



ARIZONA STATE UNIVERSITY FIRE PREVENTION & SAFETY PLAN

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Fire Prevention and Safety Plan

Purpose

The Arizona State University Fire Prevention and Safety Plan (Plan) is a document that sets fire safety standards for practices, policies, and procedures to facilitate the university community's ability to conduct safe operations and to ensure regulatory compliance. The purpose of the Plan is to provide minimum standards to safeguard life, health, property, and public welfare by monitoring and controlling the design, construction, quality of materials, occupancy use, location and maintenance of all buildings, and structures within the campus community.

The Plan includes methods designed to protect employees, students, and guests from fire and safety hazards presented by diverse operations conducted at the university and to promote safe practices. The Plan meets the fire prevention and safety requirements outlined in the Arizona Administrative Code (AAC) and Occupational Safety and Health Act (OSHA) which encompass the uniform codes and nationally recognized codes and standards. The Plan is to simplify and address the most common fire and safety compliance issues in the above mentioned codes and standards.

Scope and Application

The objective of the Plan is to provide one comprehensive fire prevention and safety document for the campus community to reference in order to ensure safe practices are implemented in each university operation, as well as construction operations and special events conducted on university property or university-related functions on non-university property. The provisions of the Plan apply to construction, alteration, moving, demolition, repair, maintenance and use of any building or structure. The university is a complex environment and warrants a Plan to provide special and specific guidance for public assembly areas, classrooms, laboratories, restaurants, industrial operations, repair shops, and warehouses. University Services Capital Programs Management Group (CPMG) and Environmental Health & Safety (EH&S) are responsible, along with any architect or engineer, to enforce and comply with all requirements of AAC and OSHA or ensure compliance with the intent of the code. The State Fire Marshal's Office is responsible for enforcing all requirements of the Uniform Fire Code—97 edition (UFC) and the National Fire Protection Association (NFPA).

The Plan applies to all university employees, functions, and affiliations. In addition, the university has the following plans, compliance guidelines, and programs established to protect the university community from health hazards:

- [ASU Hazard Communication](#) "Employee Right-To-Know" Program (applies to all employees)
- [ASU Chemical Hygiene Plan](#) (applies to employees engaged in the laboratory use of hazardous chemicals)
- [ASU Exposure Control Plan](#) for Bloodborne Pathogens (applies to employees determined to have potential exposure to human blood and other potentially infectious materials as mandated by OSHA)
- ASU Compliance Guidelines: [Electrical Safety](#), [Special Events](#), [Decorations and Displays](#), [Hot Work Operations/Cutting and Welding](#), [Facility Safety](#), [Occupancy Limits](#), [Fire Protections Systems](#), [Emergency Evacuations](#), [Compressed Gas Cylinders](#), [Smoking and Open Flames](#), [Exit Systems](#), [Remodels and Construction](#), [Office Safety](#), and [Residential Life](#).

Responsibilities

Environmental Health & Safety (EH&S) - is responsible for promoting regulatory compliance with AAC and OSHA standards for ASU. EH&S will serve as the custodian of all documents required by the Plan, e.g., the latest edition/revision of the Uniform Building Code (UBC), Uniform Mechanical Code (UMC),

UFC, and NFPA. An organizational chart defining the area of EH&S responsibilities along with other EH&S information can be obtained by contacting EH&S at (480) 965-1823 or e-mail at EHS@asu.edu.

University Fire Marshal - The university fire marshal manages the fire inspection program, plans review program, fire safety training program, special events review, fire/accident investigation, general safety, monitoring the fire protection testing and maintenance programs, hazard mitigation program, correspondence/liaison with the regulators—State, Federal, and local, and provides consultations and technical support for the university community.

University Fire/Safety Inspectors - The university fire/safety inspectors are responsible for conducting regularly scheduled fire and safety audits of every university facility, conduct follow-up inspections, certify fire protection equipment, provide fire/safety training, assist in plans review, and conducts investigations.

Deans, Directors, and Chairs - Deans, directors, and chairs are responsible for ensuring that a fire and safety policy and evacuation plan is established for their organization. The fire and safety policy and evacuation plan must be specific to their operation to ensure compliance with the Plan and all applicable codes, as well as ensuring all staff receives adequate fire and safety training.

Managers and Supervisors - Managers and supervisors are responsible for ensuring all ASU and department fire and safety policies and evacuation plans are implemented, and all staff is aware and trained on the policies and evacuation plan. The policies and evacuation plan must be specific to their operation and comply with the Plan and all applicable codes.

