

Theatrical Fog, Haze and/or Smoke ProtocolDate of
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EMUDPS-EHS-P043

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I. PURPOSE

This protocol is designed to provide for the safe use of theatrical fog, haze and/or smoke at campus events, including but not limited to Athletic events, concerts and theatrical productions. This protocol ensures safety is the highest priority and is intended to mitigate the risks associated with theatrical fog, haze and/or smoke while reinforcing the safety of event participants and protection of property.

II. SCOPE

This protocol applies to any event, performance, program or other activity including the use of theatrical fog, haze and/or smoke where the sponsor or co-sponsor is either an EMU college, department, office, organization, school or other University unit or is a third party who is hosting or conducting an event that includes theatrical fog, haze and/or smoke on University-owned or leased property. There are no exceptions or exemptions from this protocol.

III. DEFINITIONS

Operator - The person with overall responsibility for the operation and safety of a theatrical fog, haze and/or smoke display. The operator is also responsible for setting up and removing theatrical fog, haze and/or smoke materials and/or devices after a performance.

Safety Data Sheets (SDS) - Detailed information documents prepared by the manufacturer or importer of a chemical that describes the physical and chemical properties, physical and health hazards, routes of exposure, precautions for safe handling and use, emergency and first-aid procedures and control measures. SDS were formerly named Material Safety Data Sheets (MSDS).

Sponsor The organization (person, group, or government agency) that arranges with a theatrical fog, haze and/or smoke supplier for its services in presenting a theatrical fog, haze and/or smoke display or in providing the theatrical fog, haze and/or smoke for use in an event.

Theatrical Fog – A suspension that falls, being heavier than air. This includes smoke that has been chilled.

Theatrical Haze - Effects creating an unobtrusive, homogeneous cloud intended primarily to reveal lighting beams, such as "light fingers" in a rock concert.

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Theatrical Smoke – A suspension that rises, expanding indefinitely.

IV. RESPONSIBILITIES

A. Sponsor and/or Co-sponsor

1. At least 45 days prior to the event, the contract between the sponsor and the fog, haze and/or smoke company shall be submitted to EMU Legal for review, including review of the indemnification language.
2. Ensure the completion and submission to EHS of the EMU Application for Use of Theatrical Fog, Haze and/or Smoke at least 30 working days in advance of the event using fog, haze and/or smoke.
3. Prior to the event, coordination of an on-site visit by DPS, EHS, REM, EMU AHJ (Physical Plant) and the Fog, Haze and/or Smoke Operator.
4. For indoor events, coordination of the deactivation and reactivation of the smoke detection system with the EMU Electric Shop.
5. Notification of the Ypsilanti Fire Marshal of the smoke detection deactivation and reactivation.
6. Coordination, training and implementation of fire watch requirements for events requiring the smoke detection system to be deactivated.

B. Fogging Vendor

1. Assist the sponsor/co-sponsor in completing the EMU Application for Use of Theatrical Fog, Haze and/or Smoke by providing specific information regarding the display and use plan including detailed product descriptions
2. Provide the operator for the event.
3. Ensure all operators and assistants have the required training and are experienced.
4. Ensure the area surrounding the foggers is clean after the event and is acceptable to the EMU sponsor or other EMU representatives.

C. Department of Public Safety, Environmental Health and Safety and Risk and Emergency Management

1. Ensure the Fog, Haze and/or Smoke Vendor has the proper insurance coverage and indemnification for the University.
2. Review the submitted Application for Use of Theatrical Fog, Haze and/or Smoke at EMU and either approve or deny the application in a timely manner.
3. Conduct site visits for the review of safety protocols and procedures for the event.
4. During the event DPS provides support for fire watch and safety assurance during and after the event.

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V. PROCEDURES

A. Use of Theatrical Fog, Haze and/or Smoke

1. General Guidelines

- a. Dry ice and liquid nitrogen are commonly used and safe-handling procedures are required
- b. The Safety Data Sheets (SDSs) must be provided for any fog, haze and/or smoke products intended to be used. Weblinks are an acceptable method of providing SDSs.
- c. Some products use proprietary formulas, concealing the identity and proportion of ingredients. Products with SDSs clearly identifying the chemical ingredients and safe handling procedures are recommended.
- d. Fog, haze and/or smoke product manufacturer directions shall be followed exactly as the manufacturer indicates and shall not be adulterated or altered, such as by adding dyes, fragrances or additional chemicals. Colored fog can be achieved with colored lighting.
- e. Fog, haze and smoke generating machines shall be used and maintained in good condition and immediately taken out of service if problems or defects are found.
- f. Fog, haze and smoke outlets shall be located well out of traffic areas. Tracked residue beyond the use area may create a slip and fall hazard.
- g. The theater's first aid and emergency plan shall include response to severe reactions to fog, haze and smoke.
- h. Prior to any production with fog, haze and/or smoke effects, the workers shall be told the type of chemical fog, haze and smoke products being used. The SDSs for the fog, haze and smoke must be available to workers on request prior to engagement and workers shall be given instruction/training on safe handling and use of the chemicals.
- i. High-risk individuals shall not be exposed to smoke and fog. This group includes, but is not limited to, children, people with severe lung problems and/or asthma, pregnant women and people with serious illnesses including AIDS.
- j. Events using fog, haze and/or smoke must include this information on event promotional materials, programs, tickets and/or signage to warn patrons of its use.
- k. Respirators equipped with appropriate filter cartridges shall be used when circumstances warrant. Filter cartridges shall be used according to manufacturers' recommendations and selected based on the chemical hazards present. Please see the [EMU Respiratory Protection Program](#) for additional information regarding respirator usage. Contact EHS at 7-0794 for assistance.
- l. Persons shall not be assigned to tasks requiring use of respirators unless they are physically able to perform the work and use the equipment. Workers required to wear respirators who experience

