WELCOME TO THE 2020 GRADUATE STUDENT SAFETY SEMINAR!

1:30	Welcome! Safety Responsibility and the role of EH&S	*Dr. Tracy Harvey, EH&S Lab Safety Program Manager, Chemical Hygiene Officer*
1:45	General Hazard Awareness and Workspace Safety	*Scott Nelson, EH&S Occupational Health and Safety Specialist*
2:00	Biohazards and animals, Incident Response	*Eleanor Wade, EH&S Occupational Health and Safety Specialist*
2:15	Guest Faculty Speaker	*Dr. Alex Merz, Professor, Biochemistry; Adjunct Associate Professor, Physiology and Biophysics*
2:30	Chemical Safety and General Laboratory Safety Best Practices	*Alex Hagen, EH&S Laboratory Safety Specialist*
2:45	Guest Faculty Speaker	*Dr. Kristi Morgansen, Chair and Professor, Aeronautics & Astronautics; Adjunct Professor, Electrical and Computer Engineering*
3:00	Summary and Closing Remarks ☺	*Dr. Tracy Harvey*

WORKING TOGETHER FOR A
SAFE AND HEALTHY U

GRADUATE STUDENT SAFETY SEMINAR

TRACY HARVEY, PHD
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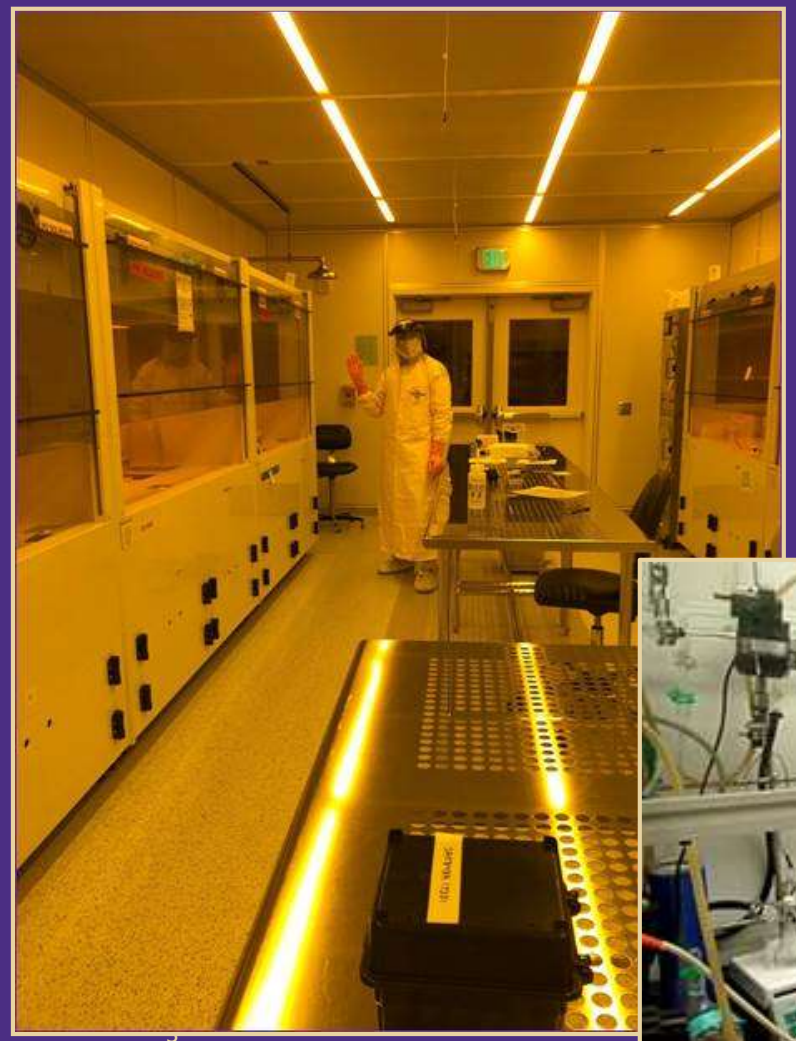
ENVIRONMENTAL HEALTH & SAFETY
UNIVERSITY of WASHINGTON

THE UW RESEARCH ENVIRONMENT IS UNIQUE!



WHY THE FOCUS ON SAFETY – WHY IS THIS IMPORTANT?

- You may be working in potentially hazardous environments that are unfamiliar.
- Your PI, department, and future employers expect you to understand and demonstrate safe laboratory practices.
- You want to be successful in your scientific career… and not get hurt or hurt anyone else.

IS THERE EVIDENCE THAT SOME WORKSPACES POSE RISK AT THE UW?

- Multiple lab fires in past 10 years
- Chemical Spills: 18 reported spills in 2019 and 17 so far in 2020.
- Serious employee injuries: every year
- Serious incidents: every year
- Near-miss incidents: 81 in 2019 and 41 so far in 2020.

- Reported injuries: 15-20 lab-related incidents reported per month at the University of Washington; over 1000 work-related injuries reported last year

SAFETY RESPONSIBILITY

RESEARCH AND TEACHING LABORATORIES

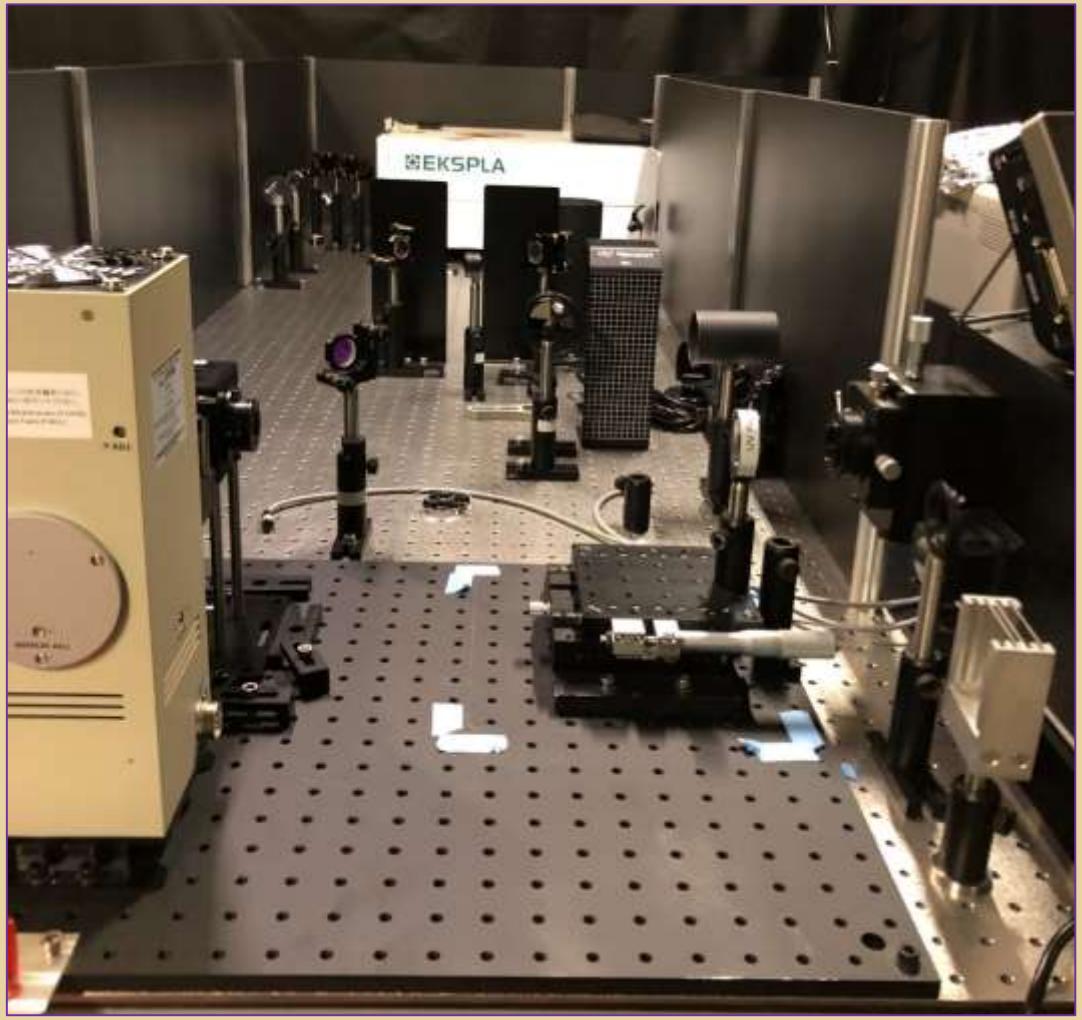
- ✓ Hazardous Chemicals in Use
- ✓ Laboratory Scale Operations
- ✓ Chemicals “Manipulated”
- ✓ Protective Practices / Equipment Required

SAFETY RESPONSIBILITY

RESEARCH AND TEACHING WORKSPACES

- ✓ Biological
- ✓ Physical
- ✓ Radiological

hazards may also be present in a lab space.



SAFETY RESPONSIBILITY

Responsibilities matrix

http://www.ehs.washington.edu/system/files/resources/matrix.pdf

Packet item

UW LABORATORIES SAFETY RESPONSIBILITY MATRIX

Levels	Actions
INSTITUTIONAL (President, Chancellors & Provost)	• Demonstrate safety as a *core value* to the institution; encourage public discussion, provide adequate resources, and develop effective policies (Executive Order 55 and Institutional Policies). • Appoint a leadership team responsible for building a culture of safety. • Align rewards and recognition systems with efforts to promote safety.
COLLEGE / SCHOOL (Deans)	• Lead to promote a culture of safety in laboratories; emphasize training, PPE, and chemical safety. • Require review of safety policies, procedures, and guidelines for laboratories. • Be informed of serious accidents/incidents and follow up to prevent recurrence. • Maintain awareness of teaching and research activities and the risks they present to the Institution. • Manage college resources considering safety oversight, facility improvement, and safety goals.
DEPARTMENTAL (Chairs & Directors)	• Foster a positive culture of safety as criteria for faculty promotion, tenure, and salary. • Motivate responsible parties to improve safety and achieve institutional goals. • Appoint a safety officer to promote and ensure safety procedures department-wide. • Remind PI's to take safety training and require use of PPE prior to conducting work in a laboratory. • Promptly address issues identified in lab safety surveys; review accident reports and assure preventative actions and SOP's are in place.
PRINCIPAL INVESTIGATORS & FACULTY	• Assume ultimate responsibility and set expectations for safety within their laboratory. • Facilitate open dialogue regarding safety standards (labs and field sites), develop clear written procedures for lab operations, and oversee safety responsibilities delegated to personnel working in the laboratory. • Conduct a hazard analysis prior to conducting any experimental procedures; address issues regarding inadequate or compromised equipment in their laboratory. • Manage chemicals correctly in accordance with written procedures and best practices; maintain an orderly and well-managed laboratory to provide sufficient space for safe practices. • Ensure everyone in the lab receives proper safety training and is provided with adequate PPE; wear appropriate PPE for personal protection to model a culture of safety. • Report accidents/incidents/near misses in OARS; discuss lessons learned with supervisor and co-workers.
RESEARCH STAFF; LABORATORY STAFF; VOLUNTEERS; INTERNS; UNDERGRADUATE, GRADUATE STUDENTS; & POSTDOCTORAL SCHOLARS	• Be mindful of potential risks to their own safety and safety of others in the lab, classroom, and field. • Stop any experiment or activity that is potentially unsafe and notify your supervisor. • Notify your supervisor of potentially unsafe or faulty equipment or supplies. • Immediately report all accidents and incidents to your supervisor, OARS, and discuss lessons learned. • Follow verbal and written lab safety rules, wear PPE, and follow written procedures. • Complete all training requirements and classes; both required and recommended. • Conduct a hazard analysis prior to conducting any experimental procedure. • Include a hazard analysis and safety considerations in thesis, dissertation, and funding proposals.
ENVIRONMENTAL HEALTH & SAFETY (EH&S)	• Work collaboratively with research personnel to promote an open dialogue to enhance safety; provide essential online and classroom lab safety training. • Maintain the Lab Safety Manual and tools (i.e.) selecting and utilizing PPE that reflect best practices. • Maintain an effective chemical inventory database with access to safety data, tools, and reports. • Test fume hoods and biological safety cabinets to ensure effective performance. • Provide fit testing for cartridge respirators and advice on PPE options. • Collect hazardous waste (in a timely manner). • Identify and evaluate hazards via a supportive lab safety survey program. • Collect and report safety metrics to the research community, committees, and leadership. • Monitor and communicate regulatory and advisory changes to the research community.
FACILITIES SERVICES	• Maintain building systems and perform custodial services to facilitate lab operations. • Test and service fire and life safety systems and equipment including: showers, eyewashes, fire extinguishers.

EH&S SERVICES: BEFORE

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Tools

- EH&S safety manuals (lab safety, biosafety, radiation safety, diving safety)
- Chemical inventory (MyChem)
- Hazard assessment for PPE
- Templates - Emergency planning, SOP, risk assessments or hazard analysis.