Employees - Employees (any university-paid person, including students) are responsible for understanding the hazards involved with their occupation. They must be familiar with all safety precautions, location and use of fire protection and safety equipment, and know the emergency evacuation plan for their area and be able to demonstrate knowledge of evacuation plan.

Inspections

Environmental Health & Safety's Fire/Safety Division conducts regularly scheduled inspections of all facilities on and off-campus, as well as special inspections for construction projects, child-care facilities, health-care facilities, and acceptance tests and inspections. Acceptance tests of fire protection systems are jointly inspected and tested by EH&S and the State Fire Marshal's Office. EH&S has a database program that maintains all fire safety documentation and reports (e.g., fire/safety inspection report, follow-up inspection reports, incident investigations). Every fire inspection, follow-up inspection, fire drill, test, or incident investigation conducted by EH&S will be entered into the database, a report generated, then sent to the appropriate or requested department representative and a hard copy maintained in our building file. Facilities are inspected periodically by scheduling a predetermined number of buildings each month. Each month the buildings are prioritized by the type of occupancy (residential life safety, high occupancy, and high value high rise facilities are of the utmost priority). The occupants are responsible for ensuring that all code and safety issues are addressed appropriately and a response memorandum (providing a status of each line item written on the inspection report) is mailed back to the University Fire Marshal or University Fire/Safety Inspector prior to the follow-up inspection due date.

Although the jurisdiction resides with the State Fire Marshal's Office, Tempe Fire Department will conduct pre-fire planning and familiarization inspections of university facilities. Any safety hazards discovered by the City of Tempe will be directed to Environmental Health & Safety and the State Fire Marshal's Office.

Self-Inspection Program

A self-inspection program is a program designed for the employee to be actively involved in the safety of their area and facility. EH&S encourages all departments to have a fire and safety self-inspection program to ensure the facility is safe and that any safety hazards can be identified and mitigated appropriately. Print out the [fire and safety self-inspection form](#) to review and copy. It is highly recommended to make

copies of this form and start a monthly inspection of your area of responsibility. A copy of the completed inspection form should be mailed to the University Fire Marshal, mail code 5505 or fax to (480) 965-0736.

Unsafe Buildings or Structures

Any building or structure or portion of a building or structure that is structurally unsafe, not provided with adequate egress, constitutes a fire hazard or identified as dangerous to human life is prohibited for use or occupancy and declared a public nuisance. Any building or area of a building that are declared to be a public nuisance must be abated by repair, rehabilitation, or removal in accordance with the procedures set forth in the Uniform Code for the Abatement of Dangerous Buildings.

The definition of what may constitute as unsafe use is when a building or area of a building creates a hazard to safety, health, or public welfare by reason of inadequate maintenance, dilapidation, obsolescence, fire hazard, disaster, damage, or abandonment.

Violations

It is unlawful for any person, department, unit, organization, or corporation to erect, construct, enlarge, alter, repair, move, improve, convert, demolish, equip, use, occupy, or maintain any building or structure or cause or permit a violation of any applicable codes or standards.

Modifications

When there are practical difficulties involved in carrying out the provisions of this document or any other applicable codes or standards—EH&S, CPMG, and the State Fire Marshal's Office may grant modifications for individual cases, as long as the intent and purpose of the code is maintained and stipulations are adhered to. Modifications cannot lessen any fire-protection requirements or structural integrity. Any variation to the code must be documented and maintained in the facility or project file of ASU EH&S, and University Services. Variances to the UFC or UBC must be submitted and approved by the State Fire Marshal's Office prior to construction phase.

Plans Review Process

The university must comply with applicable building and fire codes for temporary and permanent changes of a building, area of a building, or temporary structure. Facilities Management Policy ([CPM 309-01](#)), [Application Building and Remodeling Permits](#) and Inspections, and ([CPM 309-03](#)) Floor Covering Permit Standards and Procedures ensures the appropriate departments review proposed remodel and construction projects and compliance issues and that they are adequately addressed. It is the responsibility of each department or unit to ensure this permit process is accomplished and approved prior to engaging in any remodel or construction project. However, it is important to know all code issues cannot be assured in plans review, thus the reason inspections are performed to help ensure remodels and construction projects are compliant with applicable codes as well as to ensure that the project is accomplished in a safe manner.

