
- Surfactants.
- Thinners.
- Varnishes.
- Water Treatment Chemicals 5.

Department labels and other warnings

Department supervisors are responsible for identifying hazardous chemicals in the workplace and effectively communicating information available from the manufacturers SDS and labels or other cautionary warnings to employees.

All hazardous chemical containers in the work place must clearly identify, in English, the hazardous contents of the container. The supervisor has the responsibility to ensure that all employees under their supervision are aware of the requirements to have all hazardous chemical container labels affixed, legible and to contain the appropriate information and to enforce this requirement.

Chemical manufacturers are required to provide a label that includes the chemical name, a harmonized signal word indicating the relative degree of severity of a hazard (such as “danger” and “warning”), pictogram and hazard statement for each hazard class and category. Precautionary statements must also be used. See Appendix C. The manufacturer name, address and phone number must be included and all this must be in a consistent format.

All secondary containers shall use either the NFPA or the GHS label or manufacturers label of the appropriate size for the container. Supervisors will ensure that appropriate labels are available. If a manufacturer’s label is unavailable, the appropriate information should be copied from the SDS to the blank NFPA label available [here](#). If it is not practical to label a container, the proper chemical hazard information may be placed on a sign near the container, which is clearly visible to employees.

Containers of hazardous chemicals at ASU must be received with a label that provides the appropriate identification and the hazards associated with the chemical. The label is to be supplied by the manufacturer, importer or distributor of the chemical. If the container arrives without a label, an HMIS label will be affixed to the container as outlined:

- Appropriate hazard warning – designated by the chemical manufacturer or distributor.
- Identity of chemicals – chemical or common name on the Safety Data Sheet.
- Name and address of the chemical manufacturer or distributor.

Labels will not be removed unless the container is immediately re-labeled or the chemical in the container is emptied, cleaned and/or a new type of chemical is placed in the container, and the chemical container is re-labeled with the identity of the new chemical.

It should be noted that while the NFPA 704 Labeling system and the GHS labeling system are not the same. Laboratories registered with EHS is posted with an NFPA 704 label, referred to as an NFPA Diamond, as are chemical storage containers and chemical storage areas as required by local fire codes. When transferring information from the SDS make certain which rating is being provide, because many manufacturers may use the NFPA rating or both ratings.

Safety data sheets

Chemical manufacturers and distributors are required by OSHA to provide Safety Data Sheets, or SDS, to consumers. A SDS is provided to ensure the end-user of chemical products is informed of the hazards associated with the use of the chemical and what safety precautions should be utilized. The same SDS may be used for several chemicals if they have similar hazards and contents. Updated or new SDSs will be distributed immediately upon receipt.

Each department must maintain a complete and accurate SDS for each chemical used in the workplace upon purchase of a chemical. When new and significant information becomes available concerning the hazards of a chemical or improved method of protection for employees, the chemical manufacturers, importers, or distributors must provide a SDS with the updated information with the next shipment or within three months to the end-users. If the manufacturer, importer or distributor fails to send a SDS with a shipment labeled as a hazardous chemical, the department must obtain one from the chemical manufacturer, importer or distributor as soon as possible. Similarly, if the SDS is incomplete or unclear, the department should contact the manufacturer, importer or distributor to get clarification or obtain the missing information – see page 10 for sample letters requesting a SDS, or additional information for a SDS. No chemical shall be used by any ASU employee unless a current SDS is available.

SDSs will usually be made up of at least 16 (16) sections if they comply with the **Globally Harmonized System of Classification and Labeling of Chemicals** or **GHS** which is an internationally agreed upon system set to replace the various different classification and labeling standards used in different countries. The GHS will use consistent criteria for classification and labeling on a global level or the voluntary American National Standards Institute (ANSI) standard Z400.1, with each section describing a specific detail about the product. There may be up to 6 additional sections if information about a product for these sections is available. Note: currently there is no mandated standard format for an SDS; the format may vary depending on the manufacturer, importer, or distributor:

- Accidental release measures.
- Chemical product and company identification.
- Composition and/or information on hazardous ingredients.
- Exposure controls and personal protection.
- Fire-fighting measures.
- First aid measures.
- Handling and storage.
- Hazards identification, including emergency overview.
- Physical and chemical properties.
- Stability and reactivity.

