

Electrical Research Standard Operating Procedure Worksheet

Print the names of all researcher(s) involved in this work:	Building(s):	
Principal Investigator/Lab Manager:	Lab Number(s):	
Date:	Lab Phone #(s):	
Description of Experiment including purpose and general approach:		
SECTION 1. CHECK THE TRAINING TO BE COMPLETED PRIOR TO CONDUCTING THE PROCEDURE		
TRAINING DOCUMENTATION	YES	NO
Researchers involved have attended appropriate safety trainings per the Employee Safety Training Assessment including Electrical Safety for Qualified Persons in the last 3 years? * Researchers can check their training history at http://www.ehs.uconn.edu/training/	<input type="checkbox"/>	<input type="checkbox"/>
Failure to complete mandatory Electrical Safety Training through EHS within the last 3 years will prohibit electrical research in labs.		
SECTION 2. PREREQUISITES		
Complete the following prior to starting this research	YES	NO
Safety training required for all researchers (complete Employee Safety Training Assessment)	<input type="checkbox"/>	<input type="checkbox"/>
Define controls to protect welfare of personnel (complete Workplace Hazard Assessment)	<input type="checkbox"/>	<input type="checkbox"/>
Acquired Safety Data Sheets (SDS) for all chemicals used in this research. Refer to UConn's Hazard Communication Program or Chemical Hygiene Plan as appropriate.	<input type="checkbox"/>	<input type="checkbox"/>
Developed experimental schematic including inputs/outputs, gauges, access ports, controls, fuses or other over-current protective devices?	<input type="checkbox"/>	<input type="checkbox"/>
Developed supporting information including calculations, graphs/plots of preliminary data that supports the general safety of this procedure?	<input type="checkbox"/>	<input type="checkbox"/>
Developed a list of equipment required for this research activity?	<input type="checkbox"/>	<input type="checkbox"/>
Developed a list of Electrical PPE required for each separate step in the procedure? Refer to Selection of Electrical PPE Tables on the EHS website.	<input type="checkbox"/>	<input type="checkbox"/>
Determine the largest Restricted Approach Boundary and Flash Protection Boundary necessary for the work associated with this procedure. Refer to linked EHS pages to ascertain this information.	<input type="checkbox"/>	<input type="checkbox"/>

SECTION 3 PROCEDURE OR PROCESS (add more lines as necessary or attach pages)

Procedure or Process Steps	Safety Control(s)
0. Identify each step of the procedure and indicate the safety controls used	e.g., arc flash PPE 8cal/cm ² , fume hood, etc
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	

SECTION 4. CHECK AND DESCRIBE ADDITIONAL HAZARDS INVOLVED IN PROCEDURE

Hazard Type	Description of Hazard(s) and Control(s)
<input type="checkbox"/> Impact	
<input type="checkbox"/> Cuts/Penetration	
<input type="checkbox"/> Pressure	
<input type="checkbox"/> Biological Agents	
<input type="checkbox"/> Thermal (Hot/Cold)	
<input type="checkbox"/> Electromagnetic Radiation (EMF)	
<input type="checkbox"/> Harmful Dust/Mists/Fumes/Vapors	
<input type="checkbox"/> Light (Optical) Radiation	
<input type="checkbox"/> Ionizing Radiation	
<input type="checkbox"/> Noise	
<input type="checkbox"/> Other	

SECTION 5. SELECT THE ENGINEERING CONTROLS USED TO CONTROL THE HAZARDS

<input type="checkbox"/> Chemical Fume Hood	<input type="checkbox"/> Blast Shield
<input type="checkbox"/> Biological Safety Cabinet	<input type="checkbox"/> Ultraviolet Light Screens
<input type="checkbox"/> Glove Box	<input type="checkbox"/> Other _____
<input type="checkbox"/> Local exhaust (e.g., "snorkels" or "elephant trunks")	<input type="checkbox"/> None Required

SECTION 6. WORK PRACTICES USED TO CONTROL HAZARDS		
Work Practices: Complete the following to establish work practices that will be used	Yes	No
Principal Investigator and Lab Supervisor approves working alone during procedure? (<i>Working with exposed energized conductors >50V prohibits working alone</i>).	<input type="checkbox"/>	<input type="checkbox"/>
All work on research equipment will be performed only in an electrically de-energized state?	<input type="checkbox"/>	<input type="checkbox"/>
*Lockout Tag-out will be used to ensure de-energized state is maintained? (*Training Requirement)	<input type="checkbox"/>	<input type="checkbox"/>
Will any work be performed on exposed energized conductors >50V? (If so, work must be performed in accordance with NFPA 70E work practices that pertain to this research activity. Contact EHS for guidance).	<input type="checkbox"/>	<input type="checkbox"/>
Read and understand the Safety Data Sheet (SDS) for each chemical being used?	<input type="checkbox"/>	<input type="checkbox"/>
Physically mark Flash Protection Boundaries out on lab bench and floor surfaces to indicate where arc flash protection PPE must be donned and used. (If tape is used, ensure worn tape does not create a trip hazard).	<input type="checkbox"/>	<input type="checkbox"/>
Other work practices:	<input type="checkbox"/>	<input type="checkbox"/>
PI acknowledges that researchers involved in this procedure are trained and knowledgeable in the construction and operation of the equipment or specific work methods used and are trained to identify and avoid the electrical hazards that might be present with respect to this equipment or work methods. (a "YES" response requires the PI's initials).	<input type="checkbox"/>	PI initials _____