Certificate of Occupancy

No building or portion of a building will be used or occupied without being issued a Certificate of Occupancy by UPMG's Building Inspectors (for construction/renovation facilities) or Fire/Safety Inspection Report from the Office of the State Fire Marshal's Office or by EH&S (for any instances other than construction/renovation related).

Changes in use of a building must be approved by EH&S, State Fire Marshal's Office, and Facilities Management.

A temporary Certificate of Occupancy may be granted—provided there are no substantial hazards that will result from occupancy of any building or portion thereof before the same project is completed.

Building and Area Use (Type of Occupancy)

Buildings and areas within buildings are specifically designed to meet the requirements of a certain type of occupancy. Requirements of a code or standard are implemented once an occupancy type has been established. Occupancy types are classified by a group and division (refer to the UBC or UFC for division breakdown).

Each occupancy group has specific construction requirements and life safety system requirements that must be met and maintained. It is important that the occupancy use of an area or building maintains both the construction and life safety criteria and to submit for approval any occupancy changes to EH&S and CPMG to ensure regulatory compliance and to ensure a safe environment is maintained for the university community.

Occupant Load

Occupant loads of a building, an area, or portion of a building are established and enforced to ensure accessibility, building security, and to accommodate safe egress from a building, an area, or portion of a building. An occupant load is determined after establishing the occupancy use and the contents of the building or area of the building.

Most assembly areas on campus have the occupant load posted at the entrance of the area or the occupant load is established by the number of fixed seats in the area. The occupant load is calculated by dividing the usable square footage floor space by an occupant load factor. The occupant load factor is determined by the occupancy use. It is important to ensure that the occupant load is established and enforced for accommodating safe egress of occupants. The UBC Table 10-A provides the minimum egress requirements and occupant load factor; however, the UBC or UFC may have other requirements that are more restrictive.

It is the responsibility of each department, organization, or group to ensure that minimum egress requirements are established and enforced. EH&S assists the university community in establishing occupant load limits to ensure egress of occupants are adequately accommodated.

Guardrails

Guardrails are required for unenclosed floor and roof openings, open and glazed sides of stairways, landings and ramps, balconies or porches which are more than 30 inches above grade or floor below, and roofs used for other than service of the building. Some exceptions include the loading side of loading docks, the auditorium side of a stage, and along vehicle service pits not accessible to the public. Guardrails must not be less than 42 inches in height and have intermediate rails or an ornamental pattern such that a sphere 4 inches in diameter cannot pass through. For employee areas only, guardrails are required with a top and mid rail but the 4 inch rule does not apply. For more specific requirements and exceptions, see UBC Section 509 and occupational safety and health standards.

Exit

The term exit is defined in UBC as a continuous and unobstructed means of egress to a public way and will include intervening aisles, doors, doorways, gates, corridors, exterior exit balconies, ramps, stairways, pressurized enclosures, horizontal exits, exit passageways, exit courts and yards. Basically, the exit includes any occupied area of a building continuing on until the occupant safely exits the building.

Exits must be maintained as a safe system for egress. In addition, exits must be maintained as a safe area for rescue assistance for the physically challenged in above or below grade levels. The most common safety hazard is within the corridor. The fire code restricts the use, storage, or display of any combustible material within a corridor unless it is shielded with a transparent noncombustible material, or fire retardant treated, and does not obstruct the required exit width. Contact EH&S for information concerning State Fire Marshal's Office directives for exceptions.

It is the responsibility of each department, organization, or group to ensure that the "exit" is continuous and unobstructed, as well as ensuring compliance of fire code issues. Authorization of any type of storage or use of any "exit" can be temporarily approved by submitting a request to EH&S or to the State Fire Marshal's Office (level of fire protection, construction type, occupancy type, and occupant loads are some factors that are assessed before any variation or authorization is granted).

The specifics on exit width and height, travel distances to an exit discharge, separation requirements, and aisle requirements are provided in UBC chapter 10, Means of Egress. Determining the exit widths and fire protection requirements depend on the construction type, type of occupancy, occupant load, type of seating, type of fire detection and suppression that exists in the building, and the longevity of the occupancy type.

Seating and Aisle Spacing

There are many variables in determining seating arrangements: the number of seats in a row, the number of rows in a section, spacing requirements between seating, spacing of aisles, and spacing of cross aisles. To ensure compliance of UBC and assist departments and organizations with seating and aisle requirements, EH&S is providing the following guidelines that will comply with most situations for public assembly areas.