Additional sections may include information on toxicological, ecological, transport, disposal and regulatory information as well as any other information not covered in the above-mentioned sections.

A SDS binder will be located in designated work areas. It is recommended that a brightly colored (red) binder with the acronym SDS on the spine be used. All employees shall be informed of the location of the binder. In addition, the binder will be readily available to all employees at all times regardless of their work shift. The Department will forward new or updated SDSs to the area Supervisor. The Coordinator will request additional information if the SDS is unclear. The supervisor will maintain the SDS in alphabetical order. If the SDS replaces an older edition, the replacement will be kept in the back of the binder or forward it to the Department Supervisor to file in an archive SDS binder.

Copies of the SDS will be made available for any designated representative of the employee, or OSHA officer upon their request. The department and/or supervisor will be notified if a non-employee requests a copy of the SDS.

Maintenance of safety data sheets

Each department will maintain a department SDS master chemical file. Upon receipt of a new SDS, the Department will update the master file. The Department will assist in performing an annual SDS audit to ensure SDSs for all chemicals listed in the chemical inventory are available in the workplace.

Supervisors will maintain the SDS file and ensure the SDS file is available for all employees to review at any time, all new SDS received are filed, and that employees are aware of any new chemical introduced to the workplace. Supervisors will notify the Department if a listed chemical is no longer used or stored and will archive the SDS from the file and update the chemical inventory.

Resources for obtaining SDSs

SDSs can be obtained by contacting the vendor selling the product or the product manufacturer. An example of a letter that can be sent to a manufacturer to request an SDS follows. Most SDS can be found by a simple web search such as Google. If you have difficulty locating an SDS please contact EHS through [email](#) or 480-965-6219.

Sample letter requesting a SDS

Blitz Manufacturing Company 1923 Oak Grove Lane Springfield, Massachusetts 02110 Dear

Sir or Madam:

The Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200) requires employers be provided Safety Data Sheets (SDS) for all hazardous substances used in their facility, and to make these SDS available to employees potentially exposed to these hazardous substances.

Therefore, we request a copy of the SDS for your chemical product listed as (give product and/or chemical name here). We did not receive an SDS with the initial shipment of (Blitz Solvent 90) we received on (date). We also request any additional information, supplemental SDS, or any other relevant data your company or supplier has concerning the safety and health aspects of this chemical product.

Please consider this letter a standing request to your company for any information concerning the safety and health aspects of using the chemical product that may be learned in the future. Delays in receiving the SDS information will prevent use of your chemical product in our department. Please send the requested information to John Smith, Department, XYZ Department, Arizona State University, Tempe, Arizona 85287. Please be advised, if we do not receive the SDS for the above chemical by (date), we may have to notify OSHA of our inability to obtain this information. Your cooperation will be appreciated. Thank you for your timely response to this request.

Sincerely,

John Smith Department

If an SDS does not contain the information required a follow up letter should be sent to the chemical manufacturer. An example of a follow up letter follows.

Sample letter requesting additional SDS information

ACE Chemical Company, Incorporated 214 Capitol Drive Richmond, Virginia 23230Dear

Mr. Winston:

In an effort to comply with the Occupational Safety and Health Administration's Hazard Communication Standard, my department is seeking additional information on a chemical product manufactured by your company. The SDS forwarded to our department appears to be deficient in the following areas:

1. Clear-VU 210 - no health effects listed
2. Clean-up 34 (Solvent) - no physical hazard listed

In order to provide adequate training for our employees and comply with the Standard, we must have completed SDS, particularly with reference to the above-identified items. Please send the information to John Smith, Department, XYZ Department, Arizona State University, Tempe, Arizona 85287.

