**Standard Operating Procedure**  
for work with  

<table>
<thead>
<tr>
<th>Chemical name/class:</th>
<th>Formaldehyde</th>
<th>CAS #:</th>
<th>30525-89-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>PI:</td>
<td>Mark Walters</td>
<td>Date:</td>
<td>November 2, 2018</td>
</tr>
<tr>
<td>Building:</td>
<td>Fitzpatrick CIEMAS</td>
<td>Room #:</td>
<td>Sample Prep Lab</td>
</tr>
<tr>
<td>Designated Work Area:</td>
<td>Solvent Fume Hood</td>
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1. **Circumstances of Use:**  
   Formaldehyde is used in 37% concentration in SMIF. It is to be used in the solvent fume hood in the sample prep lab.

2. **Potential Hazards:**  
   - Formalin and paraformaldehyde solutions can emit formaldehyde gas, a known human carcinogen, and can irritate the eyes and skin.  
   - Working with paraformaldehyde powder (and, to a lesser extent, flakes or granules), can expose employees to paraformaldehyde dust, which is a strong irritant/sensitizer.  
   - Contact with these solutions or paraformaldehyde solids may also cause drying of the skin and/or allergic dermatitis.  
   - The OSHA Permissible Exposure Limit for formaldehyde is 0.75 ppm for 8 hours or 2 ppm for 15 minutes. There is a substance-specific OSHA standard for formaldehyde, and an action limit of 0.5 ppm.  
   - Consult your Safety Data Sheet (SDS) and the [Laboratory Chemical Safety Summary for Formaldehyde](#) for more information on hazards.

3. **Engineering Controls:**  
   - Work with concentrated (>4% formaldehyde/paraformaldehyde) solutions only in a solvent fume hood in the sample prep lab.  
   - Handle paraformaldehyde powder (and, preferably, granules or flakes) only in a solvent fume hood.  
   - Dilute solutions (<4% formaldehyde) may be used on the benchtop in small quantities.  
   - If there is any possibility that an employee’s eyes may be splashed with solutions containing 0.1 percent or greater formaldehyde, an eyewash/drench hose must be available within the immediate work area for emergency use.  
   - If employees’ skin may become splashed with solutions containing 1 percent or greater formaldehyde, for example, because of equipment failure or improper work practices, the OSHA formaldehyde standard requires a conveniently-located safety shower. Contact OESO at 919-684-8822 to determine if a safety shower will be needed.

4. **Work Practice Controls:**  
   - Use only in designated solvent fume hood in the sample prep lab.  
   - Keep containers closed as much as possible.  
   - Use in the smallest practical quantities for the experiment being performed.  
   - If you are weighing paraformaldehyde powder and the balance cannot be located in a fume hood or BSC, tare a container then add powder in the hood and cover before returning to the balance to weigh the powder.  
   - Labs handling moderate to large quantities of formaldehyde-containing solutions on a regular basis should contact OESO at 919-684-8822 for assessment of exposure. Areas that handle only small (100 ml or less) pre-filled specimen containers, or that work with formaldehyde-containing solutions exclusively in a functioning chemical fume hood, would have low potential for overexposure, but should contact OESO if there are concerns.  
   - Once work with formalin/paraformaldehyde is complete, wipe down area with a soap and water solution.

5. **Personal protective equipment (PPE):**  
   Wear standard nitrile laboratory gloves, chemical splash goggles, face shield, and lab coat. If splash may occur, also wear an impervious apron. (OSHA requires that all contact of the eyes and skin with liquids containing 1 percent or more formaldehyde be prevented by the use of chemical protective clothing made of material impervious to formaldehyde and the use of...
other personal protective equipment, such as goggles and face shields, as appropriate to the operation.)

6. **Transportation and Storage:**
   - Transport formaldehyde solutions in secondary containment, preferably a polyethylene or other non-reactive acid/solvent bottle carrier.
   - Containers are kept in the designated refrigerator located in a chase.
   - Keep container tightly closed and sealed until ready for use.
   - Store in secondary containment with flammables, away from oxidizers, reducing agents, metals, and acids.
   - Keep containers of PFA solid away from water.
   - Avoid storing on the floor.
   - Avoid ignition sources.

7. **Waste Disposal:**
   Formaldehyde waste solutions should be poured down the solvent drain in the solvent fume hood in the sample prep lab.

8. **Exposures/Unintended contact:**
   Contact Employee Occupational Health and Wellness (EOHW) at 919-684-3136 for medical advice on occupational chemical exposures. For an actual chemical exposure/injury
   - Flush exposed eyes or skin with water for at least 15 minutes, then seek medical attention.
   - If there is respiratory irritation associated with exposure, remove all persons from the contaminated area and contact the OESO spill team.
   - Call 911 from a campus phone or 919-684-2444 from any phone to request assistance if needed. Contact Employee Occupational Health and Wellness at 919-684-8115 for exposure-related advice.
   The work-related injury or illness report found at: [http://www.hr.duke.edu/benefits/medical/workcomp/report.php](http://www.hr.duke.edu/benefits/medical/workcomp/report.php) should be completed within 24 hours. Follow-up medical attention should be sought through Duke Employee Occupational Health and Wellness (919-684-3136).

9. **Spill Procedure:**
   Most spills of formalin or paraformaldehyde solutions, or paraformaldehyde powder that occur outside of a chemical fume hood should be referred to the OESO spill response team by calling 911 from a campus phone or 919-684-2444 from any phone.

   In the event of a spill, follow SMIF spill procedures and immediately contact SMIF staff. Only SMIF staff and/or appropriate OESO personnel should clean up spills

   **Spills Contained Inside a Chemical Hood**
   - Avoid breathing vapors from the spill and leave the immediate area of the chemical hood
   - Alert people in the immediate area of the spill
   - Notify SMIF immediately by calling emergency numbers posted near the phone
   - Wait for instructions from SMIF or for SMIF personnel to arrive to complete the clean-up of the affected area.

   **Spills Outside of a Chemical Hood**
   - Attend to injured or contaminated persons and remove them from exposure
   - Press the closest manual alarm button (blue box) and evacuate the lab

   Make yourself available to the SMIF staff and/or emergency responders and be prepared to tell the following: What chemical(s) are involved, how much was spilled, where the spill is located, nature of any injuries

   Employees in the area should be prepared to clean up minor spills, including most spills confined to the chemical fume hood. Wearing double nitrile gloves, splash goggles, face shield and lab coat (and impermeable apron, if available), use absorbent pads to absorb spilled material. (For small spills of solid PFA, dampen the absorbent pad with methanol before placing over the spilled material and allow to sit for a few minutes before wiping up.) After
spill has been completely absorbed, wash down contaminated area with soap and water at least two times. Contaminated PPE and clean-up materials must be placed in a clear plastic bag or compatible container for pick-up by OESO.

NOTE: If there is respiratory irritation associated with exposure, remove all persons from the contaminated area and contact the OESO spill team.

10. **Training of personnel:**

- All personnel are required to complete the SMIF General Lab Safety session and the SMIF Chemical Safety and Wet Hood training session.
- All personnel shall read and fully adhere to the *Wet Hood Operating Procedure* and the *SMIF Lab Safety and Procedures Manual*
- All personnel shall read and fully adhere to this specific SOP for formalin, paraformaldehyde, and paraformaldehyde solutions