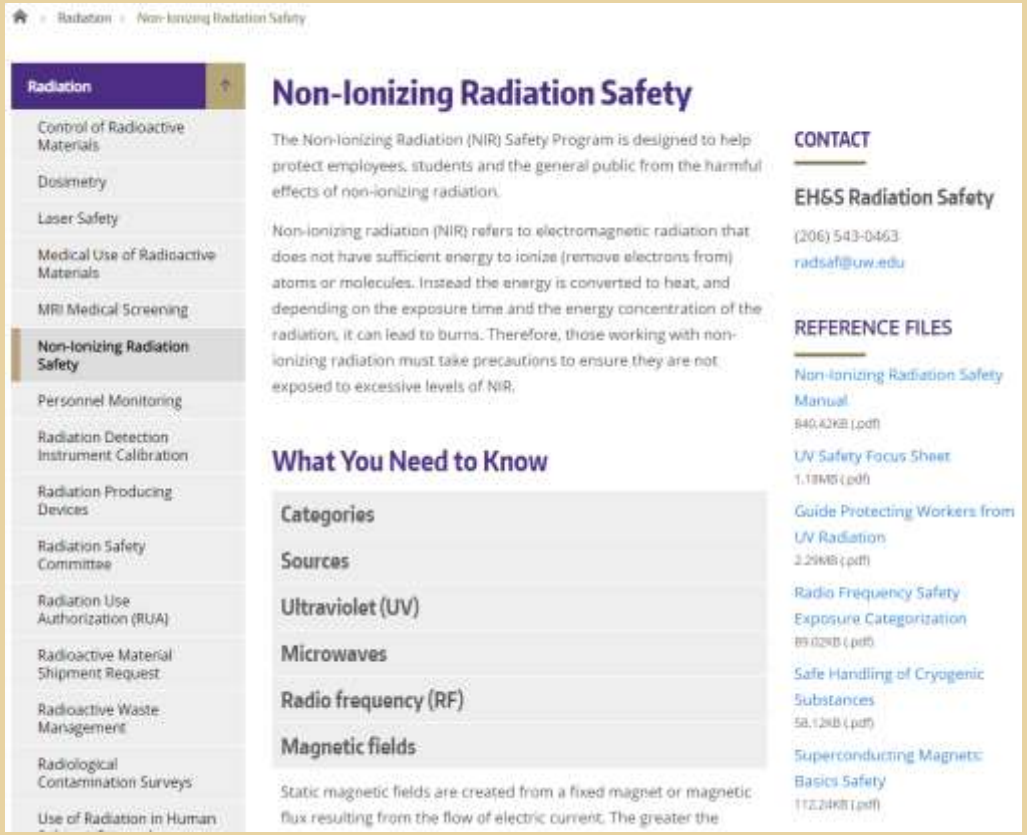
Services

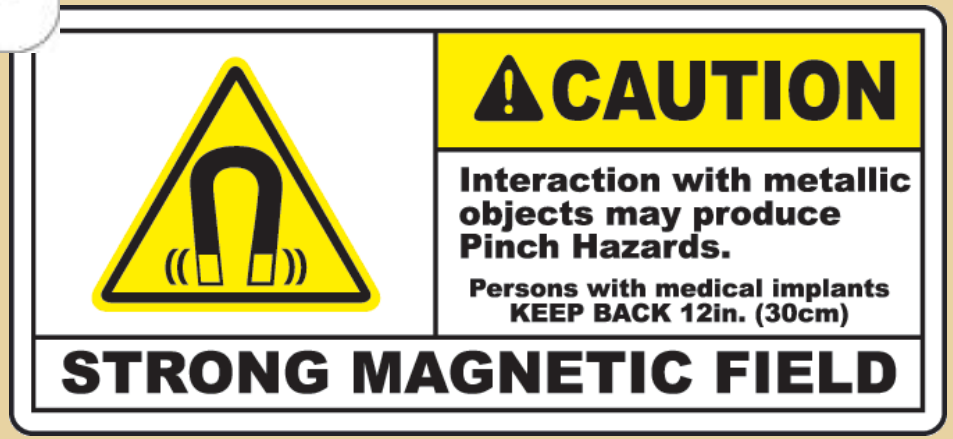
- Safety Training
- Set-up waste collection procedures
- Assessments
- UW Safety committee support
- Protocol review

Approvals

- Biological and radiological use approvals
- Medical clearance (animal & respirator use)
- Biosafety cabinet and fume hood installs

EH&S SERVICES: BEFORE





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EH&S SERVICES: DURING

- Audits, Surveys, & Inspections
- Waste collection
- Training
- Fume hood inspections
- Biosafety cabinet certifications
- Consultation/SOP review
- Accident investigation
- Transportation of hazardous materials

EH&S SERVICES: DURING

- Waste bottle explosion
- Oven fire in a fume hood

EH&S SERVICES: AFTER

- Lab move support
- Radioactive, biological and chemical waste pick up
- Contamination surveys
- Decontamination assistance

Quiz!

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GENERAL HAZARD AWARENESS AND WORKSPACE SAFETY

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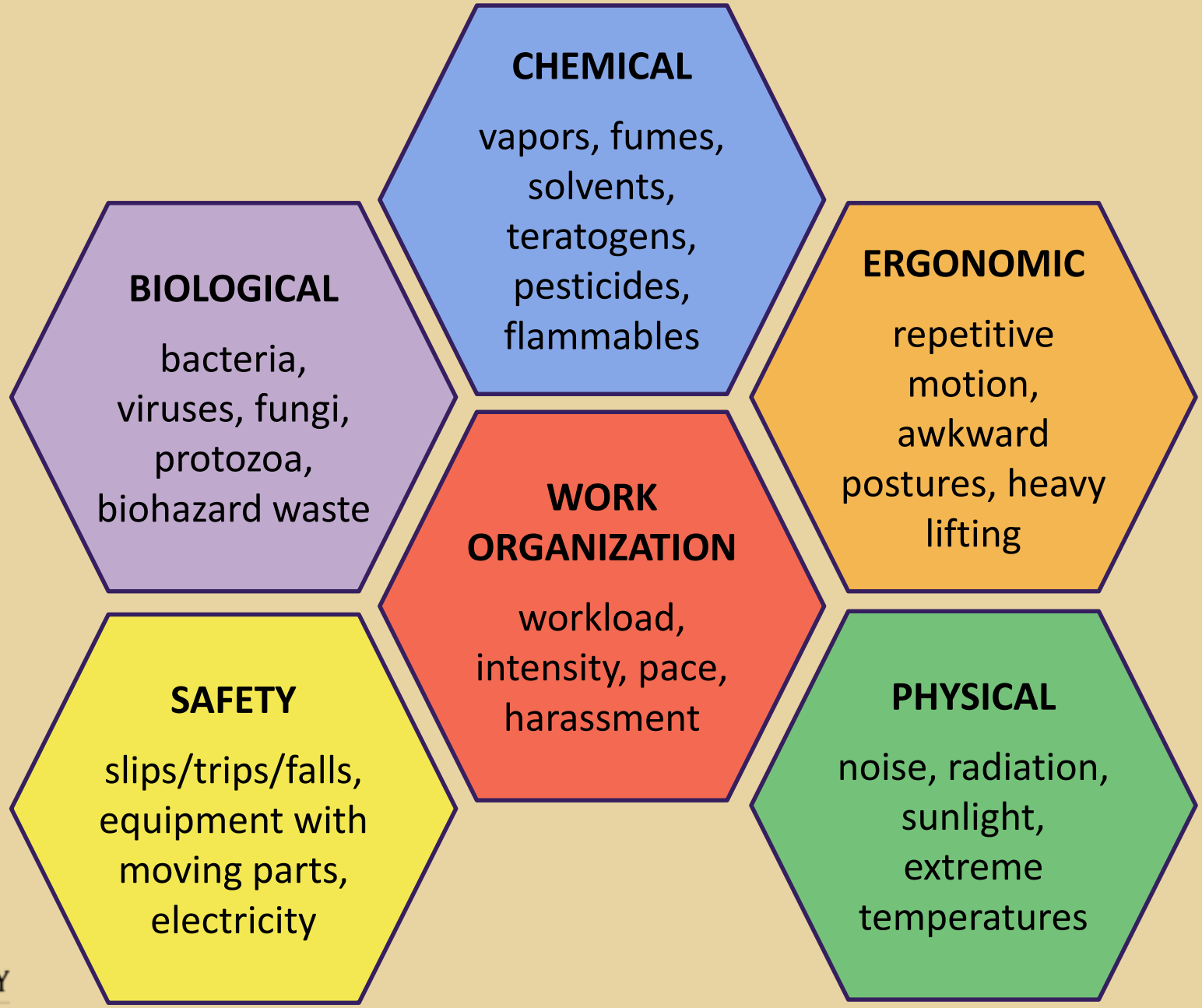
WHAT IS A HAZARD?

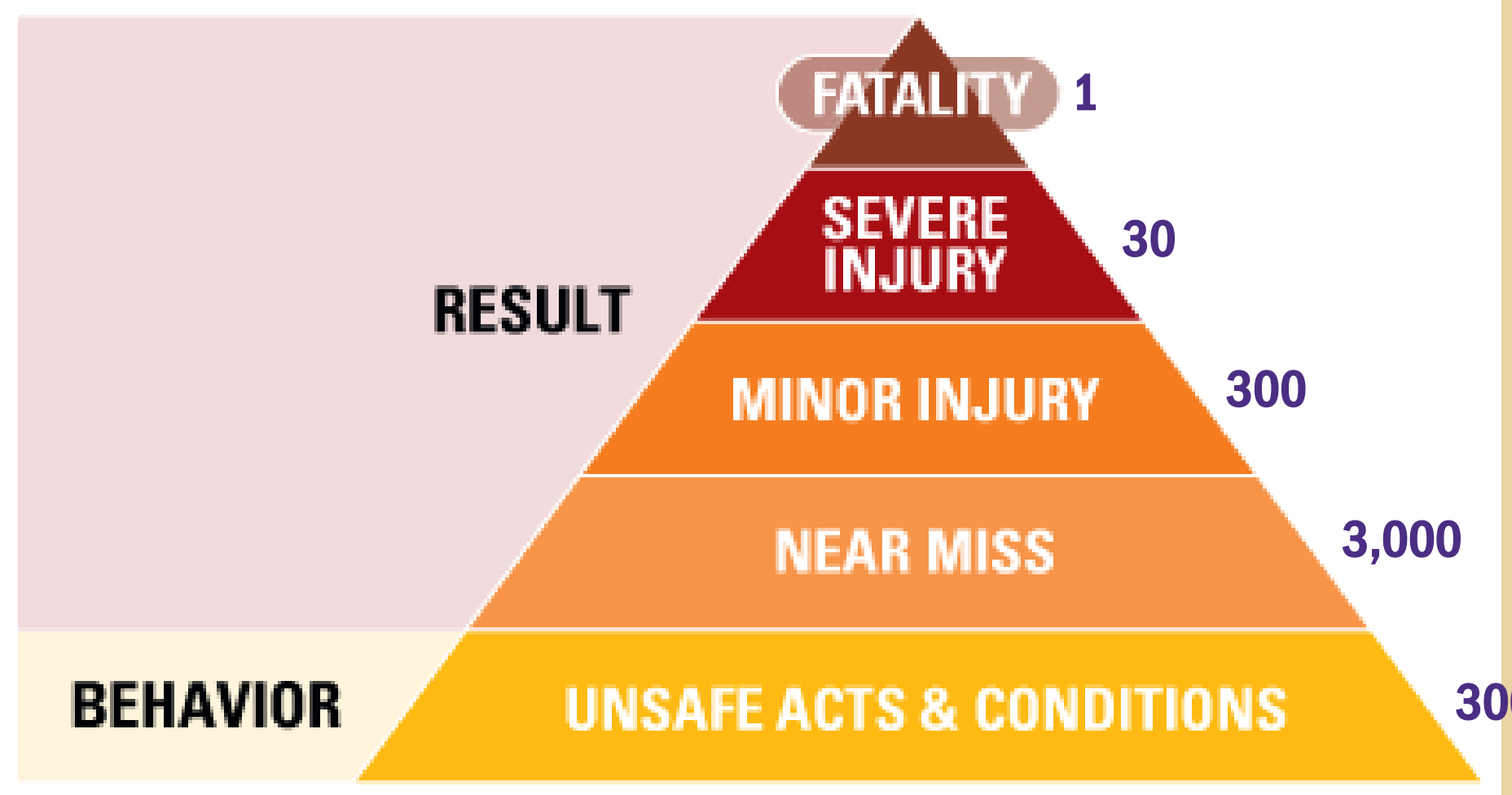
A hazard is a condition or set of circumstances that presents potential for harm.

- Health hazards that cause illnesses
- Safety hazards that cause physical harm or injury

TYPES OF HAZARDS



IMPORTANCE OF RECOGNIZING HAZARDS



WALKING AND WORKING SURFACES

ELECTRICITY

Hazards

- Contact with live parts causing shock and burn
- Faults which could cause fire
- Switching an electrical circuit-breaker could cause an arc event

Controls

- EH&S Basic Electrical Safety Page
- UW LOTO Program
- Basic Electrical Safety online training
- Campus electrical resources (i.e. electricians)
  - Permitted to work on 50 V or greater

PHYSICAL HAZARDS IN SHOPS

ABOUT

Shop and Maker Spaces

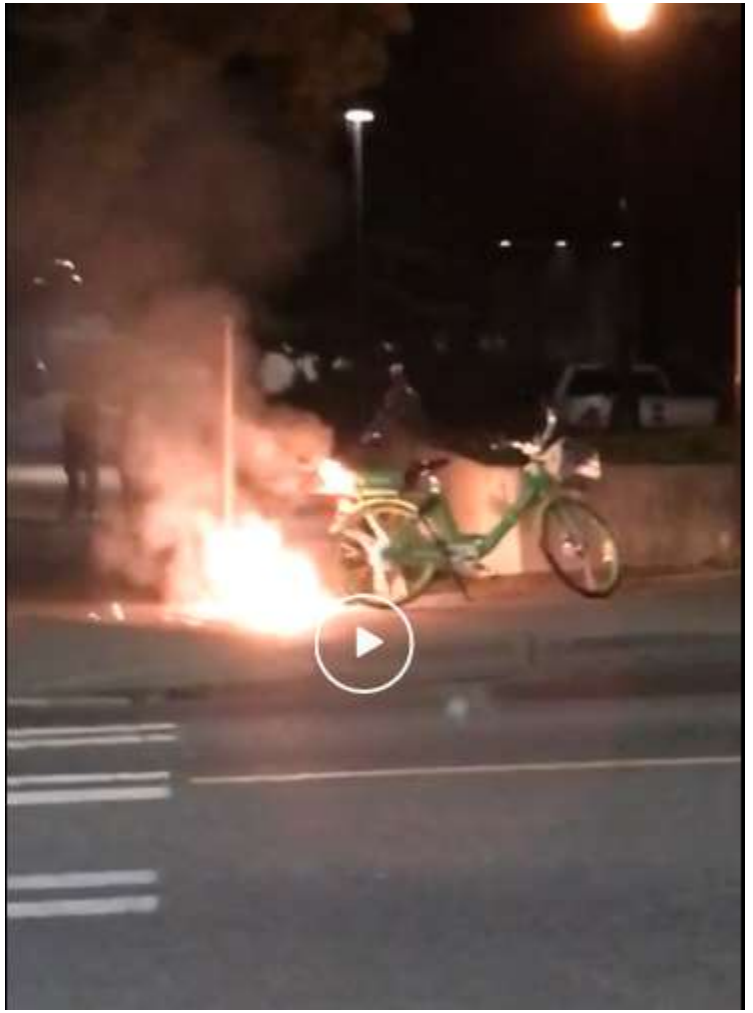
- Areas where fabrication and repair activities occur, using tools and machinery that present physical hazards
- These spaces could contain hazardous equipment, hazardous materials and hazardous activities
- There is a Responsible Party controlling access to the space and maintains Shop Safety

SHOPS AND MAKERSPACES

SHOPS AND MAKERSPACES

LI-ION BATTERIES

- Hydrocarbon solvent
- Ganged together
- Thermal runaway



CRYOGENS AND COMPRESSED GASES

EGRESS?