Thank you for your assistance in this matter.

Sincerely,

John Smith Department 10

Employee information and training

Departments shall have a written training and information program for all affected employees or ensure participation of affected employees in required EHS training programs. Employee training shall be provided when employees are initially hired and when a new chemical hazard is introduced into the workplace. The workplace supervisor will ensure that employees are trained in the specific topics covered in the HAZCOM and provide further training relative to the specific hazardous chemicals employees will use in the performance of their duties. EHS provides **training sessions** at regular intervals. For more information please see [here](#). Additionally, EHS provides specific training for individual departments or principal investigators upon request.

At a minimum, employees shall be informed of:

- Details of ASU's HAZCOM, including an explanation of the labeling system and the SDS and how employees can obtain and use the appropriate hazard information.
- How to adequately protect themselves to minimize their exposure.
- Location and availability of the written HAZCOM.
- Location of the chemical inventory and SDS binder in the workplace.
- Methods and observations that may be used to detect the presence or release of a hazardous chemical in the workplace.
- Requirements of OSHA's Hazard Communication Standard and GHS update.
- The physical and health hazards of chemicals used in their workplace.

Non-routine tasks

The methods used to inform employees of the hazards of non-routine tasks – such as the cleaning of reactor vessels, or one time equipment maintenance tasks – include the Confined Space Entry Program, Prior Approval under the ASU Chemical Hygiene Plan and Appendix D of this program “Job Hazard Analysis Form”.

Unlabeled pipes

Unlabeled pipes in any work area must be identified on engineering drawings and the hazards associated with chemicals contained in unlabeled pipes in their work areas will be identified through SDS available in that work area.

Trade secrets

A trade secret allows a manufacturer to maintain their market advantage over competitors by designating certain chemical formulations as being proprietary. For example, a trade secret may be a confidential device, pattern, information or chemical formulation. Chemical industry trade secrets are generally formulas, process data, or a "specific chemical identity." The latter is the type of trade secret information referred to in the Hazard Communication Standard. The term “a trade secret” includes the chemical name, the Chemical Abstracts Services, or CAS Registry Number, or any other specific information that reveals the chemicals precise designation. It does not include common names.

The standard maintains a balance between the need to protect exposed employees and the employer's need to maintain confidentiality of a legitimate trade secret. This is achieved by providing for limited disclosure to health professionals who are providing medical or other occupational health services to exposed employees, employees and their designated representatives, under specified conditions of need and confidentiality.

The chemical manufacturer, importer, or employer must immediately disclose the specific chemical identity of the hazardous chemical to a treating physician or nurse when the information is needed for proper emergency or first-aid treatment. As soon as circumstances permit, the chemical manufacturer, importer, or employer may obtain a written statement of need and a confidentiality agreement.

Under the contingency described here, the treating physician or nurse has the ultimate responsibility for determining that a medical emergency exists. At the time of the emergency, the professional judgment of the physician or nurse regarding the situation must form the basis for triggering the immediate disclosure requirement. Because the chemical manufacturer, importer, or employer can demand a written statement of need and a confidentiality agreement to be completed after the emergency is abated, further disclosure of the trade secret can be effectively controlled.

In non-emergency situations, chemical manufacturers, importers, or employers must disclose the withheld specific chemical identity to health professionals providing medical or other occupational health services to exposed employees, and to employees and their designated representatives, if certain conditions are met.

In this context, "health professionals" include physicians, occupational health nurses, industrial hygienists, toxicologists, or epidemiologist.