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breathing difficulty while using respirators shall be referred to a physician for evaluation.

- m. Minimize exposure to fog and smoke during strenuous physical activity.
 - n. Individuals who experience adverse reactions to fog and smoke exposure shall be immediately removed, taken to a well-ventilated area and the theater's first aid or emergency providers shall be notified.
 - o. If an adverse reaction occurs, the occurrence shall be investigated by the departmental supervisor, stage manager and/or shop steward.
 - p. A written report of the incident and investigation shall be made to Human Resources Workers' Compensation and Environmental Health and Safety and the senior administrators for the area where the incident occurred.
2. Smoke
- a. One of the most common methods of producing smoke is by passing a fluid under pressure through a heating unit, causing the fluid to vaporize.
 - i. Use only machines designed and manufactured for the generation of stage smoke.
 - ii. The relationship between fluid composition and temperature settings and other internal features of the generating equipment is critical.
 - a) Under-heating of a fluid may lead to a wet smoke that will leave a residue.
 - b) Over-heating of the fluid may lead to fluid decomposition.
 - b. Glycol-based Products
 - i. Glycol-based products are often referred to as "water based", while also containing chemicals in addition to the water.
 - ii. Ensure the generating machine is operating properly:
 - a) Appropriate rate of compression and
 - b) Correct temperature of the heating coil, see 2, a, ii a) and b).
 - iii. When in use, these fluids shall be in a secured container.
 - iv. When these smokes condense and settle on surfaces, a thin film of slippery liquid is formed, especially in the immediate area of the smoke outlet. This may produce a slip and fall hazard.
 - v. Propylene glycol and butylene glycol are more commonly used because they are less hazardous than monoethylene glycol and diethylene glycol.
 - vi. Glycols are hygroscopic, absorbing water out of the atmosphere. This may cause respiratory and eye irritation. People wearing contact lenses are especially vulnerable to eye irritation.
 - c. Oil-based Products
 - i. Oil-based products are petroleum based or organic (vegetable) products. These chemicals are less acceptable fog, haze and smoke products than glycol.
 - ii. Any oil in aerosolized form can be combustible, even explosive, at the wrong concentrations. Do not allow open flames and sparks near oil-based smoke.

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- iii. Only 100% food grade organic oils, or highly refined clear mineral oils shall be used. Identify any vegetable oils present since there are people who are allergic to certain vegetables.
 - iv. Avoid fluid containing "industrial grade" oils such as fuel oil, cutting oil and paraffin oils. These contain impurities that may cause adverse reactions.
 - v. Oil aerosols can cause extremely slippery surface conditions.
 - vi. Class B portable fire extinguishers shall be located near the location where the oil-based products are used.
 - vii. All electrical equipment that may be affected by the combustible liquid while it is in aerosol or mist form shall meet the requirements of Electrical Safety Code for a Class 1 hazardous location. The density of the aerosol or mist cloud will influence the determination as to whether the location is a Division 1 or Division 2 location.
 - viii. Smoke fluid containers and the equipment used to make the aerosol or mist shall be bonded together.
 - e. Acid and Base Smoke, Fumed Inorganic Chemicals and Organic Materials Smoke are not permitted at EMU.
3. Fog and Haze
- a. Fog is typically produced in one of two ways:
 - i. By chilling smoke or
 - ii. By condensing the natural moisture in the air using extremely cold materials such as dry ice (frozen carbon dioxide) or liquid nitrogen.
 - b. If the chilling smoke method is used, follow the smoke guidelines above.
 - c. Dry ice and/or liquid nitrogen require the following:
 - i. Handle dry ice and liquid nitrogen avoiding skin and eye exposure. Directly exposing skin to dry ice or liquid nitrogen can cause severe frostbite.
 - ii. Exercise caution when breaking up dry ice and handling liquid nitrogen. Eye protection and gloves shall be used in the handling of dry ice and liquid nitrogen.
 - iii. Dry ice and liquid nitrogen must be transported and stored in the container provided by the supplier or transferred to a suitable container. The container must be clearly labelled and legible.
 - iv. Carbon dioxide and nitrogen displace oxygen. When using dry ice or liquid nitrogen ensure adequate ventilation is provided, especially in low-lying areas and confined spaces, including, but not limited to, orchestra pits, trap rooms and stairwells.

