PARTICULARLY HAZARDOUS SUBSTANCES
LABORATORY STANDARD OPERATING PROCEDURE (SOP)
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This template SOP is designed to provide guidance in writing procedures for the safe handling and disposal of particularly hazardous substances including carcinogens, engineered nanomaterials, hazardous drugs and toxins. This template must be customized and reviewed for its applicability to the specific procedure listed below. See Section 8.5 of the Chemical Hygiene Plan (Materials and Procedures Requiring Special Provisions) for detailed information under what conditions a specific SOP is required. If you have questions concerning the applicability of any item listed in this procedure contact the Principal Investigator/Laboratory Supervisor or Environment, Health & Safety 313-593-4914.

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SPECIFIC PROCEDURE TITLE:

PREPARED BY: **REVISION DATE:**

DESCRIPTION OF PROCEDURE:

LOCATION: These procedures must be performed in a designated area.
Describe location(s):

A designated area shall be established where limited access, special procedures, knowledge, and work skills are required. A designated area can be the entire laboratory, a specific laboratory workbench, or a laboratory hood. Designated areas must be clearly marked with

signs that identify the hazard and include an appropriate warning; for example: WARNING! FORMALDEHYDE WORK AREA – CARCINOGEN.

- Upon leaving the designated area, remove any personal protective equipment worn and wash hands, forearms, face, and neck.
- After each use, wipe down the immediate work area and equipment to prevent accumulation of chemical residue.
- At the end of each project, thoroughly decontaminate the designated area before resuming normal laboratory work in the area.

Storage or consumption of food, storage or use of containers of beverages, storage or application of cosmetics, smoking, storage of smoking materials, tobacco products or other products for chewing, or the chewing of such products are prohibited in designated areas.

Designated areas shall be maintained under negative pressure with respect to corridors and public areas.

HAZARDS: The chemicals associated with this procedure present exposure or physical health hazards. Safety precautions are prudent and mandatory. The MSDSs for the chemicals used in the area must be accessible to lab personnel. **MSDS location:**
_____.

Select the hazard class: (circle all that apply) Carcinogen, chemotherapeutic agent, engineered nanomaterial, mutagen, embryotoxin, highly toxic, sensitizer. Other: (describe)
_____.
Route of exposure: (circle all that apply) Inhalation, contact, ingestion, injection.
Major target organs: (circle all that apply) Skin, liver, lung, kidney, reproductive, CNS.
Physical chemical properties: (circle all that apply) Flammable, explosive, reactive, corrosive, peroxide forming.

Add specific chemical hazard information here: _____
_____
_____

Example: Long-term risk of occupational exposure to cytotoxic (Chemotherapeutic) hazardous drugs (HD) has been associated with human cancers at high (therapeutic) levels of exposure. These drugs have been shown to be carcinogens, mutagens and teratogens in many animal species. There is evidence that hazardous drugs may cause spontaneous abortions and increase the risk of congenital malformations. In addition, some of these drugs have been shown to cause acute effects in humans, such as localized skin necrosis (death of tissue) damage to normal skin after surface contact, dizziness, lightheadedness. Adverse health effects from both acute and chronic exposures have been demonstrated in health care personnel. All of these drugs have potential to damage cells or adversely affect cellular growth and reproduction. The drugs bind directly to genetic material in the cell nucleus, or affect cellular protein synthesis. Employees can be exposed to hazardous drugs

through inhalation of drug dust or droplets, absorption through the skin directly, injection through the skin or ingestion through contaminated food.

CONTROL OF HAZARDS: Methods used to control hazards will rely on engineering controls over administrative controls and personal protective equipment.

Type of engineering control utilized: (circle) Fume hood, negative pressure glove box, sealed system, Class II Biological Safety Cabinet (BSC), other local exhaust system.

Indicate specific hazard controls that must be utilized to perform this procedure.