The request for information must be in writing and must describe with reasonable detail the medical or occupational health need for the information. The request will be considered if the

information will be used for one or more of the following activities:

- Assess the hazards of the chemicals to which employees will be exposed.
- Conduct or assess sampling of the work place atmosphere to determine employee exposure levels.
- Conduct pre-assignment or periodic medical surveillance of exposed employees.
- Conduct studies to determine the health effects of exposure.
- Design or assess engineering controls or other protective measures for exposed employees.
- Provide medical treatment to exposed employees.
- Select or assess appropriate personal protective equipment for exposed employees.

Health professionals, employees, or their designated representatives must specify why alternative information is insufficient. The request for information must explain in detail why disclosure of the specific chemical identity is essential, and include the procedures to be used to protect the confidentiality of the information. It must not include an agreement not to use the information for any purpose other than the stated need, nor shall the information be release to unauthorized individuals and/or entities under any circumstances.

Emergency Procedures

Each department must develop emergency procedures specific to their operation(s) and all affected employees must be aware of these procedures. This Program should include (but not limited to) actions or contingencies for:

- Evacuations due to fires, chemical spills, and other situations.
- First aid.
- Location of emergency equipment – fire extinguishers, fire alarm pull stations, showers, eyewashes, etc.
- Shut down, lock out during evacuations.

Protocol for handling emergencies is outlined in the [ASU Emergency Response Guide](#).

Faculty, staff, and students who discover or are involved in a hazardous chemical emergency are responsible for taking appropriate action to protect themselves and the university community by notifying the appropriate authorities and following established protocol outlined in the ASU Emergency Response Guide. The Emergency Response Guide must be available in areas that have the potential for chemical emergencies, and be posted in a conspicuous area. The Emergency Response Guide is available on the [EHS website](#) or a copy can be obtained by calling EHS at 480-965-6219.

Hazard communication and outside contractors

Notification Procedure

Each department is responsible for notifying all vendors and contractors working in locations under their control of hazardous chemicals that are in the area, making SDS available to them and obtaining written acknowledgment of receipt of this information. To accomplish this each department should provide the following information to vendors and contractors working in areas

under their control:

- A list of all chemicals located in the work area where the outside contractor or vendor will be performing the work.
- Obtain a written documentation of the contractor's or vendor's acknowledgement that the information was provided or made available prior to the initiation of the contractor's work.
- Provide SDSs upon request to the contractor for all listed chemicals.

Prior to the initiation of work, outside contractors are to provide the area department and/or unit with an SDS for each chemical being used during the work project and shall maintain a copy for each chemical being used at the work site for the entire duration the chemical is in use.

Facilities Programming and Construction will:

- Forward the contractor SDSs to the area supervisor and/or department and Environmental Health and Safety with information regarding which work area(s) will be affected.
- Establish a file for the contractor SDSs and forward a copy to each area supervisor and/or department that may be affected by the project.
- Supervisors and/or department representatives shall review the contractor SDSs with department and/or unit employees.
- Once the contractor completes the project, ensure contractors remove all project related chemicals from the work area; department representative are no longer kept on location.
- Notify the department supervisor and/or department representative that the contractor SDSs from the area file or location have been or may be removed.

All contractors involved in construction, repair or maintenance related services on ASU property or facilities are referred to as "Service Providers" and shall ensure that its employees are properly identified – e.g. officially issued picture ID and/or badge – have been instructed about the boundaries of their work areas. Service providers will comply with all applicable local, state, and federal rules and regulations, including those related to the Occupational Safety and Health Act of 1970.

All service providers please complete [ASU Service Provider Acknowledgement form](#) and return a signed copy to EHS at PO Box 876412 Tempe, AZ 85287-6412 or FAX 480.965.0736. For all service providers, ASU is providing a [general guidelines manual](#) concerning conducting work on ASU Job Sites.

Accident reporting

Employees shall report accidents and injuries to their supervisor immediately. Supervisors shall submit a report to Environmental Health and Safety for any accident, injury or near miss within 72 hours as identified in EHS 115: Incident Reporting and Investigation available [here](#). All employees will be free from any reprisals for reporting accidents. Accident reporting will assist Environmental Health and Safety in providing corrective procedures to avoid a recurrence of the accident.