1. Chair seating must be a minimum of 33 inches from back to back
2. The most protruding back part of a row must not be any closer than 22 inches from the most protruding front part of the row behind it
3. Minimum aisle space between rows will be between 4-8 feet, depending on the type of event, arrangement of seating, and occupant loads
4. Travel distance to an exit must not exceed 150 feet for non-sprinkled buildings and 200 feet for sprinkled buildings (other conditions could increase the travel distance to a maximum of 300 feet)
5. Dead-end vertical aisles for temporary seating must not exceed 26 rows
6. All loose seating (e.g., folding chairs) must be braced together as one row, in a manner that will keep the row together during an emergency egress
7. Accommodations for Americans with Disabilities Act (ADA) must be adequately addressed. Contact Affirmative Action for compliance information relating to ADA

If you are not able to comply with every item above, contact the University Fire Marshal at (480) 965-1823 or by e-mail at EHS@asu.edu for further information and approval of alternate seating and aisle accommodations.

Fire Alarm Systems and Suppression Systems

All university facilities are required to have, at minimum, a manual fire alarm system and all systems must be wired as a Class "A" system (exception: an approved variance by the State Fire Marshal). Determining the requirements of fire protection systems depends mostly on the occupancy type and type of construction. See the UBC and UFC for specific requirements for fire alarm systems and fire-extinguishing systems, and NFPA for specific installation requirements.

Standpipes

Standpipe systems may be required in facilities to accommodate fire department suppression activities (standpipes can be wet or dry systems). The following are the three classifications of standpipes which include the City of Tempe Fire Department's specification requirements for standpipes:

- Class I standpipe: A system with 2 ½ inch outlets. (Tempe 2 ½ inch standpipes must be 6 threads per inch with an orifice diameter of 3.075 inches)
- Class II standpipe: A system with 1 ½ inch outlets equipped with fire hose connected to a water supply. (Tempe 1 ½ inch standpipes must be 11 threads per inch with an orifice diameter of 2.100 inches)
- Class III standpipe: A system with a 2 ½ inch outlet or 1 ½ and 2 ½ inch outlets directly connected to a water supply and equipped with fire hose on the 1 ½ outlets. (Tempe threads and orifices are mentioned in Class I and II above.) As per variance approval by the State Fire Marshal, fire hose may be removed once obsolete, replacement required, or testing required as long as stipulations in the variance are adhered to (contact EH&S at (480) 965-1823 for details).

Halon Systems, Halon Alternative Systems, Carbon Dioxide Systems, and Dry or Wet Chemical Systems are special suppression systems and they must be maintained in accordance with NFPA Standards. All special systems are required to be tested semiannually by NAFED authorized and trained personnel (most local fire equipment companies are NAFED certified). It is the responsibility of the user group to ensure that all special systems are maintained and tested in accordance with NFPA. The user group must maintain the maintenance and testing documents for a minimum of five years and forward copies to ASU EH&S. (Halon systems are being phased out, they must be replaced with fire sprinkler system protection or alternative fire suppression systems).

Fire Extinguishers

An accessible travel distance to an appropriate fire extinguisher is required for all areas of operation (Maximum travel distance depends on the nature of the occupancy). Hazardous occupancies must have an accessible fire extinguisher within 50 feet. Non-hazardous areas must have an accessible fire extinguisher within 75 feet. (Travel distance cannot include locked doors or changes in elevation.)

The following are five classes of fires that any person should be aware of in order to select the proper fire extinguisher for capability of extinguishment.

- Class A: Wood, Paper, Plastic (Ordinary combustibles)
- Class B: Combustible and Flammable Liquids
- Class C: Energized Electrical Equipment (Usually a Class A or B once electrical equipment is de-energized)
- Class D: Combustible and Flammable Metals
- Class K: Kitchen Hood Suppression Systems and Fire Extinguishers Using K Products

To minimize the confusion of selecting the appropriate fire extinguisher on campus, the university has installed multipurpose dry chemical (ABC rated) fire extinguishers in all areas requiring a fire extinguisher with the exception of the following areas:

- Special hazard areas requiring a Class D fire extinguisher (quantity of hazard dictates the need of a class D fire extinguisher)
- Kitchens with commercial hoods require Class BC rated dry chemical fire extinguishers or Class K (depending on the type of hood system)
- Equipment, Mechanical, and Electrical Rooms require Class BC rated dry chemical fire extinguishers

The university is required by OSHA to offer fire extinguisher training classes to all employees. Training classes are offered through Employee Development on a regular basis but special department classes can be set up by calling the EH&S Instructional Coordinator at (480) 965-0974.