FIELD SAFETY

- Boating Safety
- Diving Safety
- Physical hazards in the field
- Vehicle safety
- Remote field work and international travel

APHORISMS OF SAFETY

- Fire is an exothermic one-way Red-Ox reaction
- Gravity always wins
- You cannot put toothpaste back in the tube
- We cannot read each others minds

Before starting anything in a lab or shop

- Take a moment to think
- Talk to others around you – communication is critical
- Move forward purposefully

Quiz!

ELEANOR WADE
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BIOHAZARDS AND ANIMALS, INCIDENT RESPONSE

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WORKING WITH BIOHAZARDOUS MATERIALS

BIOHAZARDS = CAN CAUSE HARM OR DISEA IMALS, OR THE ENVIRONMENT

Includes:

- **Pathogenic agents (bacteria, viruses, pri**
- **Recombinant/synthetic nu**
- **Human and po**
- **Pla**

600+ Investigators, 900+ Protocols
All regulated by Biological Use Authorization / IBC Process

WORKING SAFELY WITH BIOHAZARDS

- Know the hazards of what you (or your neighbors) are working with!
- Know your BUA and your containment level (BSL 1-3) – wear the right PPE!
- Package and dispose of your waste appropriately
- Use your biosafety cabinet appropriately
- Use good decontamination practices
- Know what to do if you get exposed

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BLOODBORNE PATHOGENS

NOT JUST LIMITED TO LAB RESEARCH!

BBP = harmful pathogens in human blood or other potentially infectious materials

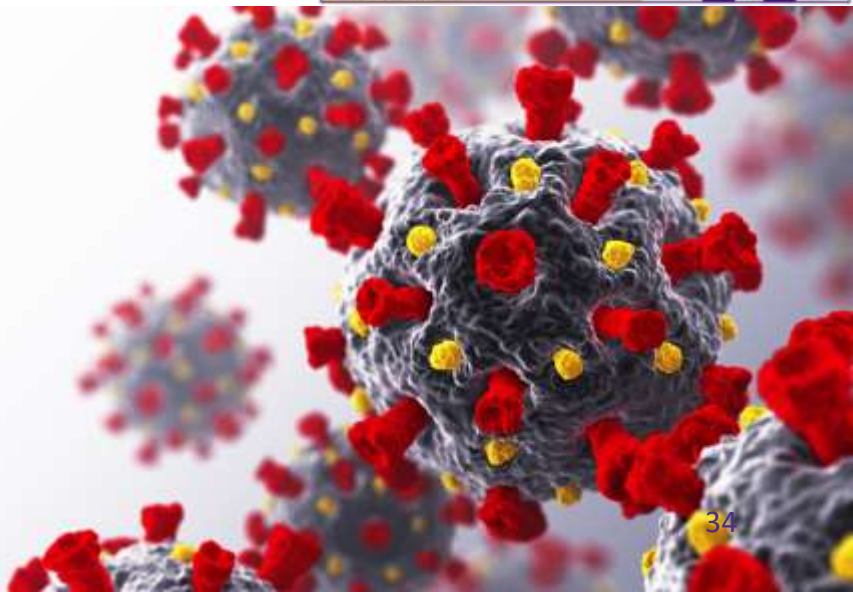
- **If you work with BBP, you should have a site-specific Exposure Control Plan**
- **Supervisors required to offer Hepatitis B vaccine if you have potential exposure**
- **Online training is available AND required annually!**
- **Use Universal Precautions = All human blood/OPIM is infectious**
  - Working or volunteering in a clinical setting
  - If you or a coworker is injured
  - If you encounter BBP outside of work

COVID-19 CONSIDERATIONS

SPEAKING OF BIOHAZARDS…

- Your lab should have a COVID-19 Prevention Plan
- Training: General (online) and site-specific (through your PI)
- Daily attestation, staying home when sick!
- Mandatory masking
- Physical distancing
- Cleaning and disinfection

REQUIREMENTS WILL EVOLVE THROUGHOUT THE YEAR



WORKING WITH ANIMALS

RODENTS, CANINES, AND PRIMATES- OH MY!

- Animal research at UW regulated by the Office of Animal Welfare (OAW), IACUC, NIH, and others.
- Types of research:
  - Infectious disease
  - Cancer and genetics
  - Toxicology
  - Behavioral
  - Ecological
- Occurs in designated animal housing, distributed labs, satellite facilities, remote field…

100,000 Animals
300+ Investigators
500 Active Protocols

HAZARDS UNIQUE TO WORKING WITH ANIMALS

- Chemical Hazards: anesthetic gases, fixing agents, hazardous drugs…
- Zoonotic diseases
- Infectious disease/biohazardous material exposure
- Physical hazards (bites, scratches, ergonomics, firearms)
- Sharps/needlesticks
- Noise
- Lab Animal Allergens

Animal Use Medical Screenings (AUMS)

Occupational Health Recommendations

WHAT TO DO IF SOMETHING GOES WRONG

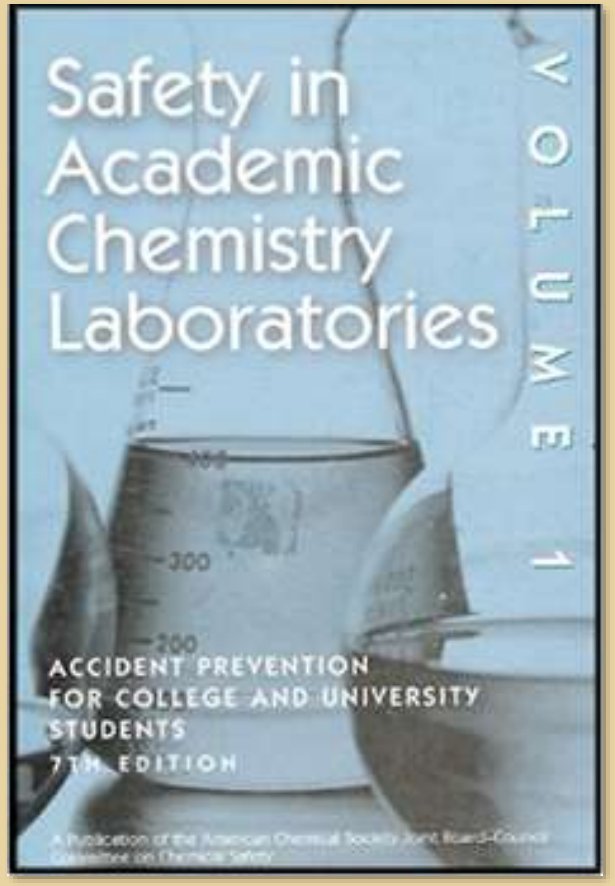
WHAT KINDS OF THINGS COULD GO WRONG?

- **Injury, illness, or exposure to something hazardous**
- **Someone almost gets hurt (near miss)**
- **Something doesn't look safe**

WHEN CAN INCIDENTS OCCUR?

Incidents often result from:

- An indifferent attitude toward safety
- Failure to recognize hazards or hazardous situations
- Failure to assess the risks involved in the work being done
- Failure to be alert to your surroundings
- Failure to follow instructions or measures to minimize risks
- Failure to recognize the limitations of your knowledge and experience



WHAT TO DO IF YOU ARE EXPOSED TO A HAZARDOUS MATERIAL

Packet item

Call 911 for a medical or life-threatening emergency!

1. Perform First Aid
2. Get Medical Help
3. Report the Incident

Find this poster in your workspace!

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EXPOSURE RESPONSE

for biological, chemical, or radiological exposures

CALL 911 FOR ANY LIFE THREATENING EMERGENCY

1. PERFORM FIRST AID

Needlestick, puncture or sharps injury, or animal bite/scratch	• Wash thoroughly for 15 minutes with warm water and sudsing soap.
Eye exposure	• Use emergency station to flush eyes for 15 minutes while holding eyes open.
Skin exposure	• **Radioactive:** Survey skin and wash until the count rate cannot be reduced further. Stop if skin becomes irritated. • **Chemical:** Wash with tepid water for 15 minutes. • **Hydrofluoric acid:** Wash for 5 minutes, then apply calcium gluconate gel to skin. • **Biological:** Wash with sudsing soap and water for 15 minutes.
Inhalation or ingestion	• Move out of the contaminated area and seek fresh air. • Do not induce vomiting unless instructed to do so. • **Radioactive:** Blow nose into clean tissue and survey for contamination.

2. GET MEDICAL HELP

For radiological exposure or emergency:	Call Radiation Safety at 206-543-0463. Call 911 if office closed. Provide the radionuclide, estimate of amount and time since exposure.
For chemical exposure or emergency:	Call 911 and follow the instructions given. Provide the chemical name, concentration, time since exposure and Safety Data Sheet (SDS).
For biological and all other exposures:	Call the Employee Health Center at 206-685-1026. Harborview sites call 206-744-3081. If closed, call 911 and follow the instructions given.
For all exposures:	Notify your supervisor. Secure the area before leaving.

3. REPORT THE INCIDENT

For hospitalization, fatality, or recombinant nucleic acid exposure:	Notify EH&S immediately after performing first aid and getting medical help. Call the EH&S main phone line at 206-543-7262. If closed, call 206-685-UWPD (8973) to reach EH&S staff on call.
All incidents and near misses:	Submit a report via the UW Online Accident Report (OARS) within 24 hours at https://oars.ehs.washington.edu

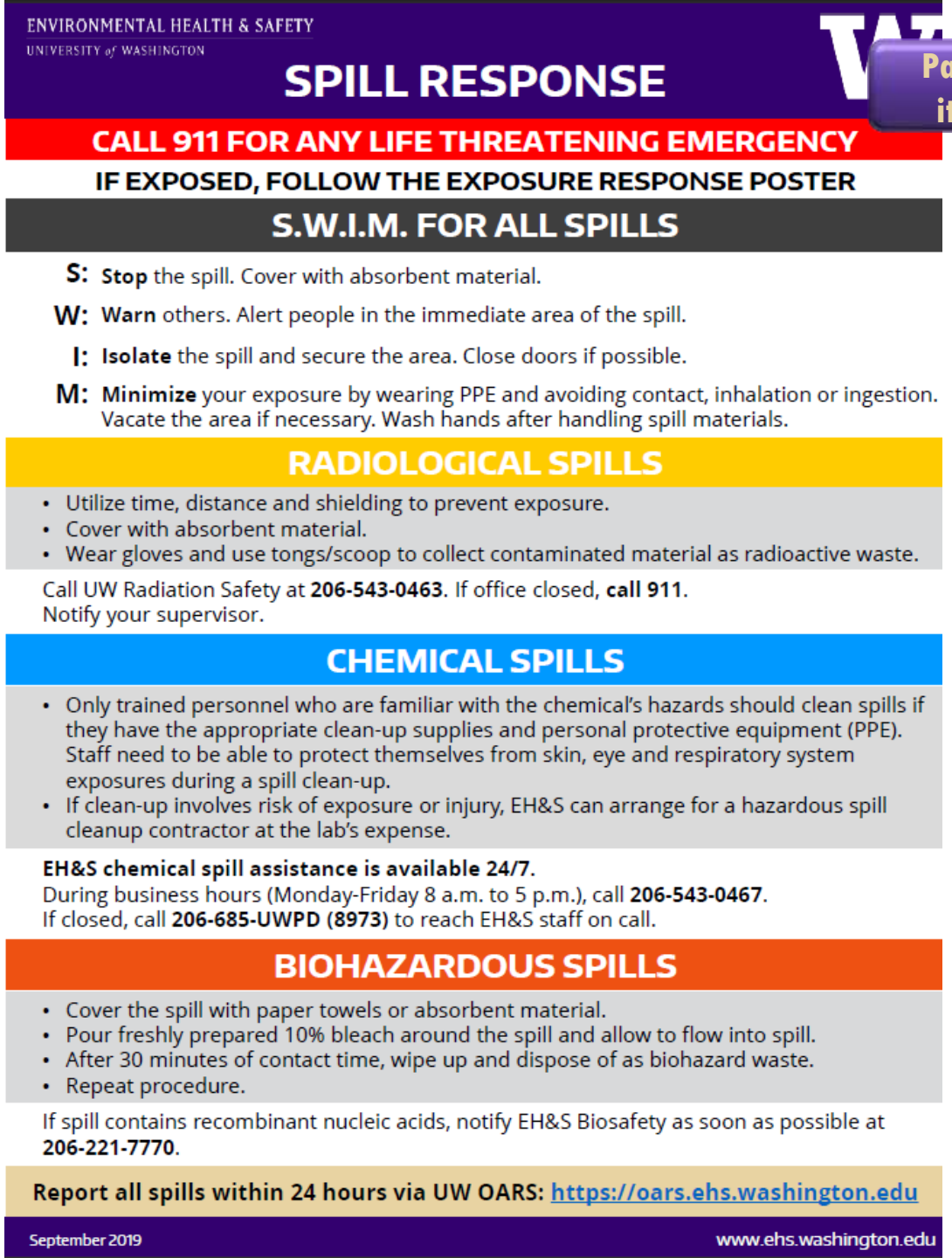
September 2019 www.ehs.washington.edu

WHAT TO DO FOR SPILLS

This spill response poster should be coming to a lab near you.

It provides details on how to handle a variety of spills, though you need to be trained to do so!

Packet item



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SPILL RESPONSE

CALL 911 FOR ANY LIFE THREATENING EMERGENCY

IF EXPOSED, FOLLOW THE EXPOSURE RESPONSE POSTER

S.W.I.M. FOR ALL SPILLS

S: **Stop** the spill. Cover with absorbent material.

W: **Warn** others. Alert people in the immediate area of the spill.

I: **Isolate** the spill and secure the area. Close doors if possible.

M: **Minimize** your exposure by wearing PPE and avoiding contact, inhalation or ingestion. Vacate the area if necessary. Wash hands after handling spill materials.