Audits

Departments, departments, managers and supervisors are responsible for establishing, implementing and maintaining a system of communication to relay health and safety information to employees. Resources available through ASU's EHS department should be used whenever available but other sources may be used if approved through EHS.

Supervisors and safety committees may conduct regular, periodic audits of the workplace to evaluate work practices and identify potential hazards. The frequency of audits should be determined by the level of risk associated with a department's specific operation or process. Audits should be conducted annually or whenever there is a change in the type of hazardous chemicals, processes, procedures, or equipment used which may alter the hazards posed to employees. The department, safety committee and supervisors should evaluate the effectiveness of the HAZCOM program for their specific work area. For more information or to gain assistance with conducting this type of audit, please contact EHS at [email](#).

Environmental Health and Safety will conduct periodic inspections, as necessary, determining individual department compliance with HAZCOM. Inspections may be performed in conjunction with the department's periodic audit by the department representative and/or safety committee members or compliance officers. Inspection reports will document opportunities for improvement and be directed to the Department Dean, Director, Chair or designee.

Corrective action is to be completed in a reasonable amount of time and documented. Improvement opportunities related to training, labeling or maintenance of SDS should be completed within 30 days of the finding.

Audit reports shall include the date the audit was conducted and the name of the employee(s) conducting the audit.

Program evaluation

Periodic program evaluations will be conducted by EHS. Program evaluations will assess the effectiveness of the systems in place to implement the requirements of this program.

Record keeping

Documentation and records associated with this program shall be maintained as required by the Hazard Communication Standard, 29 CFR § 1910.1200. Environmental Health and Safety, individual departments, supervisors, and other department representatives shall maintain records as indicated below.

- Departments who present their own training under this program shall forward copies of training records to EHS for long term maintenance.
- Each department shall maintain SDS including archives of hazardous chemicals no longer in use.

- Each department shall maintain the most recent Chemical Inventories associated with their operations
- EHS shall maintain copies of employee training records for any training program presented by EHS.

Records shall be made available to employees and/or their representatives upon request.

Appendix A

Definitions

ACGIH: American Conference of Governmental Industrial Hygienists; an organization of professional personnel in governmental agencies or educational institutions engaged in occupational safety and health programs. ACGIH develops and publishes recommended occupational exposure limits – see "TLV" – for hundreds of chemical substances and physical agents.

Acute: Severe, often dangerous conditions in which relatively rapid changes occur.

Acute Exposure: A single, brief exposure to toxic substances. Effects (i.e., adverse effects on the human body) if any are evident soon after the exposure, could come quickly to a crisis.

Alloys: A mixture of metal, such as brass, in some cases a metal and a non-metal.

Ambient Temperature: Temperature of the immediate surroundings.

Appearance/Odor: The color, physical state at room temperature, size of particles, characteristics of the material. Odor is described in comparison to common familiar "smells." Threshold refers to the concentration required in the air before vapors are detected or recognized.

Asphyxiant: A chemical, gas or vapor. that can cause death or unconsciousness by suffocation. Simple asphyxiants such as nitrogen, either use up or displace oxygen in the air. They become especially dangerous in confined or enclosed spaces. Chemical asphyxiant, such as carbon monoxide and hydrogen sulfide, interfere with the body's ability to absorb or transport oxygen to the tissues.

Aspiration Hazard: The danger of drawing a fluid into the lungs and causing an inflammatory response to occur.

Autoignition Temperature: Lowest temperature at which a flammable gas or vapor-air mixture will ignite from its own heat source or other contacted heat source.

Boiling Point: Temperature at which vapor pressure of a liquid equals atmospheric pressure.

C.A.S. Number: The number assigned to chemicals or products by the Chemical Abstracts Service.

Carcinogen: A substance or agent capable of causing or producing cancer.