Some department operations on campus are more likely to have a fire or incident occur. For this reason, EH&S recommends that all employees that work within the following areas should attend a fire extinguisher training class which provides hand-on training:

- high risk areas, welding, use of open flames, hazardous chemicals, flammable and combustible liquids and gases, or have an increased probability of fire

Campus Mall Use

Campus malls are designed for pedestrian traffic but must accommodate authorized vehicle traffic. Authorized vehicles are ASU service vehicles, approved vendors, and emergency vehicles. Temporary approval may be granted for special events provided they do not obstruct emergency vehicle access per UFC specifications. All drivers using the malls must park their vehicles in a manner that will maintain a minimum mall access width of 20 feet and a minimum height clearance of 13 feet 6 inches (per UFC). All sides of university buildings must be accessible for emergency response vehicles/personnel within 150 feet or less.

All building exit doors, especially the main entry/exit, must be clear of any vehicles. Whenever possible, service vehicles should park in the service vehicle parking space, the nearest road, or nearest loading zone parking space.

Evacuation Procedures

Each facility on campus must have an emergency evacuation plan and procedures. The evacuation plan and procedures should be developed and implemented with a collaborated effort by the building occupants. Some key items that must be in the evacuation plan are as follows:

- Clearly identify responsibilities of occupants to assist in evacuation procedures (activation of building fire alarm system, call 911, provide any information pertaining to the fire or emergency to the emergency responders)
- General Safety precautions (closing doors, understanding and use of life safety protection equipment—including fire extinguishers)
- Evacuation procedures (emergency notification protocol and evacuation plan)
- Designate safe area to reassemble
- Establish accountability procedures and responsibility
- Address issues related to evacuation of physically challenged
- Responsibilities of advising the on-scene emergency responder of vital information related to the emergency

Other issues to consider when developing an emergency evacuation plan are as follows:

- Type of Construction and Height of Facility
- Type of Fire Protection Systems
- Number of Exits
- Types of Exits and Travel Distance to each Exit
- Occupant Load
- Coordination with all Occupants
- Alternative reassemble areas for accountability

For assistance in developing and implementing an evacuation plan contact the University Fire Marshal at (480) 965-1823 or e-mail at EHS@asu.edu.

General Safety

Safety precautions and prohibitions are necessary to ensure a safe environment for employees, visitors, and for the occupants that live and work in residential facilities. EH&S and the State Fire Marshal's Office prohibit the following items or practices on state property:

- Trees or any other vegetation that is no longer living (i.e., cut Christmas trees, palm fronds—exceptions: flowers as long as maintained fresh per florist's recommendations)
- Candles or Open Burning (must be approved by EH&S or State Fire Marshal's Office)
- Storage of Class I Liquids in basements (for more information see UFC Article 79)
- Use of extension cords (see electric safety section for authorized use and specifications of extension cords)
- Smoking in areas that restrict any open flames or smoking due to hazardous chemicals or materials use, storage, handling, or dispensing
- Obstructing, tampering with, or misusing fire detection and fire suppression systems and their devices
- Storage in corridors and stairways, within 18 inches of fire sprinkler heads or within 24 inches from ceiling on non-fire sprinkled buildings, within 24 inches of smoke or heat detectors, in mechanical rooms, electrical rooms, and exits. (Only temporary authorization can be approved by EH&S or the State Fire Marshal's Office)
- Bicycles in public buildings (exception: when approved by the building supervisor with a copy of the approval sent to EH&S and it does not violate code or cause a safety hazard)
- Vehicles or any gas powered equipment used or stored inside buildings (exception: temporary approval may be granted by EH&S or the State Fire Marshal's Office for special events)
- Battery charging inside buildings (exception: batteries that are completely sealed and do not emit any gases while recharging or when authorized by EH&S and the State Fire Marshal's Office)
- Any modification to a building or area of a building without a [permit](#) issued by Facilities Management or Facilities Planning and Construction (permits must be reviewed by EH&S)
- Storage of any items near any heat sources (i.e., lamps, transformers, heaters, generators, motors, etc.)
- Fireworks or Pyrotechnics without the official approval of EH&S or State Fire Marshal
- Unauthorized use of halogen lamps or other [lamps/bulbs](#) that generate extreme heat

For general safety guidelines for vendors, holiday, or special occasion decorations or displays and special events, see the appropriate areas in this Plan, university policies, and compliance guidelines or request for related information from EH&S by calling (480) 965-1823 or e-mail at EHS@asu.edu.