RADIOLOGICAL SPILLS

- Utilize time, distance and shielding to prevent exposure.
- Cover with absorbent material.
- Wear gloves and use tongs/scoop to collect contaminated material as radioactive waste.

Call UW Radiation Safety at **206-543-0463**. If office closed, **call 911**.
Notify your supervisor.

CHEMICAL SPILLS

- Only trained personnel who are familiar with the chemical's hazards should clean spills if they have the appropriate clean-up supplies and personal protective equipment (PPE). Staff need to be able to protect themselves from skin, eye and respiratory system exposures during a spill clean-up.
- If clean-up involves risk of exposure or injury, EH&S can arrange for a hazardous spill cleanup contractor at the lab's expense.

EH&S chemical spill assistance is available 24/7.
During business hours (Monday-Friday 8 a.m. to 5 p.m.), call **206-543-0467**.
If closed, call **206-685-UWPD (8973)** to reach EH&S staff on call.

BIOHAZARDOUS SPILLS

- Cover the spill with paper towels or absorbent material.
- Pour freshly prepared 10% bleach around the spill and allow to flow into spill.
- After 30 minutes of contact time, wipe up and dispose of as biohazard waste.
- Repeat procedure.

If spill contains recombinant nucleic acids, notify EH&S Biosafety as soon as possible at **206-221-7770**.

Report all spills within 24 hours via UW OARS: https://oars.ehs.washington.edu

September 2019 www.ehs.washington.edu

REPORT ACCIDENTS, NEAR MISSES, AND SAFETY CONCERNS

- Tell your PI, lab manager, or supervisor
- Use Online Accident Reporting System (OARS)
- Contact your UW Safety Committee

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Quiz!

DR. ALEX MERZ

PROFESSOR, BIOCHEMISTRY; ADJUNCT ASSOCIATE PROFESSOR, PHYSIOLOGY AND BIOPHYSICS

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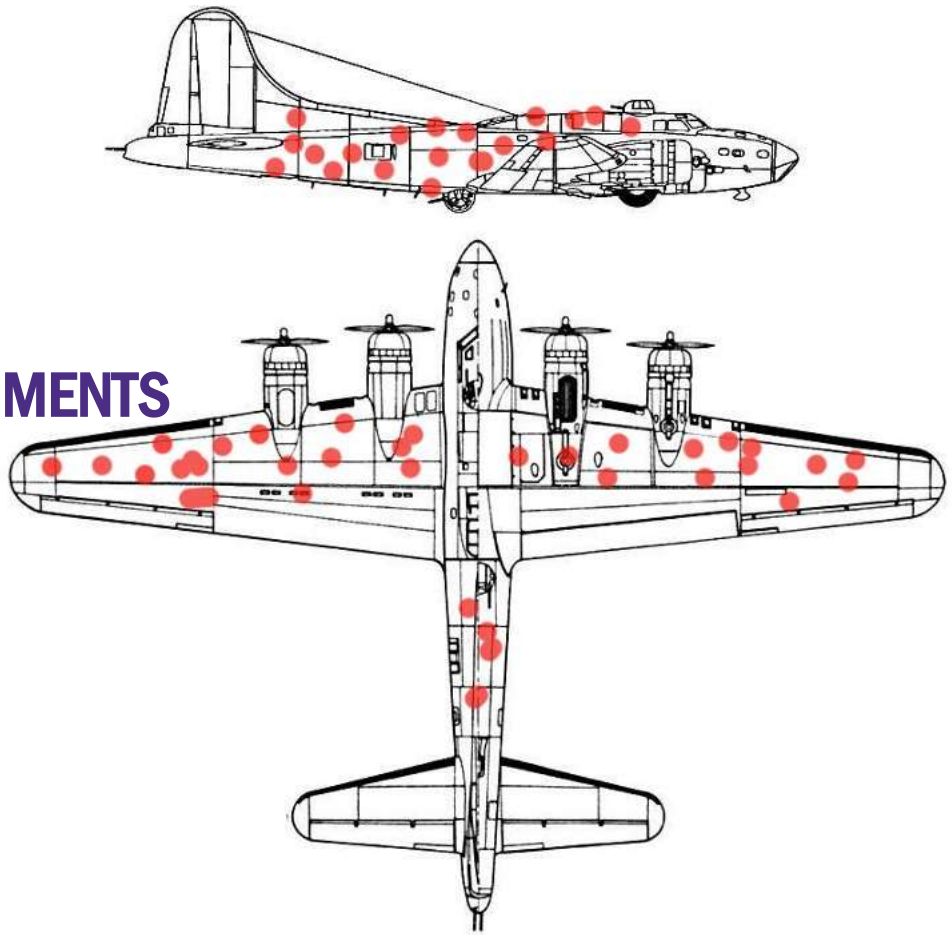
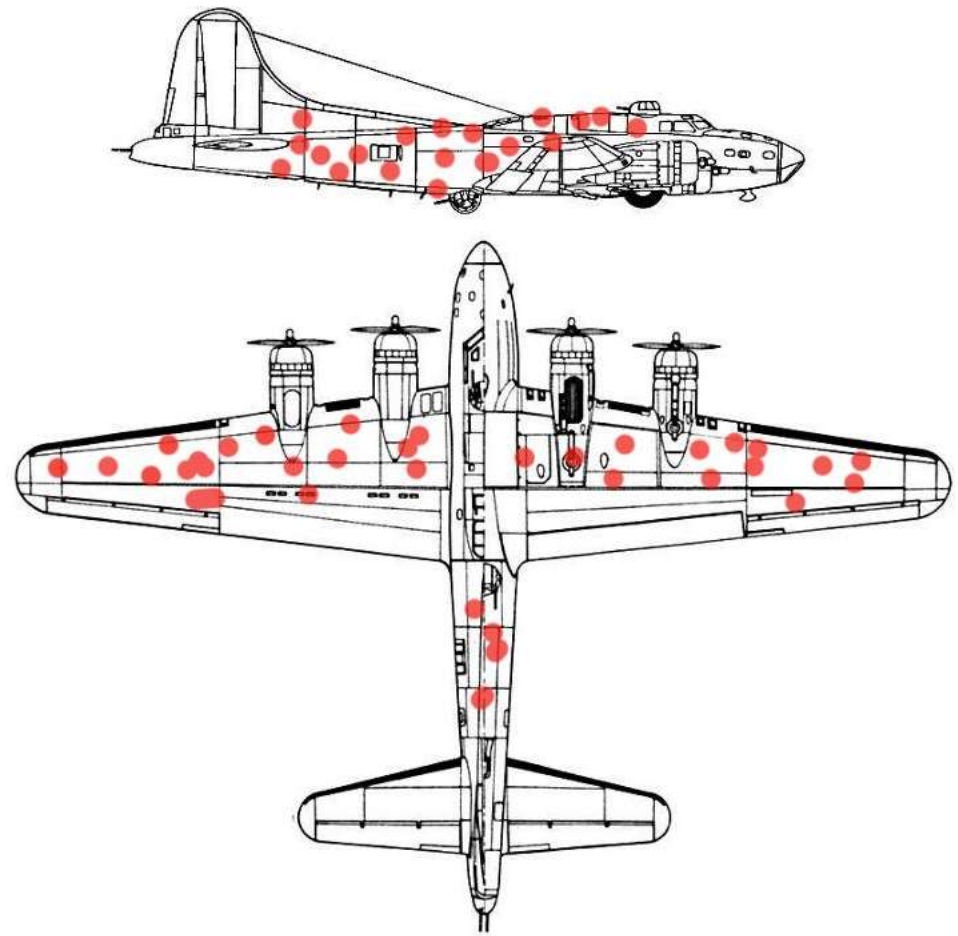
SURVIVORSHIP BIAS

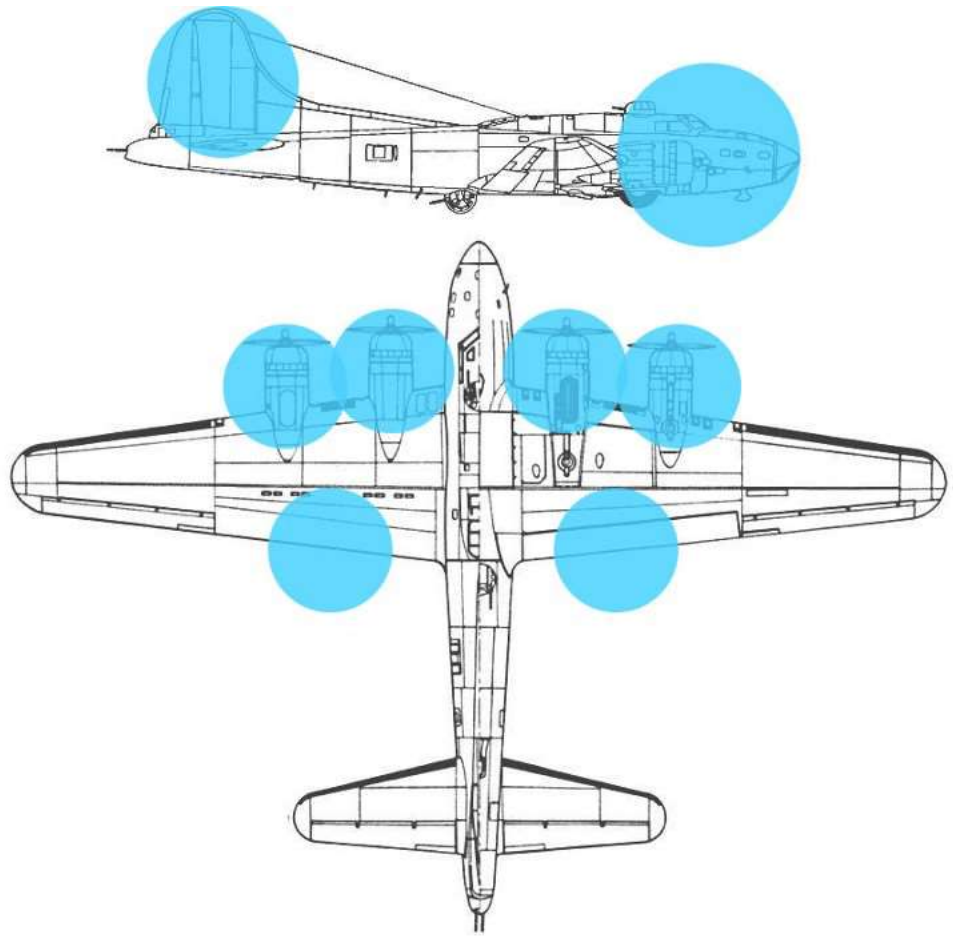
WHY IT MATTERS FOR SAFETY IN RESEARCH ENVIRONMENTS

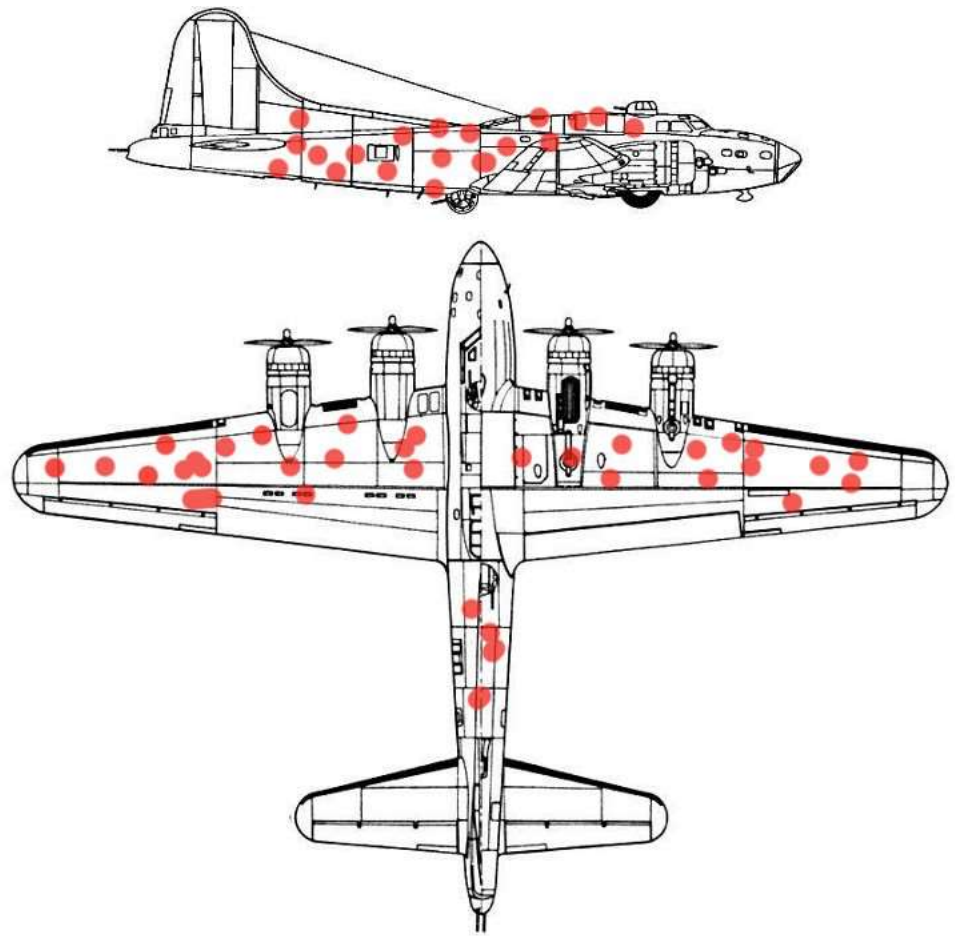


Alex Merz, PhD | Department of Biochemistry | UW School of Medicine

merza@uw.edu | autumn 2020





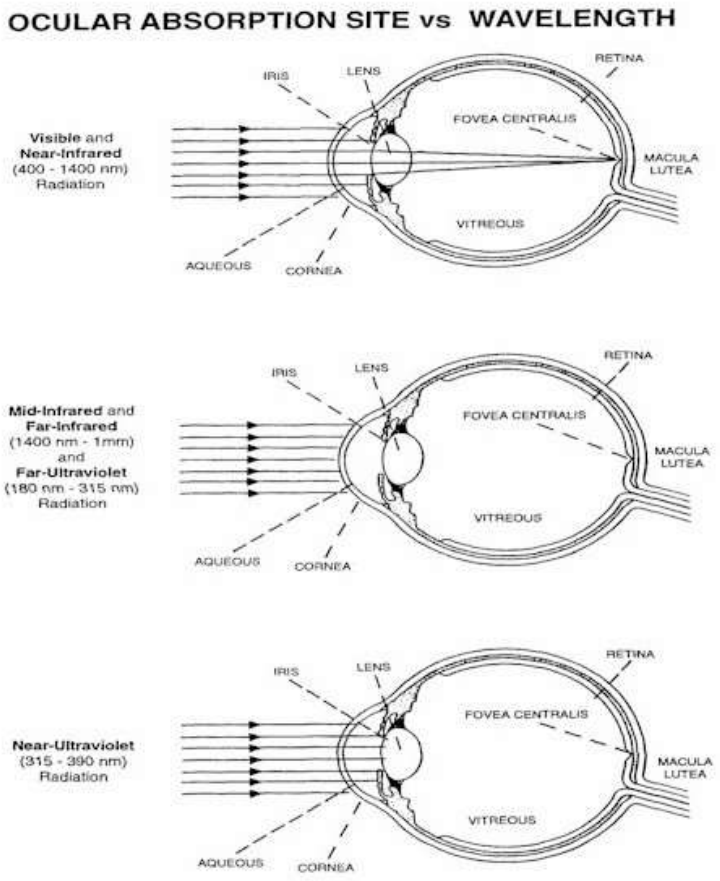


how is this relevant to lab safety?