Catalyst: A substance which changes the speed of a chemical reaction but undergoes no permanent change itself. An example of a catalyst is the platinum used in automotive catalytic converters on the exhaust system.

Chronic Effect: An adverse effect on a human or animal. Symptoms develop slowly over a long period of time or recur frequently.

Combustible: A substance capable of fueling a fire. Also a term used to classify certain liquids on the basis of their flashpoints. Also see "flammable".

Compressed Gas: A gas under pressure which is greater than that of the atmosphere. An example is the air in automobile tires.

Corrosive Material: As defined by the Department of Transportation (DOT), a corrosive material is a liquid or solid that causes visible destruction or irreversible alterations in human skin tissue at the site of contact; or in the cases of leakage from its packaging, a liquid that has a severe corrosion rate on steel.

Cutaneous: Pertaining to or affecting the skin.

Decomposition: Breakdown of a material or substance (by heat, chemical reaction, electrolysis, decay or other processes) into simpler substances.

Dermal: Pertaining to or affecting the skin.

Dyspnea: Shortness of breath, difficult or labored breathing.

Erythema: A reddening of the skin. 16

Evaporation Rate: The ratio of time required to evaporate the same volume of a reference liquid (ether). The higher the ratio, the slower the evaporation rate.

Explosive: A chemical that causes a sudden release of pressure, gas and heat when subjected to shock, pressure, or high temperature.

Exposure Limit: Limit set to minimize occupational exposure to a hazardous substance. Recommended occupational exposure limits used are American Council of Governmental Industrial Hygienists' Threshold Limit Values, or TLV, and Occupational Safety and Health Administration Permissible Exposure Limits, PEL.

Extinguishing Agents (Methods): Agent(s) suitable for controlling or putting out a fire, when properly applied.

Flammable: A material which is easily ignited and burns with extreme rapidity.

Flammable Limits: The range of a vapor or gas concentration in air that will burn or explode if an ignition source is present.

Flash Point: The minimum temperature at which a liquid gives off sufficient vapor to form, with air, an ignitable mixture.

General Exhaust: Removal of contaminated air from a large area by an air circulation or exchange system.

Generic Substance: A substance identified by its general chemical name and/or formula.

Hazard Communication Program (HAZCOM): The written program employers must develop and use which specifies employee training for routine and emergency use of all potentially hazardous chemicals in the work place, details pertaining to chemical labels, storage and Safety Data Sheets and a complete list of all hazardous chemicals in the work place.

Hazardous chemical: Any chemical which poses a physical hazard or a health hazard. This is determined by information in the SDS.

Health Hazard: Any chemical for which there is at least one scientific study that shows it may cause acute or chronic health symptoms. This includes chemicals which are carcinogens, toxic or highly toxic, irritants, corrosives, sensitizers, or chemicals that effect target organs including the lungs, kidneys, nervous system, pulmonary system, reproductive system, skin and eyes.

Highly Toxic:

- A chemical is highly toxic to breathe if it has a (LC50) rating of less than 200 PPM for gas or vapor and a 2 mg/L for dust, fume, or mist when exposed for an hour or less.
- A chemical is highly toxic to ingest if it has a median lethal dose (LD50) of less than 50 mg/kg. This means that 50 percent of the test animals (rats) died when given an oral dosage of 50 milligrams for each kilogram of body weight.
- A chemical is highly toxic to touch if it has an (LD50) rating of less than 200mg/kg, meaning that 50 percent of the lab animals (rabbits) die after having continuous skin contact at that dosage for 24 hours or less.
- A chemical which has been found through testing of laboratory animals to cause death when exposed at certain levels.

Ignition source: Anything that provides heat, sparks, or flame sufficient to cause combustion/explosion.

Incompatible: Materials which could cause dangerous reactions from direct contact with one another are described as incompatible.

Ingestion: The drawing of a substance into the body (lungs) through the nose, mouth, and breathing passages, in the form of a gas, vapor, fume, mist, or dust. 17

Irritant: A substance which will cause an inflammatory response or reaction of the eye, skin, or respiratory system, following single or multiple exposures.

