got PPE?

your safety is nothing to experiment with
Outfitting UC’s Laboratory Heros

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UC Systemwide Laboratory Safety Manager

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University of California Office of the President
Director of EH&S

American Chemical Society
San Francisco, CA 8-12-2014
Big Picture Timeline

- **Planning Ordering**
- **LHAT**
- **Event Reg.**
- **Fitting & Bulk Distribution**
- **Steady State**

- Q2 2013
- Q4 2013
- Q1 2014
- Q2 2014

- ~40,000 Researchers
Why PPE?

Elimination
Substitution
Isolation
Engineering
Administrative
PPE
Cal/OSHA 8 CCR 3320 Hazard Assessment.

- Employers are required to **assess** the workplace for hazards that will require PPE.
- This assessment **documented**
- **Select** PPE that will protect the worker from the hazards identified
- **Communicate** assessment and selection decisions
- **Train** researches on the PPE
- Select PPE that properly **fits** each lab worker
- **Use** the PPE
- ** Maintain** the PPE
Systemwide Policy on PPE

- Systemwide Training Policy: PPE Policy
- Submitted for OP review June 2012. – under adoption review
- Applies to
  - all laboratory areas and
  - all faculty, staff, volunteer, or visitor/visiting scholars.

http://policy.ucop.edu/
PPE Documentation

- Volume 1: System-Wide Program Requirements & Technical Resources
- Volume 2: Campus-Specific Bulk Distribution Event Guide
- Volume 3: Campus-Specific Steady State Program
1. Principal Investigators (PI)
Use the Laboratory Hazard Assessment Tool (LHAT) to:
- Create lab groups
- Assess workplace hazards to determine PPE to be used
- Invite lab staff and approve lab worker association
- Assign a delegate or designee to perform these actions (optional)
  - Documented in LHAT

2. Lab Worker
Use LHAT to:
- Identify with a lab group
- Review hazard assessment
- Complete the Outfit for Safety Training and quiz
- Print a PPE voucher
  - Documented in LHAT

3. Schedule Fitting Time
Schedule fitting time with EventBrite.
  - Documented in EventBrite

4. Fitting and Distribution
Fitting and distribution of the PPE.
  - Documented by Mission Linen

5. PPE Maintenance
Researcher uses program in place to maintain and replace PPE.
- Dirty coats go into a specially marked hamper
- Clean coats returned on hangers
- Dirty coats go into the mail (in a sealed envelope)
- Clean coats return on hangers
- Dirty coats go into the mail (in a sealed envelope)
- Clean coats return in the mail or delivery service
Principal Investigators (PI)

Use the Laboratory Hazard Assessment Tool (LHAT) to:
- Create lab groups
- Assess workplace hazards to determine PPE to be used
- Invite lab staff and approve lab worker association
- Assign a delegate or designee to perform these actions (optional)

☑️ Documented in LHAT
<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>C2. Working with hazardous liquids or other materials which create a splash hazard</th>
<th>Eye or skin damage</th>
<th>Poisoning</th>
<th>Chemical-resistant apron should be considered</th>
<th>Face shield should be considered</th>
<th>Lab coat</th>
<th>Chemical-resistant gloves</th>
<th>Chemical splash goggles</th>
<th>In adjacent area:</th>
<th>Safety glasses</th>
<th>Lab coat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>C3. Working with small volumes (&lt;= 4L) of corrosive liquids or solids</td>
<td>Low probability for a splash hazard</td>
<td>Eye or skin damage</td>
<td>Safety glasses</td>
<td>Lab coat</td>
<td>Chemical-resistant gloves</td>
<td></td>
<td>Safety glasses</td>
<td>Lab coat</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>C4. Working with large volumes (&gt; 4L) of corrosive liquids or solids</td>
<td>Low probability for a splash hazard</td>
<td>Eye or skin damage</td>
<td>Safety glasses</td>
<td>Lab coat</td>
<td>Chemical-resistant apron</td>
<td>Chemical-resistant gloves</td>
<td>Safety glasses</td>
<td>Lab coat</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>C5. Working with small volumes (&lt;= 1L) of flammable solvents/materials when no reasonable ignition sources are present</td>
<td>Eye or skin damage</td>
<td>Potential poisoning through skin contact</td>
<td>Safety glasses</td>
<td>Lab coat</td>
<td>Chemical-resistant gloves</td>
<td></td>
<td>Safety glasses</td>
<td>Lab coat</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>C6. Working with large volumes (&gt; 1L) of flammable solvents/materials</td>
<td>Major skin or eye damage</td>
<td>Major fire</td>
<td>Potential poisoning through skin contact</td>
<td>Flame-resistant cutout gloves should be considered</td>
<td>Safety glasses</td>
<td>Chemical-resistant gloves</td>
<td>Flame resistant lab coat (NFPA 2112)</td>
<td>Safety glasses</td>
<td>Lab coat</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>C7. Working with any quantity of flammable solvents/materials when there are reasonable ignition sources present, or working in areas where flammable concentrations of vapors or gas may be present</td>
<td>Major skin or eye damage</td>
<td>Major fire</td>
<td>Potential poisoning through skin contact</td>
<td>Flame-resistant outer gloves highly recommended</td>
<td>Safety glasses</td>
<td>Chemical-resistant gloves</td>
<td>Flame resistant lab coat (NFPA 2112)</td>
<td>All personnel in laboratory</td>
<td>Safety glasses</td>
<td>Flame resistant lab</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>C8. Working with Category 1 or 2 acutely toxic chemicals</td>
<td>Chemicals pose a high level of immediate threat</td>
<td>Safety classes</td>
<td></td>
<td>Safety glasses</td>
<td>Lab coat</td>
<td>Chemical-resistant gloves</td>
<td>Flame resistant lab coat (NFPA 2112)</td>
<td>Safety glasses</td>
<td>Lab coat</td>
<td></td>
</tr>
</tbody>
</table>
So what type of Lab Coat Do you Need?

