**Guidelines for Creating a Laboratory-Specific Standard Operating Procedure (SOP)**

*If there is a written experimental protocol that incorporates relevant safety information from the below sections, this can be used in lieu of completing the SOP Template.*

*This document serves as guidance for completing the Standard Operating Procedure (SOP) Template for a chemical or process. Include relevant information for all sections. Initial sources of chemical-specific information are the European Chemicals Agency (ECHA) website, PubChem, Safety Data Sheets (SDS) from a manufacturer, and the OESO website. This list is not exclusive; other sources might contain more relevant information. Save documentation with other electronic lab materials or print and place with other safety information for your lab. Please contact the OESO-Occupational Hygiene and Safety Division at 919-684-5996 with any questions.*

**Laboratory and SOP descriptive information:**

* Chemical name with CAS# or process
* Principal Investigator
* Principal Investigator Signature-**when SOP is finalized/updated**
* Date-**when SOP is finalized/updated**
* Building
* Room(s)
* Designated work area
* OESO Approval-is OESO approval required for this process or the use of this chemical?
* OESO Signature
* Departmental Approval- is departmental approval required for this process or the use of this chemical?
* Departmental Signature

1. **Hazard Identification**
   1. **Preparation and Use:** Describe the circumstances of use for the hazardous chemical, including how any stock solutions and/or working solutions are prepared. If this SOP is for a process, describe each hazardous chemical that is used in the process. At minimum, describe the following for each chemical:
      1. **Concentration**- Describe the preparatory steps for the needed concentration and/or how the chemical is obtained (e.g. product # 1234, purchased from Sigma-Aldrich) in needed concentration.
      2. **Quantity-**Amount needed for individual experiments.
      3. **Frequency-**Detail frequency of use for each chemical.
      4. **Location-**Indicate use on benchtop, in chemical fume hood, a dedicated location in the lab, etc.

b. **Potential Hazards and Risk:** What are the inherent hazards and associated risk with using the chemical? Are there physical and/or health hazards as purchased and in-use? Describe the purchased and in-use physical state and condition for each chemical. Describe the route of a potential exposure (e.g. inhalation, dermal, etc.). When/how would an exposure occur (e.g. inhalation of gases/vapors, while weighing and mixing, etc.)? Consider “worst-case scenarios” when describing the hazards and risk associated with the chemical; how can the risk be minimized?

Note: Are there suitable chemical substitutions for the described chemical(s) that are less hazardous?

1. **Hazard Control**
   1. **Selection and Purchasing:** Describe the total quantity purchased. If possible, purchase small quantities or dilute solutions to reduce the risk of exposure and to minimize waste. Consider safer container options (e.g. shatterproof glass, septum-top containers, etc.). Can the chemical(s) be bought in suspension and/or liquid form?
   2. **Engineering Controls:** Engineering controls are defined as equipment that reduce or remove a hazard from the laboratory. Are engineering controls necessary for the chemical(s)? Will be the chemical(s) be handled in chemical fume hood, glove box, biological safety cabinet, other? Is an eyewash, drench hose, or a safety shower required for the use of the chemical?

Note: Engineering controls are preferred over Personal Protective Equipment (PPE). Some type of containment (chemical fume hood or glove box) is required for use of [Particularly Hazardous Substances](http://www.safety.duke.edu/sites/default/files/PHSInfoSheet.pdf) that are aerosols, powders, concentrated or volatile liquids, or gases.

* 1. **Administrative and Work Practice Controls:** Explain safe work practices. Consider:
     1. Describing special handling requirements.
     2. Describing special equipment requirements. For example, are fire extinguishers necessary for safe use?
     3. Describing chemical-specific antidotes or first aid treatments.
     4. Chemical segregation strategies (also address in sub-section 2e: Storage and Transportation).
     5. Describing additional safe work practices, such as keeping containers closed, working away from open flames, etc.
     6. How will the work surface and other items be decontaminated after use? (required for chemicals that are listed as PHS health hazards)
     7. Is this SOP for a chemical or drug that will be dosed in animals and requires Duke’s [SOP for Handling Animals Dosed with Toxic Chemicals](http://www.safety.duke.edu/sites/default/files/SOPHandling_animals_dosed_W_Toxic_Chems.doc)? If so, reference the chemical-specific animal handling SOP.