LC50: Lethal Concentration 50; a single dose of material which on the basis of laboratory tests is expected to kill 50% of a group of test animals when administered by mouth (oral) or applied to the skin (dermal or cutaneous).

LD50: Lethal Dose 50; a single dose of material which on the basis of laboratory tests is expected to kill 50% of a group of test animals. The material may be administered by mouth (oral) or applied to the skin (dermal or cutaneous).

Lower Explosive Limit or LEL: The lowest concentration of a gas or vapor in the air that can produce ignition or explosion.

Local Exhaust: A system for capturing and exhausting contaminants from the air at the point where the contaminants (gases, particulates) are released. Not to be confused with "general exhaust".

Safety Data Sheet or SDS: Written or printed material about a chemical that specifies its hazards, safe use and other information. It is prepared by the chemical manufacturer, and is required by federal law.

Mechanical Exhaust: A powered device, such as a motor-driven fan or air/street venturi tube, for exhausting contaminants from a work place, vessel, or enclosure.

Narcosis: Stupor or unconsciousness caused by exposure to a chemical.

Neutralize: To render chemically neutral or harmless; neither acid nor base; to counteract the activity or effect of; the addition of a base (sodium hydroxide) to an acid (hydrochloric acid) results in water and a salt (sodium chloride), thus the acid has been "neutralized" or rendered harmless.

Odor Threshold: The minimum concentration of an airborne, toxic substance whose odor is detectable to the average individual. Depending on whether it is above or below substances TLV, it may be indicative of whether additional ventilation is required.

Oral: Of, through, pertaining to, or affecting the mouth.

OSHA: Occupational Safety and Health Administration of the U.S. Department of Labor; a federal agency with safety and health enforcement authority for most of U.S. industry and business.

Oxidizer: Department of Transportation defines oxidizer or oxidizing material as a substance that yields oxygen readily to stimulate the combustion (oxidation) of organic matter. Chlorate (ClO₃), permanganate (MnO₄) and nitrate (NO₃) compounds are examples of oxidizers.

Permissible Exposure Limit PEL: An exposure limit established by OSHA's regulatory authority. May be a time weighted average (TWA) limit or a maximum concentration exposure limit.

Personal Protective Equipment or PPE: Equipment designed to protect worker health and safety, e.g., chemical resistant gloves, safety glasses or goggles, face shields, etc.

Parts per million or PPM: The unit for measuring the concentration of a gas or vapor in contaminated air. Also used to indicate the concentration of a particular substance in a liquid or solid.

Physical Hazard: A chemical which is proved to be a combustible liquid, compressed gas, explosive, flammable, oxidizer, pyrophoric, unstable (reactive) or water-reactive.

Polymerization: A chemical reaction in which a large number of relatively simple molecules combine to form a large chainlike molecule. A hazardous polymerization is a reaction which takes place at a rate which releases large amounts of energy.

Pyrophoric: A chemical which ignites spontaneously with air at 130 degrees F. or less.

Respiratory Protection: Devices for use in conditions exceeding set exposure levels. When properly selected, maintained and worn by the user, it will protect the users' respiratory system from exposure to airborne contaminants by inhalation.

SCBA: Self-contained breathing apparatus.

Sensitizer: A substance, which on first exposure, causes little or no reaction in man or test animals, but which on subsequent exposure(s) may cause a marked response not necessarily limited to the contact site. Skin sensitization is the most common form of the problem in the industrial setting, although respiratory sensitization to a few chemicals has been known to occur.

Solubility in Water: The percentage of a material (by weight) that will dissolve in water at a specific temperature.

- NEGLIGIBLE LESS THAN 0.1%
- LIGHT 0.1 TO 1.0%
- MODERATE 1 TO 10%
- APPRECIABLE MORE THAN 10%
- COMPLETE SOLUBLE IN ALL PROPORTIONS

Solvent: A substance which dissolves another substance.