B. Fire Watch Requirements

1. The sponsoring department is responsible for coordinating and implementing the fire watch requirements.
2. A detailed fire watch plan must be submitted with the application.

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3. For indoor events using fog, haze and/or smoke, the smoke detection system must be deactivated. This is coordinated with the EMU Electric Shop. Arrangements must also be made to reactivate the system at the end of the event.
4. The Ypsilanti Fire Marshal must be notified of the smoke detection system deactivation and reactivation.
5. During the entire time the smoke detection system is deactivated, a fire watch must be in place.
6. Personnel working the fire watch must be properly trained in fire watch procedures, including fire extinguisher training, fire watch observation requirements, emergency notification procedures, evacuation procedures, the location of the nearest pull station and their observation area.
7. Fire watch personnel must be dedicated to only fire watch activities and have no other responsibilities.
8. Fire watch activities must continue until the smoke detection system has been fully reactivated.

C. Application for the use of theatrical fog, haze and/or smoke

1. Contract review and indemnification requirements for Fog, Haze and/or Smoke Operators
 - a. Contracts with Fog, Haze or Smoke Operators must include indemnification of EMU and shall be submitted to EMU Legal Affairs at least 45 days prior to the event.
 - b. The indemnification must include language equivalent to the following:

Vendor agrees to indemnify EMU and its Board of Regents, officers, agents, servants, attorneys, employees, successors or assigns (“Indemnified Parties”) and hold the Indemnified Parties harmless from and against all liability, losses, damages, claims, liens, and expenses (including reasonable attorneys’ fees) arising out of or connected with the work or services performed. Vendor’s breach of this Agreement, or resulting from claims for bodily injury, wrongful death, personal injury or property damage (collectively “Indemnifiable Losses”). Vendor shall at the request of EMU undertake to defend any and all suits and to investigate and to defend any and all claims or suits, investigate and defend any and all claims whether justified or not, if such claim or suit be against EMU, the Board of Regents, or their respective officers, agents, servants, attorneys, employees, successors or assigns, provided however, that Vendor may not settle any claims against the Indemnified Parties without the Indemnified Parties’ prior written consent.

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2. At least 30 working days prior to the event using pyrotechnics the following information must be submitted to the Environmental Health and Safety (EHS):
 - a. The completed [EMU Application for Use of Theatrical Fog, Haze and/or Smoke](#), see form emudps-ehs-f088.
 - b. If EMU personnel are providing the fog, haze and/or smoke, please provide the following information:
 - i. EMU employees name
 - ii. Experience with fog, haze and/or smoke production
 - iii. Program safety protocols.
 - c. Insurance Requirements for Fog, Haze and Smoke Operators
 - i. Fog, Haze and Smoke Operators must maintain the following types of insurances with companies holding a Best's rating of not less than "A", and in amounts no less than as follows:
 - a) Commercial general liability with a minimum limit of \$1,000,000 per occurrence and \$3,000,000 aggregate for bodily injury, property damage and personal injury arising out of fog, haze or smoke displays;
 - b) Automobile liability with a minimum limit of \$1,000,000 per occurrence.
 - ii. A Certificate of Insurance (COI) must be provided at least 30 days prior to the event including evidence of the above listed insurance coverages.
3. A detailed site diagram including the following:
 - a. Site and/or stage layout with seating areas designated
 - b. Number and location of all fog, haze or smoke generators
 - c. Scale and clearances to performers and audience
 - d. Ventilation precautions
 - e. Provide as much detail as possible to avoid denial of the application.
 - f. Detailed fire watch plan
4. Provide the SDSs for all materials being used to create the fog, haze or smoke and the running order and duration of use. Weblinks for SDSs are acceptable.

D. Post Fog, Haze and/or Smoke Usage

1. The fire watch must remain in effect until the smoke detection system has been reactivated.
2. The Operator is responsible for removal of all unused fog, haze and/or smoke products and equipment.
3. The Operator is responsible for cleaning and properly disposing of any debris and unused chemicals from the fog, haze and/or smoke generation. The

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EMU sponsor and/or other EMU representatives must approve of the clean-up.

VI. REFERENCES

- A. Ontario Ministry of Labour, Training and Skills Development Fog and Smoke Safety Guideline for the Live Performance Industry in Ontario
- B. Purdue University Operating Procedures for Including Pyrotechnic Devices at an Event
- C. University of Central Florida Permit Application for the Use of Pyrotechnic Displays on University Property.

VII. APPENDICIES

- A. EMUDPS-EHS-f088 [EMU Application for Use of Theatrical Fog, Haze and/or Smoke](#)

VIII. HISTORY

Revision	Date	Changes
0	6/3/22	Original Protocol