Electrical Safety

To ensure that electrical work in buildings are installed in accordance with the National Electric Code (NEC) and to protect the university and the university community, only journeyman electricians and licensed/bonded contractors are authorized to perform electrical work on campus buildings and equipment.

Any electrical equipment or outlets that are within 6 feet of a water source or exposed to outside weather conditions must be on a Ground Fault Circuit Interrupter (GFCI) system to prevent shock and comply with NEC.

All electrical equipment and appliances must be tested and approved for use by a nationally recognized testing laboratory, i.e., Underwriters Laboratory (UL), Factory Mutual (FM). It is the user's responsibility to

ensure that all electrical equipment and appliances are approved by a nationally recognized testing laboratory, inspected prior to use for any damage, repaired or discarded if damaged, and that equipment and appliances are used as recommended by the manufacturer.

The university has general safety requirements for use of electrical equipment or devices in university buildings and prohibits the use of any electrical equipment or devices that are not in compliance with the following (review general safety in this Plan and also review the university policies and [compliance guidelines on electrical safety](#)):

- Extension or flexible cord specifications (temporary use only):

-Minimum of 16 gauge with ground

-The cord and both ends (male and female) must be intact with no damage--fraying or exposed wiring

- Only use extension cords or electrical cords in the same room/area (prohibited for use through walls, doorways, ceilings, floors or running under carpets)
- Use of extension cords for permanent wiring (extension cords are for temporary use and must meet the specifications above; limit use to 90 days or less)
- Devices or extension cords that increase outlet capacity (only surge protectors with individual circuit breakers are authorized)

Storage

Storage is a necessity for day-to-day operations; however, improper storage and unauthorized storage creates a fire hazard and may violate fire code. All building occupants must observe and comply with the following in regards to storage:

- Storage must be maintained in an orderly manner
- Loose storage must be kept off floors
- Loose papers, magazines, books, or files must be either put into boxes, stored in filing cabinets, or stacked in an organized manner on shelves
- Excessive amounts of combustible materials, storage, or debris must not be permitted to accumulate in the building
- Storage of any chemicals, flammables, combustibles (liquids, solids, or gases) must be approved and permitted by EH&S (See UFC Tables for more details)
- Storage of any material must not obstruct an exit (see exit definition under Exit section), obstruct any fire protection equipment or devices, or obstruct the view of exit signs
- Ensure appropriate aisle width and head clearance is maintained
- A minimum of 18 inches clearance from the deflector of a fire sprinkler head is maintained and a minimum of 24 inches from the ceiling of non-fire sprinkled buildings
- Storage of Class I Liquids or any other materials that create a toxic or flammable hazard where the material's vapor density is heavier than air is prohibited in basements (see UFC Article 79 for more information)
- Bicycles are prohibited in public buildings or any place that obstructs egress from a building or area of a building (review general safety section of this Plan for exception)
- Storage under stairways is prohibited (exception: building's pre-existing conditions approved by the State Fire Marshal or compliance of applicable codes when constructed)

Combustible materials must be segregated from flammable and oxidizing materials. Any chemical, flammable, or combustible material must be separated and stored (when required) in approved cabinets. (See [safe handling and storage of peroxides](#)).

Flammable and Combustible Liquids

Flammable and combustible liquids require special consideration for storage, handling, and dispensing. Some key issues important for compliance and protection to human health are as follows:

- Spill control, drainage control, and secondary containment. All buildings, rooms, and areas must provide a means to control spillage and to contain or drain spillage and fire-protection water in accordance with UBC and UFC
- All areas storing, handling, or dispensing Class I Liquids must comply with storage requirements set forth in UFC Article 79 and comply with the electrical requirements of the NEC
- All areas must comply with the exempt amounts in the UBC and UFC tables or special conditions of a controlled area (Variances must be approved by EH&S and the State Fire Marshal's Office)
- All Class I liquids must be stored in grade level or above locations (Not permitted in basements or below grade level locations)

All Class I and II liquids require storage within an appropriate cabinet (flammable or combustible). Class III liquids may require storage within an appropriate cabinet (decision is based on the quantity, hazards within the area, type of occupancy, and factors involved with mixed occupancies). Exception: Groups A, B, E, F, I, M, R, and S Occupancies, the combined total quantities of flammable and combustible liquids used for demonstration, treatment and laboratory work not exceeding 10 gallons (37.85 L) may be authorized without cabinets but must be in approved locations.