Notes: **At minimum, all chemical containers must be labeled with a chemical name (and concentration, if diluted) and hazard warnings.** If feasible, weigh powders in a fume hood or BSC. If not, add powder to a tared weighing boat (or other container) in the hood and then cover before returning to the balance. Chemicals that form peroxides or shock-sensitive crystals should be dated with both the “opened” date and “disposal” date.

* 1. **Personal Protective Equipment:** Describe PPE requirements for each task involving the chemical. How often will PPE be changed? Are there specialized or very-specific PPE requirements (e.g. respirators, flame resistant lab coat, etc.) for safe use?

Note: Respirator use requires employee participation in the Respiratory Protection Program, which involves medical clearance, annual fit testing, and training. Respirators are masks designed to protect the wearer from specific airborne hazards and are different from surgical masks, which only protect the wearer from splashes and are primarily intended to protect others from infectious aerosols exhaled by the wearer. Please be clear about use of surgical masks versus respirators.

* 1. **Storage and Transportation**: Describe how the chemical is stored. Describe how the chemical is transported both inside and outside of the laboratory setting. Consider:
     1. Chemical segregation strategies (e.g. incompatibles).
     2. Storing flammables in a flammable cabinet.
     3. Use of secondary containers.
     4. Traveling through low-traffic hallways.
     5. Use of maintenance elevators.

1. **Emergencies, Spill Procedures, and Exposures/Unintended Contact**

Describe how employees should handle a chemical-specific emergency or chemical spill. On the Durham campus, “large” spills of volatile or powdered hazardous materials and all mercury spills must be referred to the OESO spill response team by calling 911 from a campus phone or 919-684-2444 from any phone. Researchers may also contact the OESO spill response team for guidance on whether or not they can safely clean up a spill themselves.

Note: Waste from cleaning up hazardous material spills (including contaminated PPE) must be treated as hazardous waste.

Describe how employees should handle accidental exposure to the chemical(s). Consider:

* 1. Stoppage of work and leaving the immediate area for inhalation hazard concerns.
  2. Removal of contaminated clothing and/or PPE.
  3. Flushing with emergency eyewashes and/or drench hoses for eye/skin contact.
  4. Changing contaminated gloves.
  5. Contacting Employee Occupational Health and Wellness (EOHW) at 919-684-3136 for medical advice on occupational chemical exposures and/or filling out a [Report of Work-Related Injury/Illness](http://www.hr.duke.edu/benefits/medical/workcomp/report.php).

1. **Waste**

Describe how chemical waste is stored and disposed. If the chemical is considered regulated waste, any unused or unwanted portion (and its container, unless the container is empty) must be disposed of as a hazardous waste in accordance with the [Duke University Chemical Waste Policy](http://www.safety.duke.edu/sites/default/files/Q-Chemwastemgt.pdf). For additional information, see the [Laboratory Chemical Waste Management Practice](http://www.safety.duke.edu/sites/default/files/labwastemgt.pdf)s document and the [Drain Disposal Guidelines](http://www.safety.duke.edu/sites/default/files/drain_disposal_practice.pdf). If you have specific questions about disposal, please call OESO Environmental Programs at 919-684-2794.

**5. Details of Process**

If this SOP is for a process, describe the overall process in as much detail as possible.

**6. Training of Personnel**

All personnel are required to complete the online General Lab Safety session through the OESO website. Furthermore, all personnel shall read and fully adhere to the SOP when handling the chemical. It is the PI’s responsibility to document that employees have been trained on following the SOP.