SECTION 7. SELECT PERSONAL PROTECTIVE EQUIPMENT TO BE WORN DURING THE PROCEDURE	
Electrical Shock and Arc-Flash Personal Protective Equipment	
Body Part	Arc-rated Personal Protective Equipment
<input type="checkbox"/> Eye and Face Protection (electrical arc flash)	<input type="checkbox"/> Arc-rated Face Shield _____ Cal/cm2 (<i>must be used with safety glasses or goggles</i>) <input type="checkbox"/> Balaclava _____ Cal/cm2 (<i>used with arc-rated face shield in situations ≥ 8 Cal/cm2</i>) <input type="checkbox"/> Arc-rated Flash Suit Hood _____ Cal/cm2 <input type="checkbox"/> Other _____ Cal/cm2
<input type="checkbox"/> Body Protection (electrical arc flash)	<input type="checkbox"/> Arc-rated Long-Sleeved Shirt and Pants _____ Cal/cm2 <input type="checkbox"/> Arc-rated Coverall _____ Cal/cm2 <input type="checkbox"/> Arc-rated Flash Suit Jacket, Pants, and hood _____ Cal/cm2 <input type="checkbox"/> Arc-rated Jacket _____ Cal/cm2 <input type="checkbox"/> Arc-rated Parka _____ Cal/cm2 <input type="checkbox"/> Arc-rated Rainwear _____ Cal/cm2 <input type="checkbox"/> Arc-rated Hard hat liner _____ Cal/cm2 <input type="checkbox"/> Other _____ Cal/cm2
<input type="checkbox"/> Hand Protection (electrical shock and arc flash)	<input type="checkbox"/> Electrically Insulated Gloves with Leather Protectors <input type="checkbox"/> Arc-rated Gloves (<i>If rubber insulated gloves with leather protectors are used, arc-rated gloves are not required</i>) <input type="checkbox"/> Other _____

Other Hazard Personal Protective Equipment	
Body Part	Personal Protective Equipment
<input type="checkbox"/> Eye and Face Protection (non-electrical)	<input type="checkbox"/> Safety Glasses (<i>are req'd if potential for arc-flash exists</i>) <input type="checkbox"/> Impact or Splash Protection Face Shield <input type="checkbox"/> Safety Goggles <input type="checkbox"/> Other _____
<input type="checkbox"/> Head Protection	<input type="checkbox"/> Hard Hat (<i>is required if potential for arc-flash exists</i>) <input type="checkbox"/> Other _____
<input type="checkbox"/> Hand Protection (non-electrical)	<div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Butyl Rubber <input type="checkbox"/> Natural Rubber <input type="checkbox"/> Neoprene <input type="checkbox"/> Nitrile <input type="checkbox"/> Polyvinyl alcohol (PVA) </div> <div> <input type="checkbox"/> Polyvinyl chloride (PVC) <input type="checkbox"/> Fluoroelastomer (Viton) <input type="checkbox"/> Norfoil <input type="checkbox"/> Thermally-insulated gloves <input type="checkbox"/> Other _____ </div> </div>
<input type="checkbox"/> Body Protection (non-electrical)	<div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Lab coat <input type="checkbox"/> Flame-resistant lab coat <input type="checkbox"/> Long pants </div> <div> <input type="checkbox"/> Plastic or rubber apron <input type="checkbox"/> Other _____ </div> </div>
<input type="checkbox"/> Foot Protection	<input type="checkbox"/> Leather shoes (<i>required if potential for arc-flash exists</i>) <input type="checkbox"/> Closed-toed footwear <input type="checkbox"/> Steel-toed shoes <input type="checkbox"/> Other _____
<input type="checkbox"/> Respiratory Protection	<div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> Powered Air-Purifying Respirator <input type="checkbox"/> Full Face-piece Negative Pressure <input type="checkbox"/> Half-mask negative pressure </div> <div> <input type="checkbox"/> Dust Mask <input type="checkbox"/> Not Applicable <input type="checkbox"/> Other _____ </div> </div>
<input type="checkbox"/> Hearing Protection	<input type="checkbox"/> Ear plugs (<i>required if potential for arc-flash exists</i>) <input type="checkbox"/> Other _____
<input type="checkbox"/> Other	
SECTION 8. FOLLOW PROCEDURE FOR EMERGENCIES AS LISTED BELOW:	
<ol style="list-style-type: none"> 1. Relocate to a safe location. Close door(s) to lab if feasible. 2. Call 911. 3. If safe, post a "NO ENTRY" sign(s) or other warning information on the door(s) 4. Evacuate the building through the nearest exit. Do not run. Do not use elevators. 5. Do not re-enter area until instructed to do so by UConn Fire Department or other emergency personnel 6. Report accident to Principal Investigator/Supervisor 	
SECTION 9. REVIEW AND UNDERSTAND FIRST AID PROCEDURES LISTED BELOW:	
First Aid- Eyes	<ol style="list-style-type: none"> 1. Move to the eyewash, forcibly hold eyelids open and begin flushing both eyes. 2. Remove contact lenses and eyewear while flushing (if applicable). 3. Dial 911 or have someone else dial 911. 4. Keep flushing eyes under the eyewash until emergency personnel arrives. 5. Report incident to supervisor and EHS.