things we got away with

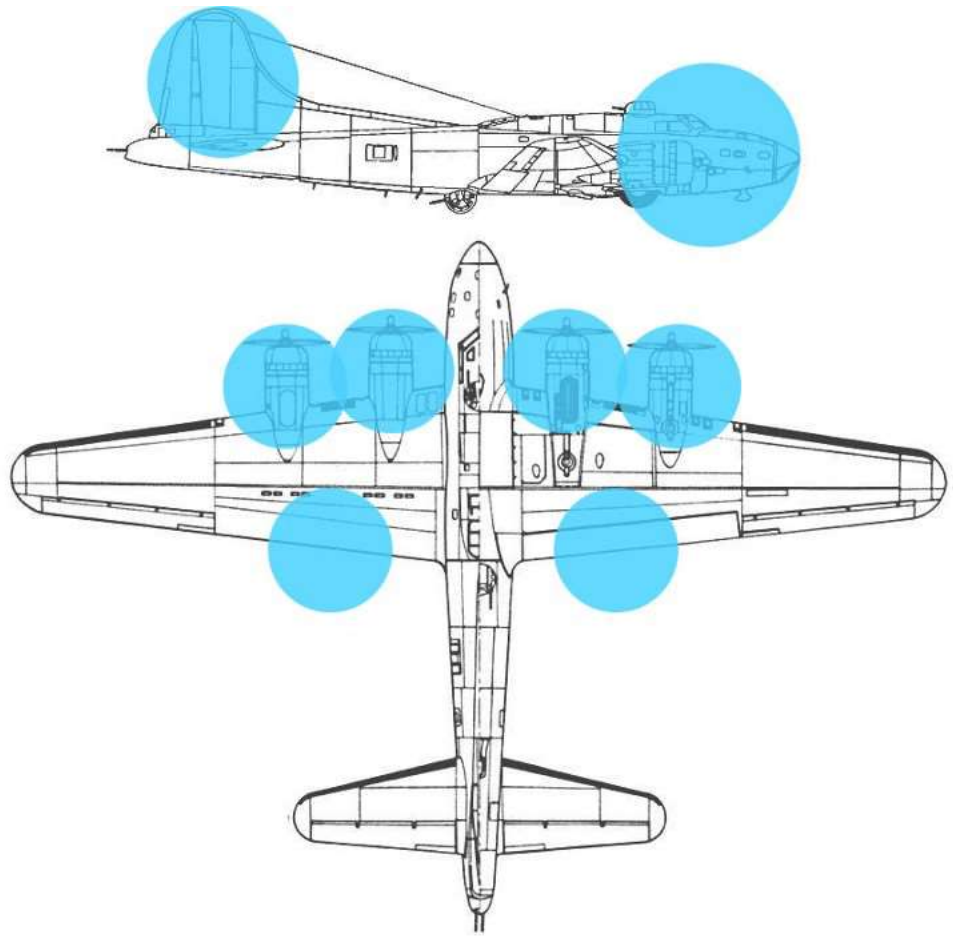
things we got away with

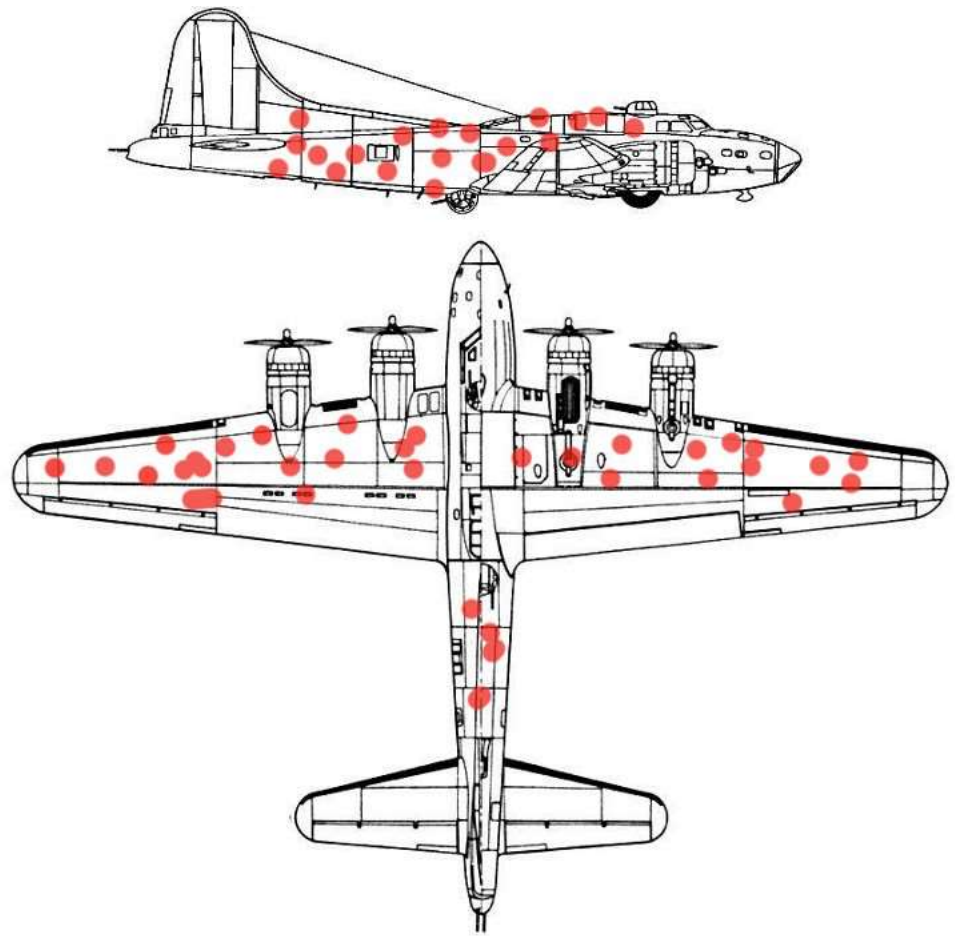
things we got away with



1 W — Class 4

1047 nm — IR — invisible — **no blink reflex**





things that happened to other people

things that happened to other people

CHEMISTRY WORLD

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NEWS

UCLA chemist avoids prison time for lethal lab accident

BY REBECCA TRAGER | 25 JUNE 2014

Out-of-court agreement resolves ongoing lab safety case

A legal case that could have set a precedent whereby university researchers in the US would be held liable for unsafe practices in their laboratories has been resolved without going to court, and the chemistry professor in question has avoided serving prison time.

After Sheri Sangji, a young research assistant at the University of California, Los Angeles (UCLA), died from lab injuries in early 2009, her supervisor, Patrick Harran, faced criminal prosecution. But a settlement was announced on 20 June that allows him to escape a trial.

things that happened to other people

On 29 December, 2008, Sangji was conducting an experiment in Harran's organic chemistry lab with a pyrophoric t-butyl lithium solution. She wasn't wearing a protective lab coat when the chemical burst into flames, severely burning her over nearly half of her body. She died from her injuries 18 days later.

1. things you know will hurt you

2. things you don't (yet) know will hurt you

THINGS I WON'T WORK WITH

Things I Won’t Work With: Dioxygen Difluoride

By Derek Lowe | 23 February, 2010

The latest addition to the long list of chemicals that I never hope to encounter takes us back to the wonderful world of fluorine chemistry. I’m always struck by how much work has taken place in that field, how long ago some of it was first done, and how many violently hideous compounds have been carefully studied. Here’s how the **experimental prep** of today’s fragrant breath of spring starts:

> *The heater was warmed to approximately 700C. The heater block glowed a dull red color, observable with room lights turned off. The ballast tank was filled to 300 torr with oxygen, and fluorine was added until the total pressure was 901 torr. . .*

And yes, what happens next is just what you think happens: you run a mixture of oxygen and fluorine through a 700-degree-heating block. “Oh, no you don’t,” is the common reaction of most chemists to that proposal, “. . .not unless I’m at least a mile away, two miles if I’m downwind.” This, folks, is the bracingly direct route to preparing dioxygen difluoride, often referred to in the literature by its evocative formula of FOOF.

1. things you know will hurt you

2. things you don’t (yet) know will hurt you

Images from the Honolulu Fire Department investigation

In March, 2016, a postdoctoral fellow at the University of Hawaii was injured in a laboratory explosion.

The experiment used a mixture of hydrogen, carbon dioxide, and oxygen gases as feedstock for a bacterial culture inside of a low-pressure tank.

The investigation report from the Honolulu Fire Department concluded that an electronic gauge, which was used to measure the pressure inside the gas-mixing vessel, created a spark when the researcher pressed the “off” button. The spark ignited the gas inside the tank, triggering the explosion. The electronic gauge was not designed to be used in a system containing a flammable mixture of gas.

The postdoctoral fellow lost their arm.

ask questions.

biological

radiation

chemical

mechanical

electrical

resist complacency.

your PI cannot protect you from yourself.

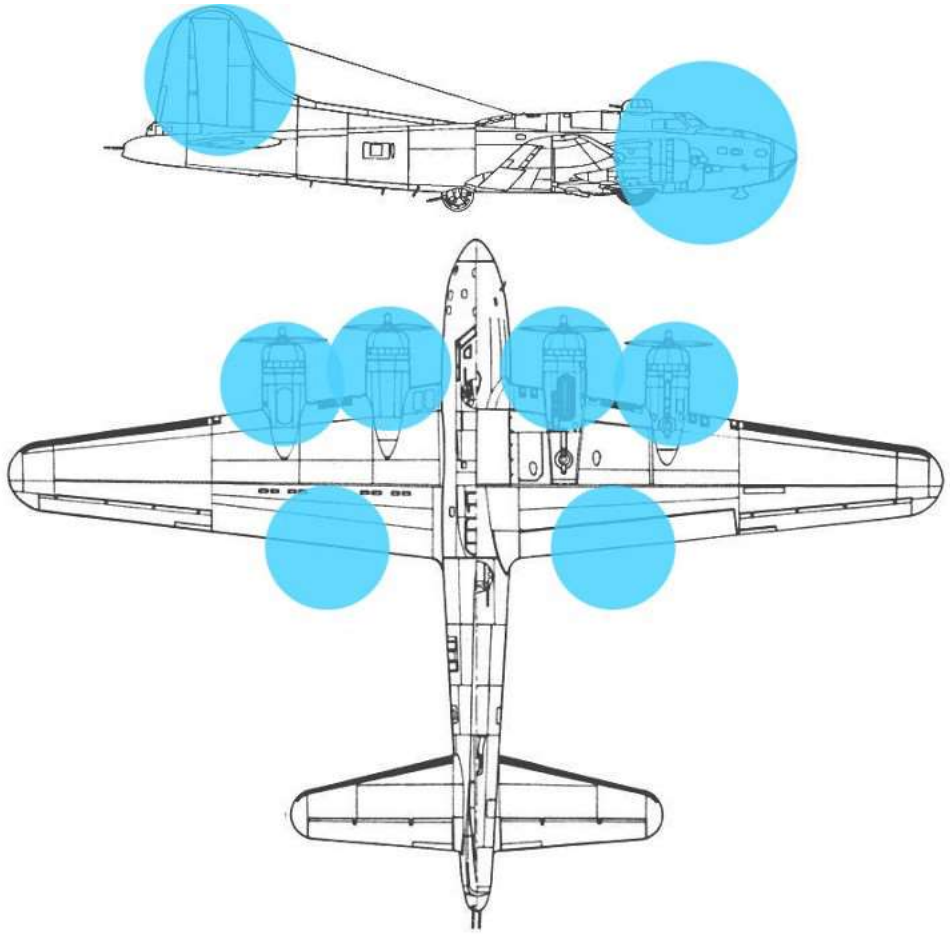
practice situational awareness.