_____
_____
_____
_____

Additional required procedures:

Although the specific SOPs will vary according to the material used, the following guidelines are generally applicable for projects involving particularly hazardous substances:

- Use the smallest amount of chemical that is consistent with the requirements of the work to be performed.
- Use containment devices (such as lab fume hoods or glove boxes) when: (i) volatilizing these substances, (ii) manipulating substances that may generate aerosols, and (iii) performing laboratory procedures that may result in uncontrolled release of the substance.
- Use high efficiency particulate air (HEPA) filters, carbon filters, or scrubber systems with containment devices to protect effluent and vacuum lines, pumps, and the environment whenever feasible.
- Use ventilated containment to weigh out solid chemicals. Alternatively, the tare method can be used to prevent inhalation of the chemical. While working in a laboratory hood, the chemical is added to a pre-weighed container. The container is then sealed and can be re-weighed outside of the hood. If chemical needs to be added or removed, this manipulation is carried out in the hood. In this manner, all open chemical handling is conducted in the laboratory hood.
- Use containment devices for the following procedures that may also present opportunities for employee exposure during preparation: Withdrawal of needles from drug vials; Drug transfers using syringes and needles; Breaking open ampoules; Expulsion of air from drug-filled syringe.

If the process does not permit the handling of such materials in an OSEH certified ventilation control device, contact EHSEM at 313-593-4914 to review the adequacy of control measures.

PROTECTIVE EQUIPMENT: Prior to performing this procedure, the following personal protective equipment must be obtained and ready for use: (ex. acid resistant gloves, safety eyewear, lab coat, chemical splash apron):

_____

_____

_____

Hand Protection - Select appropriate glove type and double glove. For proper selection of glove material, review chemical MSDS and glove manufacturer's glove selection guides (see OSEH web site for links).

Glove Type: (circle appropriate glove material) nitrile, neoprene, vinyl, latex, laminate.
Gloves should be changed frequently and should be pulled up over outer sleeves to reduce skin exposure.

Where to Find Compatibility Information

Most glove manufacturers have chemical compatibility charts available for their gloves. These charts may be found in laboratory supply catalogs such as *Fisher Scientific* and *Lab Safety Supply*. Best Gloves. Best Gloves also offers an excellent on-line database for glove selection at www.bestglove.com. Visit EHSEM's Glove Use webpage for more information.

Eye Protection – Select appropriate eye protection.
Eyewear: (circle appropriate type) safety glasses, Safety goggles
Goggles (not safety glasses) are appropriate for processes where splash, spray, or aeresolization is foreseeable.

Other Protective Clothing
At minimum, lab coat, long pants, and closed toed shoes are to be worn when entering laboratories having hazardous chemicals.

Hazardous chemicals that are toxic via skin contact/absorption may require additional protective clothing (i.e., face shield, apron, oversleeves, bonnets) as appropriate where chemical contact with the body/skin is foreseeable.

Respiratory protection – Is not required when proper engineering controls are implemented. In some cases a N95 disposable respirator can be used as an added layer of protection from particulates or a potential splash. Respirator usage may require training, fit testing and a medical evaluation. Contact OSEH (7-1143) to determine requirements for specific applications.

DECONTAMINATION PROCEDURES

Personnel decontamination: Immediately after working with particularly hazardous materials, remove gloves, wash hands and arms with soap and water. Any time you leave the designated area you must remove protective clothing and conduct personnel decontamination.

Area decontamination: Decontamination procedures vary depending on the material being handled; consult the MSDS. Consideration should be given to neutralizing some agents with other reagents as part of the decontamination process; consult the MSDS, EHSEM, and other resources to determine applicable methods.

All surfaces should be wiped with the appropriate cleaning agent following dispensing or handling. Waste materials generated should be treated as a hazardous waste.

In the absence of other methods, decontamination should consist of surface cleaning with water and detergent followed by thorough rinsing. The use of detergent is recommended because there is no single accepted method of chemical deactivation for all agents involved.

A plastic backed absorbent pad should be placed under the work area during the process. This should be changed at the end of each process or when a spill occurs.

Equipment decontamination: Decontaminate glassware, vacuum pumps or other contaminated equipment before removing from the designated area. Attach the EHSEM Equipment Decontamination form to equipment to be sent offsite.