First Aid- Skin Contamination	<ol style="list-style-type: none"> 1. Move to safety shower, pull shower handle, and flush affected area with water. 2. Remove contaminated clothing while flushing (if applicable). 3. Dial 911 or have someone else dial 911. 4. Keep rinsing affected area until emergency personnel arrives. 5. Report incident to supervisor and EHS.
First Aid- Electric Shock or Burns	<ol style="list-style-type: none"> 1. Turn off electric power at the main disconnect. 2. Extinguish any burning clothing on the victim. 3. Remove any smoldering or hot clothing that's not sticking to the skin of the victim. 4. Dial 911 or have someone else dial 911. 5. Consider CPR and or AED as necessary for electric shock. 6. Report incident to supervisor and EHS.
First Aid- Inhalation	<ol style="list-style-type: none"> 1. Move to fresh air. 2. Dial 911 or have someone else dial 911. 3. Report incident to supervisor and EHS.
First Aid- Other	<i>Describe additional first aid procedures based on hazards (e.g. use of Water-Jel wraps or blankets to reduce burn severities).</i>

SECTION 10. SELECT WASTES GENERATED AND DESCRIBE MANAGEMENT PROCEDURES

Type of Waste	Waste Characteristics	Waste Management
<input type="checkbox"/> Chemical	<input type="checkbox"/> Corrosive <input type="checkbox"/> Ignitable <input type="checkbox"/> Reactive <input type="checkbox"/> Toxic	<i>Describe how hazardous chemical wastes will be managed (e.g. Label with words "Hazardous Waste", Use full chemical names on labels, Keep waste containers closed, Storage with compatible wastes, etc.)</i>
<input type="checkbox"/> Biological	<input type="checkbox"/> Solid <input type="checkbox"/> Liquid <input type="checkbox"/> Sharps <input type="checkbox"/> Animal Research	<i>Describe how biological wastes will be managed (e.g. sharps disposed of in approved sharps containers, solid wastes collected in biohazard box-bag units, etc.).</i>
<input type="checkbox"/> Radioactive	<input type="checkbox"/> Short half-life <input type="checkbox"/> Long half-life	<i>Describe how radiological wastes will be managed (e.g. short half-life waste segregated by radionuclide, radioactive waste stored in containers provided by the Radiation Safety Office, etc.).</i>
<input type="checkbox"/> Other		

SECTION 11. DECONTAMINATION PROCEDURES

<input type="checkbox"/> Equipment	<i>Describe how equipment will be decontaminated after use (e.g. use manufacturer instructions, specifications, etc.).</i>
<input type="checkbox"/> Glassware	<i>Describe how glassware (i.e. beakers/flasks/test tubes, etc.) will be decontaminated after use.</i>

<input type="checkbox"/> Work Area	<i>Describe how the work area (e.g. lab benches, fume hoods, etc.) will be decontaminated after use.</i>
<input type="checkbox"/> Personal Hygiene	<i>Describe how the researchers will decontaminate after procedure.</i>

SECTION 12A. RESEARCHER APPROVAL

I have reviewed and will follow the standard operating procedure (SOP) for the procedure/process listed above. I understand that further approval from the PI/Lab Manager is required if any of the following events occur:

- A change in operational voltages or available short circuit current that would require a change in the arc rated protective clothing or shock hazard protection.
- Any change in over-current protective devices or their settings that could potentially change the clearing times of fuses or circuit breakers.
- Any change in the selective coordination of circuit breakers or fuses in the system.
- A change in amount (*Add quantity and/or volume*) or substitution of the chemicals in the procedure is planned.
- A change in the agreed-upon experimental set-up as planned.
- Signs of a failure in safety design or equipment are observed.
- Signs or symptoms of a chemical exposure are observed.
- Unexpected and/or potentially dangerous experimental results occur (e.g., electric shock, arc flash, fire, uncontrolled buildup of heat and/or pressure, etc.)

Significant Changes with new safety implications many require a revised procedure.

Print Name	Signature	Date

Section 12B. PRINCIPAL INVESTIGATOR APPROVAL

I approve the contents of the lab-specific standard operating procedure listed above:

SIGNATURE:	DATE:	PHONE:
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A HARD COPY OF EACH PROCEDURE MUST BE STORED IN THE LAB.