Occupancy quantity limits of stored flammable or combustible liquids must not exceed the following:

- Quantities in Group A, B, E, F, I, M, and S Occupancies must not exceed amounts necessary for demonstration, treatment, laboratory work, maintenance purposes, and operation of equipment and must not exceed quantities set forth in UFC Table 7902.2-A.
- Quantities in Group R Occupancies must not exceed amounts necessary for maintenance purposes and operation of equipment and must not exceed quantities set forth in UFC Table 7902.5-A.

Bonding and Grounding

Static protection is necessary in order to prevent a fire or explosion from occurring. Bonding and grounding is a necessary precaution and required when dispensing any Class I, II, and III-A Liquids. The basic concept is ensuring that two or more items where a transfer of a liquid will occur must be connected to the ground and to each other. More specific requirements are in UFC Article 79 or contact the University Fire Marshal at (480) 965-1823.

Special Events

Special events are defined as any event that is not of normal occurrence and involves the public. All special events on university property or involving university personnel must have an ASU event coordinator submit a request to EH&S to review, approve, and provide recommendations to address any code issues, safety issues, and insurance issues.

In every submitted request, EH&S requires the following information at least 30 calendar days prior to the event (see [permit request form](#)):

- A copy of the certificate of insurance identifying ASU, Arizona Board of Regents, and the State of Arizona as additionally insured (minimum coverage is determined by the Environmental Health & Safety Insurance Coordinator and any contracts that may be involved with the event)

- Type and purpose of the event
- Dates and times of the event
- Location of the event
- Number of people expected
- Type and size of any temporary structures (structures will require a certificate of fireproofing, see UFC Table 3205-A and Table 3211-A for more details)
- Number of vehicles expected (a permit may be required to park vehicles on campus. Contact ASU Parking and Transit Services for more information)
- Name, title, and contact telephone numbers of the event coordinator/s (home, work, cellular telephone numbers and pager numbers)
- Special equipment to be used (i.e., cooking and lighting equipment, powered or motorized equipment, etc.)
- Special hazards (i.e., open flames, flammable and combustible liquids and gases, fireworks, pyrotechnics, etc.) For minimum mortar separation distances see UFC Table 7802.3-A)
- A layout plan of the event

All requests will be reviewed for safety and fire code compliance and the event coordinator will be contacted with an approval, rejection, or special condition approval with stipulations to meet the intent of applicable codes.

Permits

[Permits](#) are required by Environmental Health & Safety for the following:

- Special Events
- Fireworks or Pyrotechnics
- Open flames or open burning
- Storage of chemicals over the UBC/UFC exempt amounts or if considered a controlled area
- Any condition, operation, or use of materials considered being hazardous, dangerous, or unsafe
- Hot Work Operations in confined spaces requires a [confined space permit](#). Hot work must comply with [RSK102](#) and [Hot Work Compliance Guidelines](#).
- Laboratories, research, and other similar buildings or areas within buildings, must have permits to operate, store, and use hazardous chemicals—this is permitted through a Environmental Health & Safety certification program called Laboratory Management Information System

Safe Handling and Storage of Peroxides and Peroxide Forming Chemicals

Background

Peroxides are compounds containing O-O bonds with an oxidation state of -1 . Hydrogen peroxide (H_2O_2) and its organic peroxide derivatives are intrinsically unstable substances that spontaneously decompose under normal conditions. Special precautions must be taken when using peroxides due to their explosive nature and sensitivity to shock, friction, sparks, and heat.

Alkali (group IA) and alkaline (group IIA) metals combine with oxygen to produce metallic peroxides. They are primarily oxidizer hazards; however, metallic peroxides are also water reactive compounds. Metallic peroxides decompose when heated to form oxygen, which supports combustion.