Biological Safety Cabinets used for antineoplastic preparation should be cleaned daily with 70% ethanol solution and decontaminated weekly and whenever spills occur. Decontamination procedures should include surface cleaning with high pH agents; thorough rinsing, removal, and cleansing of work trays; and sump cleansing.

SPECIAL HANDLING AND STORAGE

Note storage location:_____

Label containers and storage areas with strong warnings like "CANCER-SUSPECT AGENT".

Ensure secondary containment and segregation of incompatible chemicals per guidance within the Chemical Hygiene Plan. Follow any substance-specific storage guidance provided in MSDS documentation.

WASTE DISPOSAL - This procedure will result in the following regulated waste which must be disposed of in compliance with environmental regulations: _____

All particularly hazardous substance waste including gloves, syringes, vials, and solution containers should be placed in a labeled 5 gallon white pail. Needle syringe assemblies must be disposed in sharps containers with hazardous waste labels. Needles must not be recapped for disposal. The waste container must and be located within the designated area and should be closed except when actively adding waste. Contact EHSEM at 313-593-4914 for supplies and to schedule removal of waste.

ACCIDENTAL/INCIDENTAL SPILL: Prompt response to chemical spills is critical to protect worker health and safety and to mitigate adverse affects to the environment. Spills should be identified with a warning sign to limit access to the area until decontamination has been completed. Spills should be cleaned up immediately by a properly protected employee who has been trained in the appropriate procedures regarding the handling and disposal of hazardous substances. Spills should be cleaned with a mild detergent and rinsed twice with water.

All contaminated cleanup materials should be disposed of in the appropriately labeled waste container. Call EHSEM at 313-593-4914 for disposal of contaminated waste materials and for assistance in cleaning the spill.

In case of a spill onto employee's skin or eyes, quick response to the nearest emergency shower and eyewash location is necessary to reduce exposure. Remove contaminated clothing and gloves. Don clean gloves and wash the affected skin area with soap and water. For eye contact, flush the eye with water for 15 minutes and seek medical attention. Employees should be referred to Midwest Health Service, the UM –Dearborn Occupational Health Provider, for treatment. Any exposure must be reported on the WorkConnections Injury and Illness form and sent to WorkConnections.

Spills of powdered material should be cleaned up by personnel wearing appropriate respiratory protection, double protective gloves and gowns. Wet towels should be placed over the spilled material, and water should be used to absorb any dry powder. Materials used in clean-up should be placed in appropriate waste barrels and treated as hazardous waste.

Laboratory personnel who work with hazardous chemicals are to be provided the opportunity to receive medical attention/consultation when:

- A spill, leak, explosion or other occurrence results in a hazardous exposure (potential overexposure).
- Symptoms or signs of exposure to a hazardous chemical develop.

Specific emergency procedures shall be posted and employees shall be familiar with them.

TRAINING REQUIREMENTS

EHSEM general laboratory safety training as well as laboratory-specific training is required. Each employee, prior to being authorized to enter a designated area, shall receive training from the PI or an experienced lab manager that includes but not necessarily limited to:

- The nature of the hazard, including local and systemic toxicity;
- The specific nature of the operation that could result in exposure;
- The purpose and application of the medical surveillance program, including, as appropriate, methods of self-examination;
- The purpose and application of decontamination practices and purposes;
- The purpose and significance of emergency practices and procedures;
- The employee's specific role in emergency procedures;
- Specific information to aid the employee in recognition and evaluation of conditions and situations which may result in the release of chemicals addressed by this section;
- The purpose and application of specific first aid procedures and practices;

PRIOR APPROVAL: This procedure is considered hazardous enough to warrant prior approval from the laboratory director. -YES- -NO-

MEDICAL SURVEILLANCE: This procedure requires medical surveillance through the EHSEM Medical Surveillance program (contact EHSEM at 313-593-4914 for assistance on a determination of medical surveillance). -YES- -NO-

CERTIFICATION: I have read and understand the above SOP. I agree to contact my supervisor or lab director if I plan to modify this procedure.

Signature	**Name (Print)**	**Date**	**Room #**