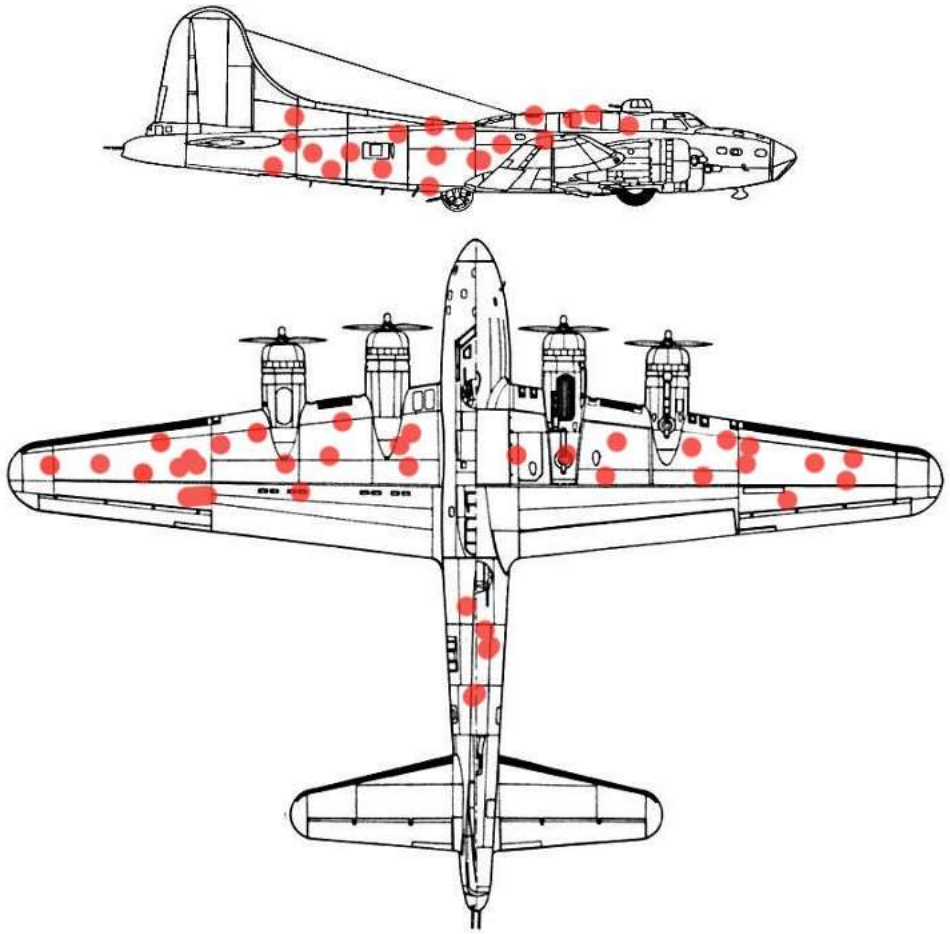
“plan the dive; dive the plan.”

remember:

every rule has a story.

rules cannot cover all situations;





think ahead: what am i missing?

your mission is to make discoveries.

prerequisite:

surfaces = dives

be safe
tell the truth
make friends
enjoy grad school!

ALEX HAGEN
fischera@uw.edu

CHEMICAL SAFETY & GENERAL LAB SAFETY BEST PRACTICES

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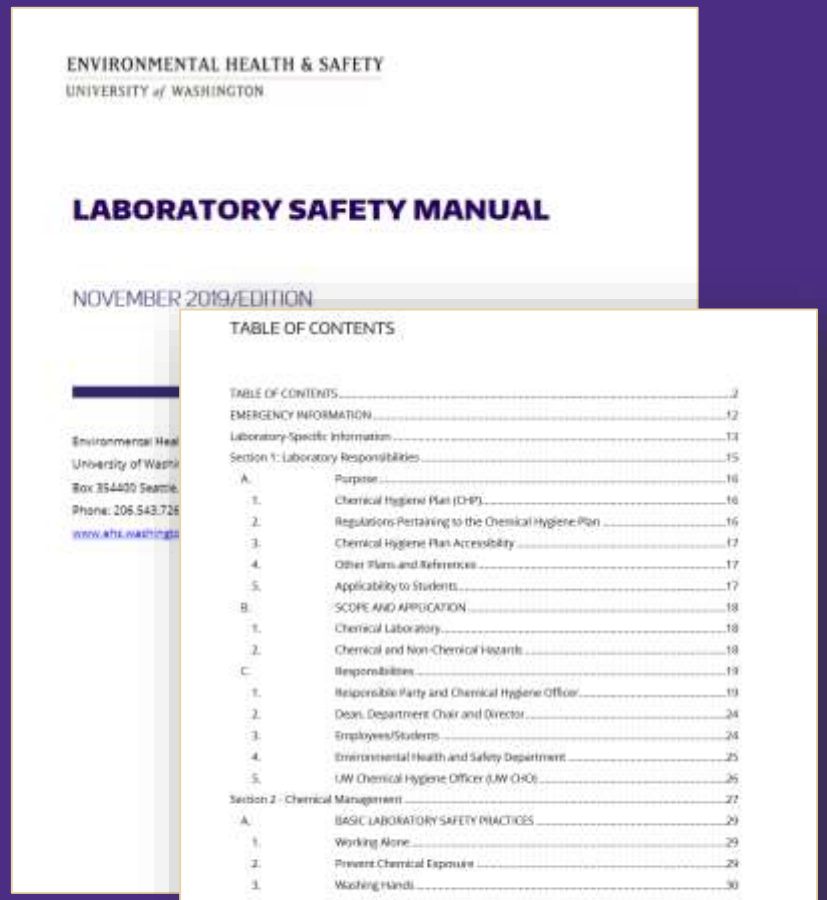
LABORATORY SAFETY PRACTICES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LABORATORY SAFETY MANUAL

NOVEMBER 2019/EDITION

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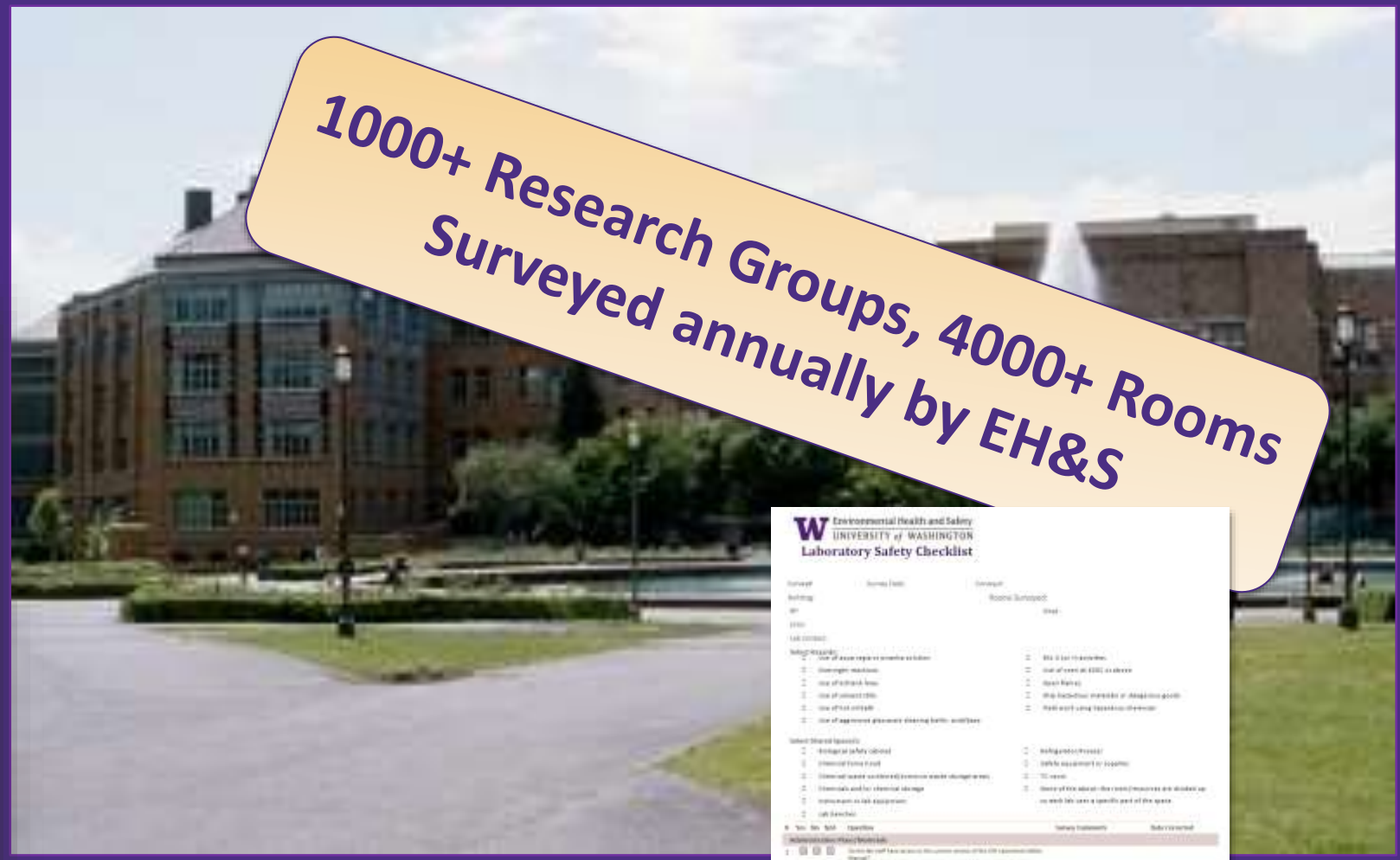
Environmental Health & Safety Department | www.ehs.washington.edu | LABORATORY SAFETY MANUAL



1000+ Research Groups, 4000+ Rooms Surveyed annually by EH&S


Environmental Health and Safety
UNIVERSITY of WASHINGTON
Laboratory Safety Checklist

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GENERAL LABORATORY SAFETY PRACTICES

General policies are in place for safe practices, such as:

Food and Drink

Practices for Laboratory in All Situations:

- **Eating and drinking are not allowed in the laboratory**

LABORATORY-SPECIFIC SAFETY PRACTICES

Lab-specific policies are in place for safe practices, such as:

Working Alone

Practices for Laboratory in All Situations:

- **Do not work alone in the laboratory if the procedures conducted involve highly hazardous substances or processes.**

GENERAL LABORATORY SAFETY PRACTICES

Ensure the following is accomplished:

Signage/Labels in Place

WORKING WITH CHEMICALS – BE PREPARED

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FOLLOW PROTOCOL

ENVIRONMENTAL HEALTH & SAFETY
UNIVERSITY of WASHINGTON

Standard Operating Procedure

Nitric Acid

Section 1 – Lab-Specific Information

Building/Room(s) covered by this SOP:	Click here to enter text.
Department:	Click here to enter a date.
Principal Investigator Name:	Click here to enter text.
Principal Investigator Signature:	Click here to enter text.

Section 2 – Hazards

Nitric acid is an oxidizer that may intensify fires. Fire conditions may cause the formation of hazardous nitrogen oxides. It can react violently with organic chemicals such as organic solvents. Nitric acid may be harmful if inhaled, ingested, or absorbed through the skin. It is extremely destructive to the tissue of the mucous membranes and upper respiratory tract. It causes severe skin and eye burns and may cause blindness and permanent eye damage. Inhalation may cause spasms, inflammation and edema of the bronchi or larynx. Other symptoms include burning sensation, coughing, wheezing, shortness of breath, headache, nausea, vomiting, and pulmonary edema. Effects may be delayed. Large doses may conversion of hemoglobin to methemoglobin, producing cyanosis or a drastic fall in blood pressure, leading to collapse, coma, and possibly death. Chronic exposure may cause erosion of the teeth, jaw necrosis, and kidney damage.

Section 3 – Engineering Controls and Personal Protective Equipment (PPE)

Engineering Controls: Use of corrosive materials should be conducted in a properly functioning chemical fume hood whenever possible. The chemical fume hood must be approved for use by EH&S.

Hygiene Measures: Avoid contact with skin, eyes, and clothing. Wash hands before breaks and immediately after handling the product.

University of Washington

Standard Operating Procedures for Chemicals or Processes

#1 Process (table)	> *The process or type of process that involves the use of hazardous chemicals in the laboratory. Describe in general terms, such as "extraction" and "distillation" or in more detailed terms, such as "spectrophotometer analysis of cholesterol extraction"*
hicals	> *For each process, list all chemicals, reactants, and products and describe their hazards. MSDSs may be attached.*
onal e nt (PPE)	> *1. List the protective equipment to use; when and why it is worn; how long the equipment will last; and how to store or to take care of the equipment.* *2. List unique types of clothing, eye protection, gloves, or respirators required.* *3. If respirators are needed, indicate how fit testing will be provided.*
ronmental / on Controls	> *List the environmental controls and ventilation systems needed to safely use the chemicals. This may include hoods, environmental rooms, aerosol suppression devices, etc. Describe safety features on equipment.*
al Handling es & Storage ents	> *Describe any special storage requirements for the chemicals. Include restricted access areas, special containment devices, and safe methods of transportation.*
and Accident es	> *Indicate how spills or accidental releases should be handled and by whom.*
e Disposal	> *Describe waste disposal procedures for these chemicals. For more information refer to Section 3 of this manual.*
al ns al Use table)	> *Annotate "N/A" if no animal exposure is involved. If chemicals are being administered to animals, describe how employees should protect themselves from contaminated animals and animal waste. Include information about restricted access, administration of the chemical, aerosol suppression, protective equipment, and waste disposal.*
icularly hazardous stance involved?	___ YES: Blocks #9 to #11 are Mandatory _X_ NO: Blocks #9 to #11 are Optional.
oval	> Optional
ntamination	> Optional
gnated Area	> Optional

Title:

e: Date:

nental Health and Safety Box 354400

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UNIVERSITY of WASHINGTON

Hazardous Chemicals SOP Template

er text in the highlighted words in italics to include specifics for your laboratory.)

(Enter your specific chemical name or chemical class name in any "chemical" field and click elsewhere. All other "chemical" fields will then autofill with your specific chemical or chemical class name.

Standard Operating Procedures for [Template]

Chemicals/Hazards	*[Obtain specific chemical hazard information from SDS/MSDS.]* Chemical: XXX CAS number: XXX Routes of exposure: XXX How exposure might occur: XXX Target organs: XXX Signs/symptoms of exposure: XXX
Process	*[Describe or attach what is being done with chemical, including specific laboratory procedures and quantities used.]* [⇐ Click here to enter text ⇐]
Preparation for use	See EH&S Laboratory Safety Manual, Section 2 for additional guidance. • Purchase the smallest amount of chemical feasible for specific tasks, or purchase chemical diluted to the concentration for use. • Provide hazardous chemical and specific SOP training to personnel working with chemical and any other personnel authorized or required to be in the laboratory or shared space during work with the agent. • Enter chemical into MyChem inventory, the online UW chemical inventory system. Attach SDS/MSDS in the process. Special procedures: *(i.e., Are procedures needed because of agent volatility or if agent readily permeates PPE?)* [⇐ Click here to enter text ⇐] • Determine appropriate cleaning method(s) for chemical. Ensure supplies for cleaning/decontamination are readily available. • Purchase or assemble supplies for a spill cleanup kit for chemical. Ensure the kit is maintained, anticipated users are trained in its use and the kit is readily available in the laboratory.
Environmental/ ntilation Controls	Preparation of chemical will be performed in a [select ventilation control from dropdown].
Personal Protective quipment (PPE)	The following PPE will be worn when working with chemicals: *[Customize list]* • Disposable, powder-free nitrile gloves [manufacturer and item #] that show no breakthrough of chemical and diluent over a time period much longer than the anticipated wear time. • Safety glasses with side shields or, if working with a volatile agent, chemical safety goggles. • Laboratory coat with buttoned front, long sleeves and elastic or knit cuffs. Wear long pants or long skirt, and fully closed shoes. • If splash or exposure to vapors is possible, wear face protection such as a face shield, and an impermeable apron with sleeves. • Respiratory protection may be needed if dust, aerosol or vapor hazard is present. Please contact the EH&S Respiratory Protection Program.