Hazard Awareness and Recognition

Common compounds known to form peroxides include, but are not limited to the following:

- Ethers, especially cyclic ether and those containing primary and secondary alkyl groups, including dioxane, tetrahydrofuran, diisopropyl ether
- Aldehydes
- Compounds containing benzylic hydrogen atoms, particularly if the hydrogen is on a tertiary carbon such as isopropylbenzene
- Compounds containing allylic hydrogens, including most alkenes, cyclohexene, cyclooctane
- Vinyl and vinylidene compounds, such as vinyl acetate
- Alkali and alkaline metals

Storage

Organo-peroxides should be isolated from all other compounds, especially flammables and combustibles. Ideally, they should be stored away from heat, ignition sources, and light in a temperature-regulated, ventilated cabinet. Due to their unstable nature, peroxides should never be stored in bulk unless extremely diluted. Polyethylene bottles are recommended for storing peroxides and superoxides, and should be capped to release oxygen gas. Metallic peroxides should always be protected from moisture.

Peroxides and peroxide forming compounds have a limited shelf life and should be purchased in small quantities. Each container should be labeled with the date of receipt and the date first opened; however, containers of ether should never be stored for more than twelve months, even if the bottle has never been opened.

Handling

Containers of peroxide forming compounds should be handled with care or not handled at all if any of the following pertain: it is of uncertain age, has formed a precipitate, or its physical properties (color, appearance) differ from those of the pure substance.

Some of the most commonly available organic-peroxides are toxic by inhalation, ingestion, and skin absorption, and almost all are eye irritants. Always consult the accompanying material safety data sheet (MSDS) prior to handling any chemical.

Testing and Stabilizing

Once a sealed container of a peroxide forming compound is opened, the risk of peroxide formation is inevitable; however, some manufacturers add oxidation inhibitors, such as hydroquinone, to some peroxide forming chemicals. To prevent the decomposition of most forms of hydrogen peroxides, regardless of their concentration, a small amount of sodium pyrophosphate can be used as a stabilizer. This will only slow down the rate of decomposition but will not prevent it.

Several testing methods for the presence of peroxides are acceptable. For guidance, please contact EH&S at (480) 965-1823. Test strips for the detection of peroxides are also commercially available.

Disposal

Please contact the EH&S Hazardous Waste Unit for the disposal of all chemicals at (480) 965-0647.

Lamps and Light Bulb Hazards

The United States Consumer Product Safety Commission has solicited an advisory concerning fires related to lamps, specifically halogen lamps.

The NFPA provided EH&S with information on fires related to lamps and light bulbs. According to the report, the United States averages about 2,900 fires, 21 deaths, 140 injuries, and \$33.6 million in direct property damage per year from lamps and light bulb related fires.

The leading cause of these fires was combustible material located too close to the heat source, which accounted for roughly one-third of the lamp and light bulb fires. The number of lamp and light bulb fires and associated deaths has decreased since the previous report. However, the number of injuries and direct property damage has increased by 9% and 49%, respectively.

The following safety tips are recommended practices for the university community to ensure a safer community and help preserve life and property:

- Keep combustible materials away from lamps and light bulbs, such as piling linens too near a bulb. (Nothing should be stacked, rested against, or placed on top of a lamp)
- Wall lamps should not be set too near curtains, furniture, or any other material including other walls
- Make sure the lamp cord is protected by an insulated bushing or grommet where the power cord enters the lamp to prevent abrasion
- Do not place cloth over a light bulb to diffuse or soften the light. (Buying low wattage or soft white or pastel light bulbs can help you achieve this effect without creating a fire hazard)
- Read and follow the recommended use and safety precautions recommended by the manufacturer
- Use only light bulbs equal to or less than that for which the light fixture is rated. (Using a higher rated bulb can cause overheating and deterioration of the conductor insulation as well as an ignition source to nearby combustibles. EH&S recommends using 60 watt or less light bulbs but not to exceed the appliance capacity)
- Check for loose connections
- Any damage, loose wiring, or any other potential safety hazard must be repaired by a qualified person or the appliance discarded
- Purchase lamps that have been listed by a recognized testing laboratory such as Underwriters Laboratory (UL)
- Due to the higher heat emitting concerns of halogen lamps, EH&S recommends if utilizing halogen lamps to have covered bulbs, or replace halogen lamps with 60 watt incandescent lamps. (Exception: exterior security lighting or in open foyers of buildings where exposure to combustible material is not present)

Remember: Lamps and light bulbs themselves do not cause fires but improper use or unsafe practices do!

If you have any questions or need more information, please contact EH&S at (480) 965-1823 or e-mail at EHS@asu.edu.