What’s the diff?
Dr. Charles Perrin – Professor of Chemistry
50 years of Teaching, Research and Service
PURPOSE OF FR FABRICS

Reduce Burn Injury and Increase Chance of Survival

- Does Not Ignite and Continue to Burn
- Does Not Melt and Drip
- Maintains a Barrier
- Insulates the Wearer from Heat
- Resists Breaking Open
- Provides Valuable Escape Time

Garment Purchasing Considerations:

- Durability / Value in Use
- Comfort / Design
- Reactivity to Oxidizers
- Particle Shedding
  - Predicted Burn Injury
SO WHAT’S RELEVANT?

HAZARD ASSESSMENT
• What are you protecting against?

NFPA 2113
• Hazard Assessment
• Garment selection, care, use and maintenance

NFPA 2112
• Standard for flame resistant garments
• 7 tests to pass including <50% body burn at 3 sec, 2 cal/cm²/sec

Garment Manufacturer
• Licensee
• ISO Certification
• Experience, Focus
• Design and Style

Industrial Laundry
• Experience with FR Garments
• Program Management
• Experience, Service

PPE Distributor
• Program Management
• Experience, Service
• Garment Maintenance/Repair?

Other NFPA Standards
• NFPA 70E –
  • Designed for electricians working on energized equipment (Different Hazard)

• NFPA 701 –
  • Flame propagation for textiles and films (Not for Garments)

Fabric Technology ...

NOT?
# FABRIC PERFORMANCE

<table>
<thead>
<tr>
<th>Inherent</th>
<th>Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>i.e. Nomex®, Kevlar®</td>
<td>i.e. UltraSoft®, Proban®</td>
</tr>
</tbody>
</table>

Fiber molecular structure does not support combustion

Chemicals added to fabric produce char/gas to inhibit combustion

**PROS**
- ✓ Permanent FR protection
- ✓ Lighter weight
- ✓ Durable
- ✓ Fiber resistant to chemical degradation
- ✓ Exceeds minimum FR standard

**CONS**
- o Higher initial cost
- o FR can be compromised by bleach/chemical exposure
- o Shorter life span
- o “Activates” beyond minimum exposure
- o Higher particle shedding
What if FR PPE is NOT ENOUGH?
Chemical Protection should not compromise Fire Protection

• Most chemical protective garments are flammable and should not be worn when fire is a hazard

• Tychem® ThermoPro fabric provides TRIPLE HAZARD protection from liquid-chemical splash, flash fire and electric arc by combining DuPont™ Tychem® chemical barrier and DuPont™ Nomex® FR technology

  • Meets FR requirements of NFPA 2112 standard

  • Provides at least 30 minutes of protection against more than 180 chemical challenges
Selection Guide for FR was developed...