Environmental Health & Safety
June 2016

1

CHEMICAL SAFETY FROM START TO FINISH

Follow protocol for:

- Labeling
- Storage
- Disposal

FOLLOW THROUGH - CHEMICAL DISPOSAL

Collection of properly labeled and identified chemical and hazardous waste by EH&S is available to all labs!

- HAZARDOUS WASTE ACCUMULATION RULES:
  - Labeling
  - Containers
  - Location
  - Volume limits

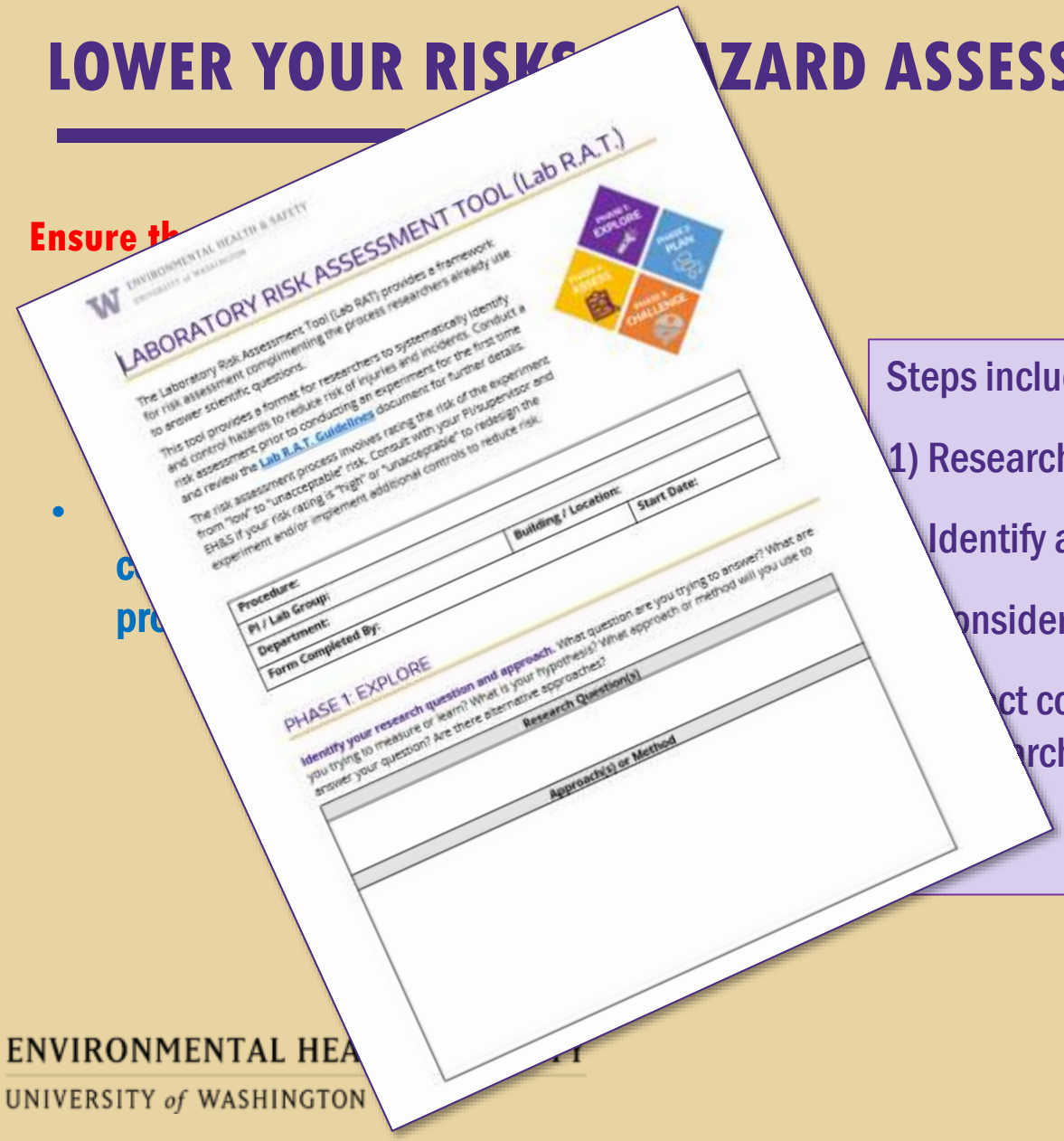
- Submit Chemical Waste Collection Requests online or through MyChem

www.ehs.washington.edu/chemical-waste-collection-request

LOWER YOUR RISKS – HAZARD ASSESSMENT

Ensure th

- c
  pr



Steps include:

1) Research chemicals and processes to be used.

Identify and evaluate all types of hazards involved.

onsider if additional hazards may be present if scaling up.

ct controls to adequately lower the perceived risks, using rchy of controls.

RADIOACTIVITY

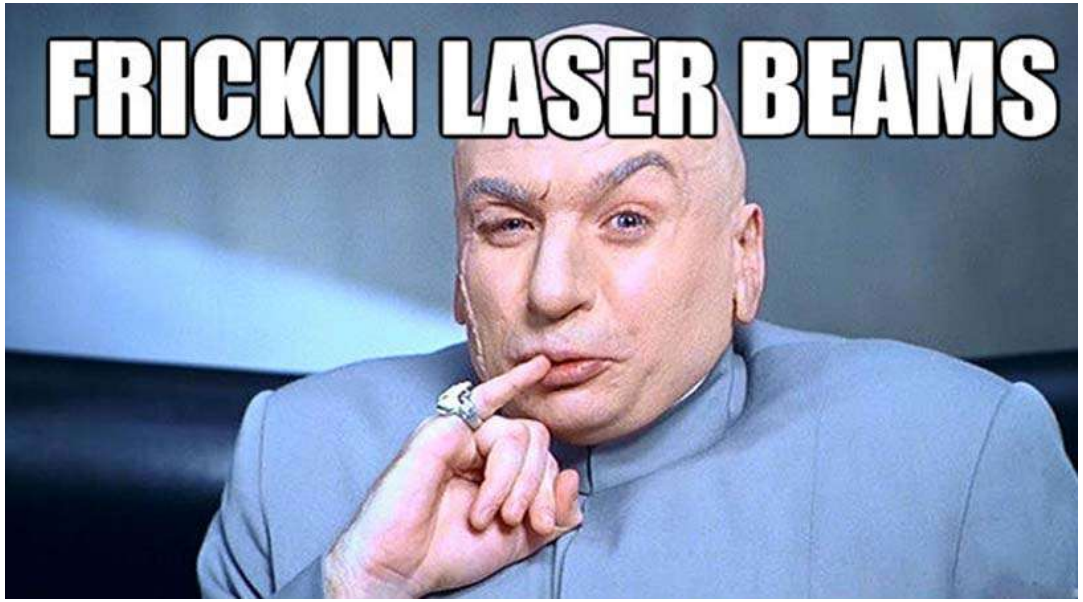
Hazards include:

Radioactive isotopes

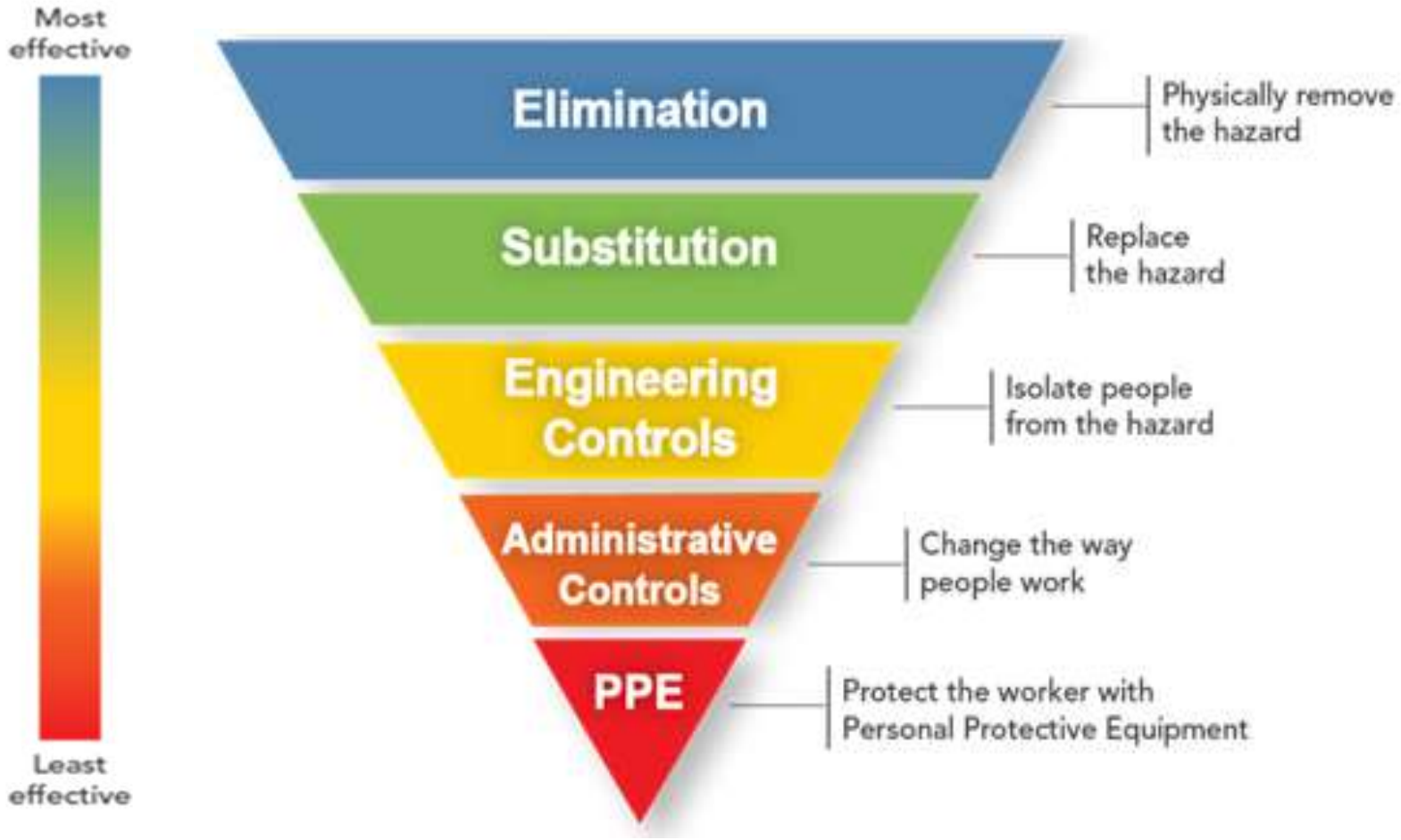
Lasers

Non-ionizing radiation

Lead bricks



LOWER YOUR RISKS - HIERARCHY OF CONTROLS



LOCAL VENTILATION

Ensure that best practices are followed regarding:

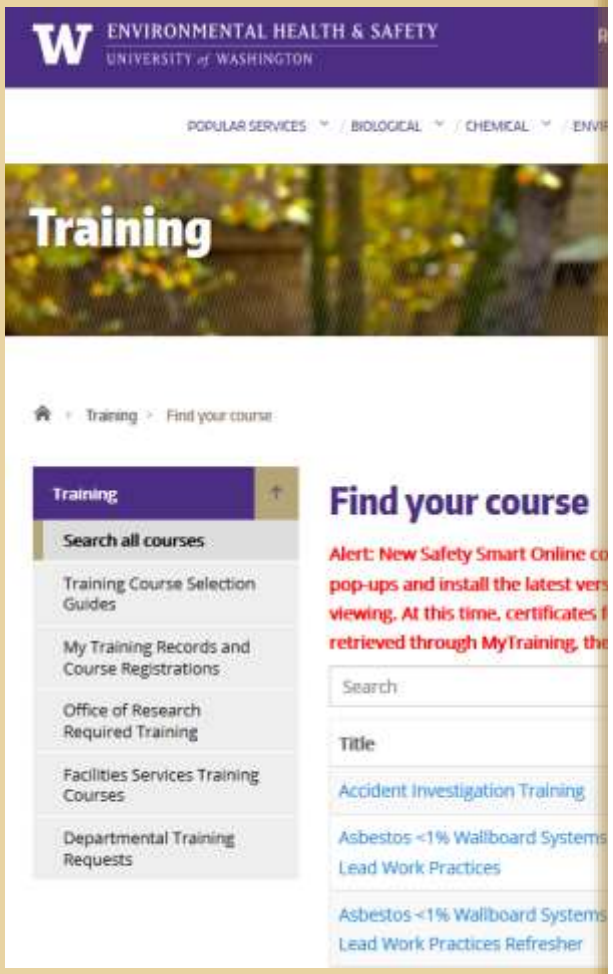
Preventing Chemical Exposure

- Prevent inhalation of chemicals

Fume hoods:
- ventilated enclosures that usually vent separately from the building's heating, ventilation and air conditioning (HVAC) system and not recirculated into the building.