Specific Gravity: The ratio of weight of volume of material to the weight of an equal volume of water usually at 60 F., otherwise specified H₂O-1.

Systemic: Spread throughout the body, affecting many or all body systems or organs, not localized in one spot or area.

TLV "Skin": This designation sometimes appears alongside a TLV or PEL. It refers to the possibility of absorption of the particular chemical through the skin and eyes. Thus, the protection of large surface areas of skin should be considered to prevent skin absorption so that the TLV is not invalidated.

Target Organ: The specific organs or body systems that sustain hazardous effects from a toxic chemical are either long or short-term. Target organs could be the liver, kidney, central nervous system or skin.

Toxic: A substance which has a median lethal dose (LD50) of 50 to 500 mg/kg for ingestion, from 200 to 1,000 mg/kg within a 24-hour period for contact and from 200 to 2,000 PPM gas or vapor for inhalation.

Upper Explosive Limit or UEL: The highest concentration of a gas or vapor in air that can produce ignition or explosion.

Unstable (Reactive): A chemical which vigorously undergoes polymerization, decomposition, or condensation via shock, pressure, or temperature.

Vapor Density: The ratio of the density of a substance's vapor to the density of another substance's vapor, usually air. A vapor density of greater than one means that the substance is heavier than air.

Vapor Pressure: The pressure exerted by vapor, in confinement, over its liquid as it accumulates at a constant temperature.

Water Reactive: A chemical which reacts with water is to form flammable gas or produce a health hazard. 19

Appendix B
29 CFR § 1910.1200
Hazard Communication

A complete copy of this standard is available at [osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10099](https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10099). Additionally, copies may be obtained by contacting EHS at (480) 965-1823, [email](#).

Appendix C

GHS Pictograms and Hazard Classes

Hazard statements are standardized and assigned phrases that describe the hazard(s) as determined by hazard classification. An appropriate statement for each GHS hazard should be included on the label for products possessing more than one hazard. The assigned label elements are provided in each hazard chapter of the Purple Book as well as in Annexes 1 and 2. Figure 4-11 illustrates the assignment of standardized GHS label elements for the acute oral toxicity categories.

Figure 4.9

GHS Pictograms and Hazard Classes		
		
<ul style="list-style-type: none"> ▪ Oxidizers 	<ul style="list-style-type: none"> ▪ Emits Flammable Gas. ▪ Flammables. ▪ Organic Peroxides. ▪ Pyrophorics. ▪ Self Reactives. ▪ Self-Heating. 	<ul style="list-style-type: none"> ▪ Explosives. ▪ Organic Peroxides. ▪ Self Reactives.
		
<ul style="list-style-type: none"> ▪ Acute toxicity (severe). 	<ul style="list-style-type: none"> ▪ Corrosives. 	<ul style="list-style-type: none"> ▪ Gases Under Pressure.
		
<ul style="list-style-type: none"> ▪ Aspiration Toxicity. ▪ Carcinogen. ▪ Mutagenicity. ▪ Reproductive Toxicity. ▪ Respiratory Sensitizer. ▪ Target Organ Toxicity. 	<ul style="list-style-type: none"> ▪ Environmental Toxicity. 	<ul style="list-style-type: none"> ▪ Acute toxicity (harmful). ▪ Dermal Sensitizer. ▪ Irritant. ▪ Irritation. ▪ Narcotic Effects. ▪ Respiratory Tract.

Appendix D
Non-Routine Tasks
Safe Work Plan

Job Hazard Analysis Form

Job Title:	Job Location:	Analyst	Date
Task #	Task Description:		
Hazard Type:	Hazard Description:		
Consequence:	Hazard Controls:		
Rational or Comment:			

Contact ASU Environmental Health and Safety
at 480-965-1823 or email asuehs@asu.edu.

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