<table>
<thead>
<tr>
<th>Product Name</th>
<th>FR Type</th>
<th>Manufacturer(s)</th>
<th>FR Rating/Test</th>
<th>Fabric Weight (oz/yd)</th>
<th>% Laundering Shrinkage</th>
<th>Laundering Colorfastness</th>
<th>% Moisture regain</th>
<th>Tenacity (lbs)</th>
<th>Chemical &amp; Other Incompatibilities / Limitations</th>
<th>Garment Life / Color Options</th>
<th>Standard Sizes / Comfort</th>
<th>Price</th>
<th>Hazard Level (HL) Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nomex IIIA</td>
<td>Inherently FR</td>
<td>Bulwark Dupont Workkne</td>
<td>NFPA 2112, NFPA 70E</td>
<td>4.5 - 7.3</td>
<td>&lt;2 - 3.5</td>
<td>Fair to Good</td>
<td>4.5 - 5.5 (moderate)</td>
<td>240 x 150</td>
<td>No chemical splash protection. Good resistance to alkaloids. Unaffected by most acids, unless exposed for long periods to high concentration acids. No chlorine bleach laundering.</td>
<td>Excellent, reported to last 3-5 times longer than cotton or chemically treated garments / Many color options</td>
<td>Semi-breathable – not as good as cotton. Can feel bulkier than cotton, &quot;itchy&quot;, stiff, or rough</td>
<td>$100/ea</td>
<td>For use up to HL-4 Highest FR protection rating, most durable, longest life, fewest chemical incompatibilities. Cost higher than most other FR.</td>
</tr>
<tr>
<td>Tecasafr Plus Cool Touch 2</td>
<td>Inherently FR</td>
<td>TenCate Bulwark</td>
<td>NFPA 2112, NFPA 70E</td>
<td>5.8 - 8.5</td>
<td>&lt;3</td>
<td>Fair to Good</td>
<td>No data</td>
<td>135 X 85 lbs</td>
<td>No chemical splash protection. Newer material.</td>
<td>Excellent / Many</td>
<td>Semi-breathable. Can feel bulkier than cotton, &quot;itchy&quot;, stiff, or rough. May not be widely available as Nomex.</td>
<td>$80/ea</td>
<td>For use up to HL-4 Highest FR protection rating, most durable, longest life, fewest chemical incompatibilities. Cost lower than Nomex, but higher than most treated FR.</td>
</tr>
<tr>
<td>Teczen</td>
<td>Inherently FR</td>
<td>Ashburn Hill Corp.</td>
<td>NFPA 2112</td>
<td>5.5</td>
<td>&lt;3</td>
<td>Fair to Good</td>
<td>6</td>
<td>110 X 80 lbs</td>
<td>No specific info available</td>
<td>No specific info available</td>
<td>All sizes</td>
<td>TBD</td>
<td>More info needed</td>
</tr>
<tr>
<td>Indura Ultra Soft Arapahoe KL16</td>
<td>Chemically Treated FR: Cotton Blend 88%/12% nylon - THP-treated</td>
<td>Westex Unknown Bulwark</td>
<td>NFPA 2112, NFPA 70E</td>
<td>7 - 9</td>
<td>3 - 5</td>
<td>Fair</td>
<td>8.5 - Arapahoe</td>
<td>130 x 100, 110 x 100 - Arapahoe 129 x 60 - KL16</td>
<td>FR properties degraded by petroleum and other flammable liquids. Not splash resistant. No chemical splash protection. Degraded by acids. No chlorine bleach laundering. Flame-resistant fabrics treated with a phosphorus containing flame retardant should not be used in chemical operations where contact with strong oxidizers (e.g. &gt;10% sodium hypochlorite, NaOCl) or reducing agents (e.g. sodium hydrosulfite, Na2S2O4) is possible. Contact with these chemicals may result in chemical burns to the wearer. Not ideal for static control. Good / Many Cotton has poor resistance to mildew, aging, sunlight. Nylon content improves abrasion resistance. FL guaranteed for life of product. Reportedly 50% longer than 100% cotton.</td>
<td>Breathable, soft, more comfortable than synthetics</td>
<td>Good / Many Cotton has poor resistance to mildew, aging, sunlight. Nylon content improves abrasion resistance. FL guaranteed for life of product. Reportedly 50% longer than 100% cotton.</td>
<td>$50/ea</td>
<td>For use up to HL-3 High FR protection rating, chemical incompatibilities with select oxidizers and reducing agents. Feels similar to standard cotton-blend lab coats. Cost lower than Nomex and other inherent FR.</td>
</tr>
</tbody>
</table>
## Type of Basic PPE

<table>
<thead>
<tr>
<th></th>
<th>FR NFPA 2112</th>
<th>Non-FR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td>Traditional Open Cuff</td>
</tr>
<tr>
<td>Female</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td></td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Male</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td></td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>
**Personal Protective Equipment (PPE)**

**VOUCHER**

<table>
<thead>
<tr>
<th>Personal Information</th>
<th>Lab Group Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ryan Mosley</td>
<td>Pt: Ryan Mosley</td>
</tr>
<tr>
<td><a href="mailto:rmosley@ucdavis.edu">rmosley@ucdavis.edu</a></td>
<td>Lab Group: Dr Mosley's Chem Lab</td>
</tr>
<tr>
<td>Hazard Assessment Reviewed: 10/14/2013</td>
<td>PIs Department: ACADEMIC &amp; STAFF ASST PROG</td>
</tr>
<tr>
<td>PPE Training Completed: 10/14/2013</td>
<td>Hazard Assessment Certified by Pt: 10/14/2013</td>
</tr>
</tbody>
</table>

**Recommended Personal Protective Equipment**

The items below can be picked up at your campus **Product Distribution Center**:

- Safety glasses
- Flame resistant lab coat (NFPA 2112)
- Barrier lab coat impervious to fluids
- Chemical splash goggles
Success of an PPE program is dependent on **three** factors:

1. Fit
2. Fit
3. Fit
Why do you think that fit is the most important factor in selecting PPE?
Eyewear – Systemwide

![Bar chart showing eyewear usage across different locations](image-url)
Bulk Distribution Event
FREE PPE!
PPE Distribution Event

[Event Date]
[Event Time]
[Event Place]
[Event Campus]
[Event EventLink]

Watch Training video, take a quiz, and print a PPE voucher.
Sign up on Eventbrite for a convenient time to attend the event.
Bring PPE voucher and get FREE PPE.

For more information, please contact XXXX-XXXX at XXXX-XXXX.

UNIVERSITY OF CALIFORNIA