- must be provided and used when the materials used will exceed exposure limits in the laboratory (other effective local ventilation may apply)

TRAINING



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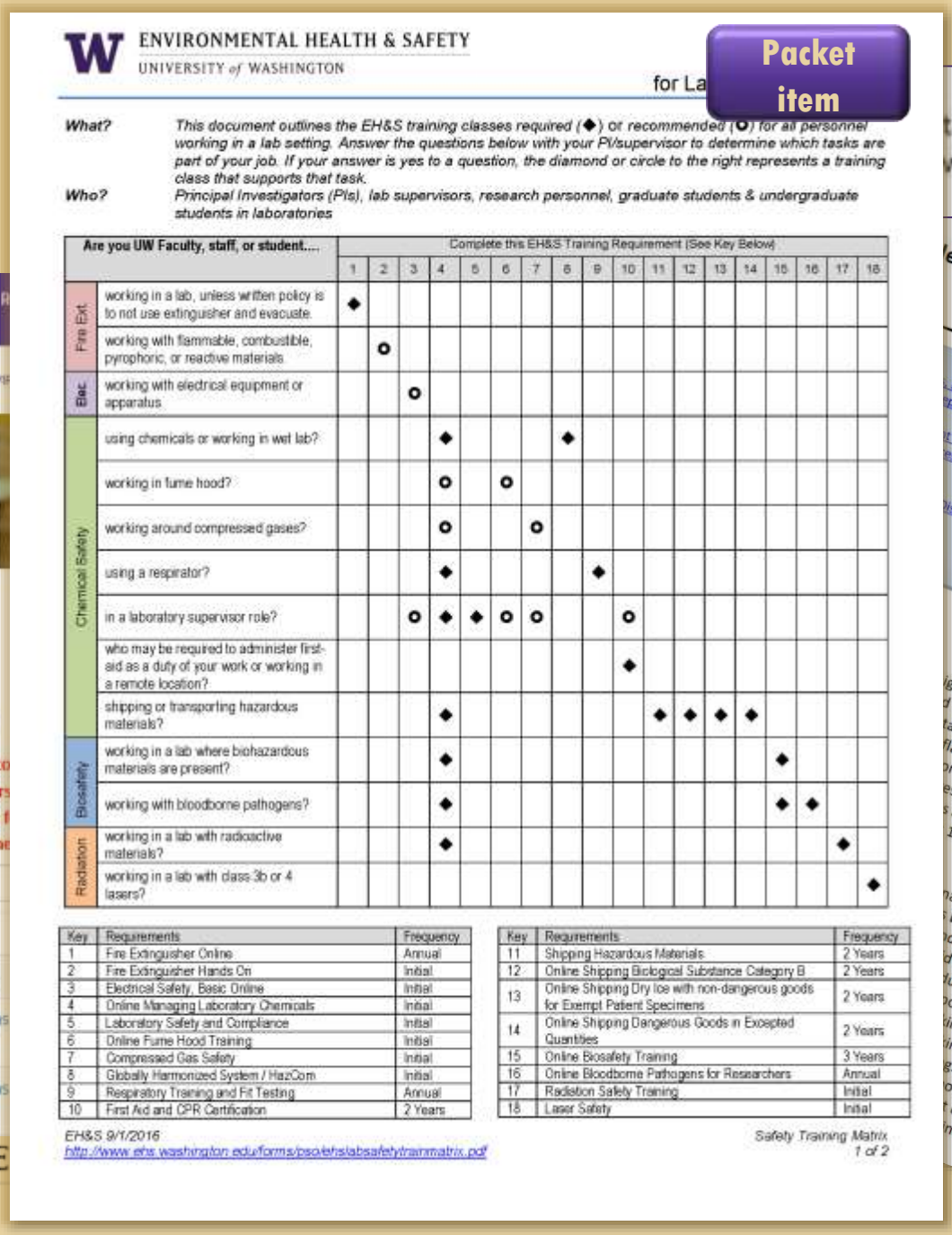

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for La

Packet item

What? *This document outlines the EH&S training classes required (◆) or recommended (○) for all personnel working in a lab setting. Answer the questions below with your PI/supervisor to determine which tasks are part of your job. If your answer is yes to a question, the diamond or circle to the right represents a training class that supports that task.*

Who? *Principal Investigators (PIs), lab supervisors, research personnel, graduate students & undergraduate students in laboratories*

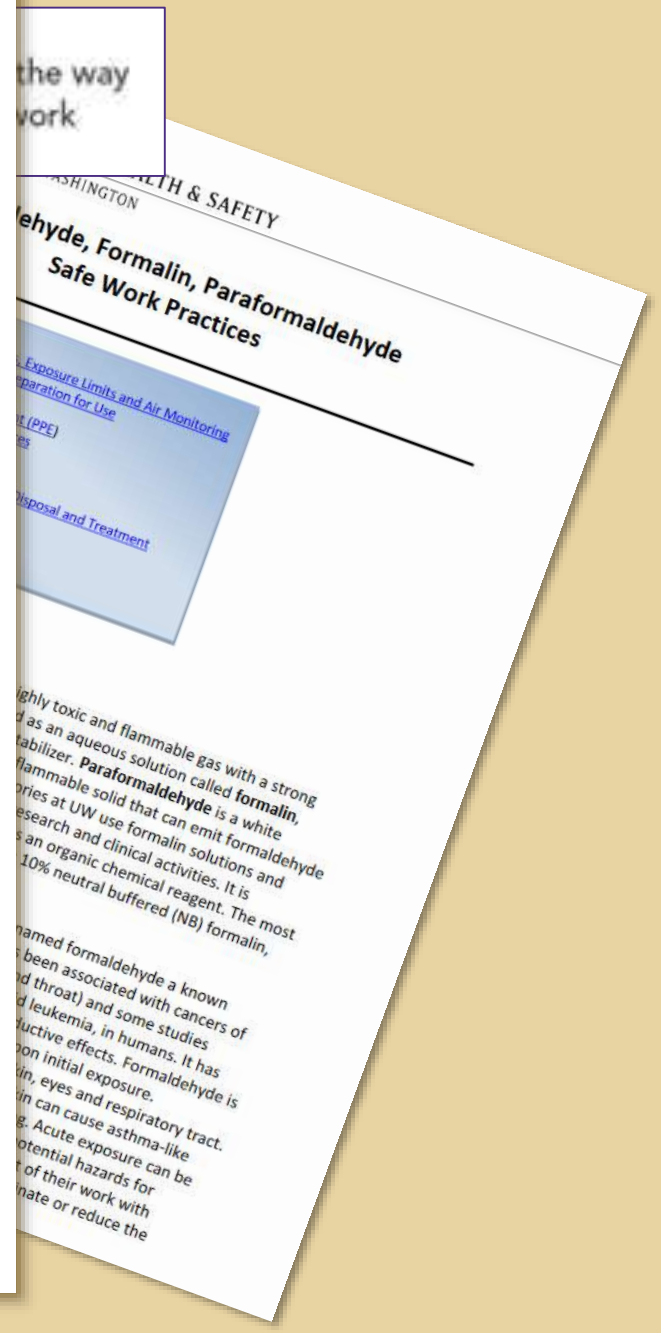
	Are you UW Faculty, staff, or student....	Complete this EH&S Training Requirement (See Key Below)																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Fire Ext	working in a lab, unless written policy is to not use extinguisher and evacuate.	◆																	
	working with flammable, combustible, pyrophoric, or reactive materials.		○																
Elec	working with electrical equipment or apparatus			○															
Chemical Safety	using chemicals or working in wet lab?				◆				◆										
	working in fume hood?				○		○												
	working around compressed gases?				○			○											
	using a respirator?				◆					◆									
	in a laboratory supervisor role?			○	◆	◆	○	○			○								
	who may be required to administer first-aid as a duty of your work or working in a remote location?										◆								
	shipping or transporting hazardous materials?				◆							◆	◆	◆	◆				
Biosafety	working in a lab where biohazardous materials are present?				◆											◆			
	working with bloodborne pathogens?				◆											◆	◆		
Radiation	working in a lab with radioactive materials?				◆													◆	
	working in a lab with class 3b or 4 lasers?																		◆

Key	Requirements	Frequency
1	Fire Extinguisher Online	Annual
2	Fire Extinguisher Hands On	Initial
3	Electrical Safety, Basic Online	Initial
4	Online Managing Laboratory Chemicals	Initial
5	Laboratory Safety and Compliance	Initial
6	Online Fume Hood Training	Initial
7	Compressed Gas Safety	Initial
8	Globally Harmonized System / HazCom	Initial
9	Respiratory Training and Fit Testing	Annual
10	First Aid and CPR Certification	2 Years

Key	Requirements	Frequency
11	Shipping Hazardous Materials	2 Years
12	Online Shipping Biological Substance Category B	2 Years
13	Online Shipping Dry Ice with non-dangerous goods for Exempt Patient Specimens	2 Years
14	Online Shipping Dangerous Goods in Excepted Quantities	2 Years
15	Online Biosafety Training	3 Years
16	Online Bloodborne Pathogens for Researchers	Annual
17	Radiation Safety Training	Initial
18	Laser Safety	Initial

EH&S 9/1/2016
http://www.ehs.washington.edu/forms/pso/ehslabsafetytrainmatrix.pdf

Safety Training Matrix
1 of 2



the way
work

ASHINGTON
TH & SAFETY

ehyde, Formalin, Paraformaldehyde
Safe Work Practices

Exposure Limits and Air Monitoring
paration for Use
t (PPE)
es
isposal and Treatment

ghly toxic and flammable gas with a strong
as an aqueous solution called **formalin**.
abilizer. **Paraformaldehyde** is a white
lammable solid that can emit formaldehyde
ories at UW use formalin solutions and
esearch and clinical activities. It is
an organic chemical reagent. The most
10% neutral buffered (NB) formalin,

amed formaldehyde a known
been associated with cancers of
d throat) and some studies
d leukemia, in humans. It has
uctive effects. Formaldehyde is
on initial exposure.
in, eyes and respiratory tract.
in can cause asthma-like
g. Acute exposure can be
otential hazards for
of their work with
nate or reduce the

PPE

PPE — Protect the worker with Personal Protective Equipment

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LABORATORY PERSONAL PROTECTIVE EQUIPMENT (PPE) HAZARD ASSESSMENT

Purpose and Description

The laboratory personal protective equipment (PPE) hazard assessment guide identifies hazards to which laboratory workers exposed and specifies PPE to protect against these hazards during work operations. When completed, the document and its training will satisfy the Department of Labor and Industries requirements for PPE as required in Washington Administrative Co (WAC) 296-800-160.

This document must be completed by the Principal Investigator (PI), Lab Manager, or their designee. This person must condu laboratory hazard assessment that is specific to operations in their laboratories. EH&S personnel are available to assist with t assessment and can review the form. EH&S may be consulted by calling 206-543-7388. The PI's/Lab Managers are responsi ensuring PPE requirements are followed.

This Hazard Assessment document consists of the following.

Section 1: Instructions and Guidance on PPE Selection, Pages 2 and 3.

Section 2: Laboratory PPE Hazard Assessment, Pages 4 to 17.

Section 3: Certify the Hazard Assessment, Page 18.

Section 4: PPE Training Documentation, Pages 19 and 20.

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DRESSING FOR SUCCESS

WHAT COULD HAPPEN?

Glassware cleaning incident due to:

- Lack of SOP
- Lack of chemical information
- Lack of training
- Working alone

WHAT COULD HAPPEN?

Lab fire due to:

- Incomplete SOP

Quiz!

DR. KRISTI MORGANSEN

CHAIR AND PROFESSOR, AERONAUTICS & ASTRONAUTICS;
ADJUNCT PROFESSOR, ELECTRICAL AND COMPUTER ENGINEERING

ENVIRONMENTAL HEALTH & SAFETY
UNIVERSITY of WASHINGTON

A&A Culture of Safety

Kristi A. Morgansen
Professor and Chair

WILLIAM E. BOEING
DEPARTMENT OF AERONAUTICS & ASTRONAUTICS
UNIVERSITY of WASHINGTON

Department Constituent Categories

- Faculty: 17 (TT=14, Research=2, Teaching=1)
- Staff: 24 (Admin=13, Research=8, KWT=3)
- Undergrads: ~200 (SO=~50, JR=~75, SR=~75)
- Grads: ~250 (MAE=~100, MSAA=~75, PhD=~75)

- Academic Coursework
- Registered Student Organizations
- Research

WILLIAM E. BOEING
DEPARTMENT OF AERONAUTICS & ASTRONAUTICS
UNIVERSITY of WASHINGTON

Overview of Department Spaces

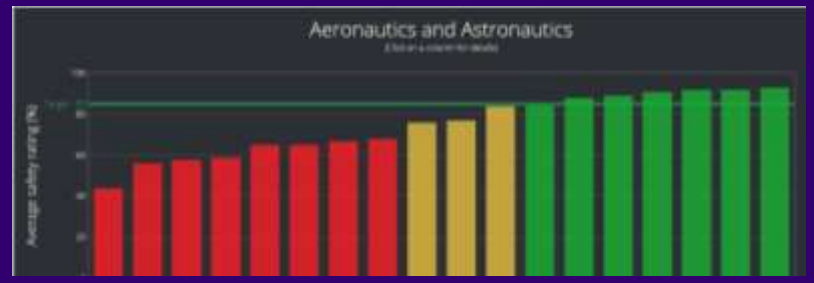
- Guggenheim
- AERB
- 3x3 Wind Tunnel
- Kirsten Wind Tunnel
- Bowman
- Field work

- High energy (power), wind tunnels, water tank (10,000 gal), composites, combustion, machine shop

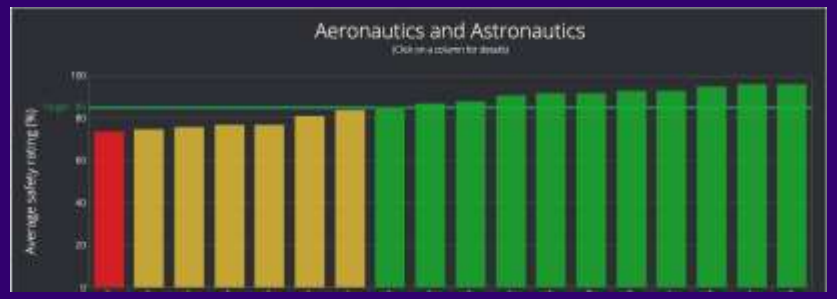
Overview of Department Assessments

September 2018: Dept ave = 65

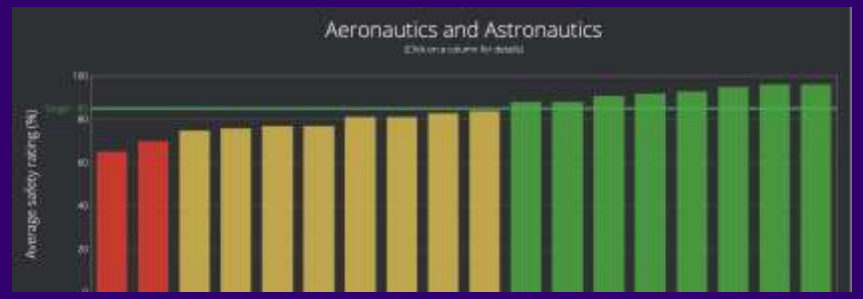
September 2019: Dept ave = 80



February 2020: Dept ave = 86



September 2020: Dept ave = 83



Key message: oversight and internal audits are effective

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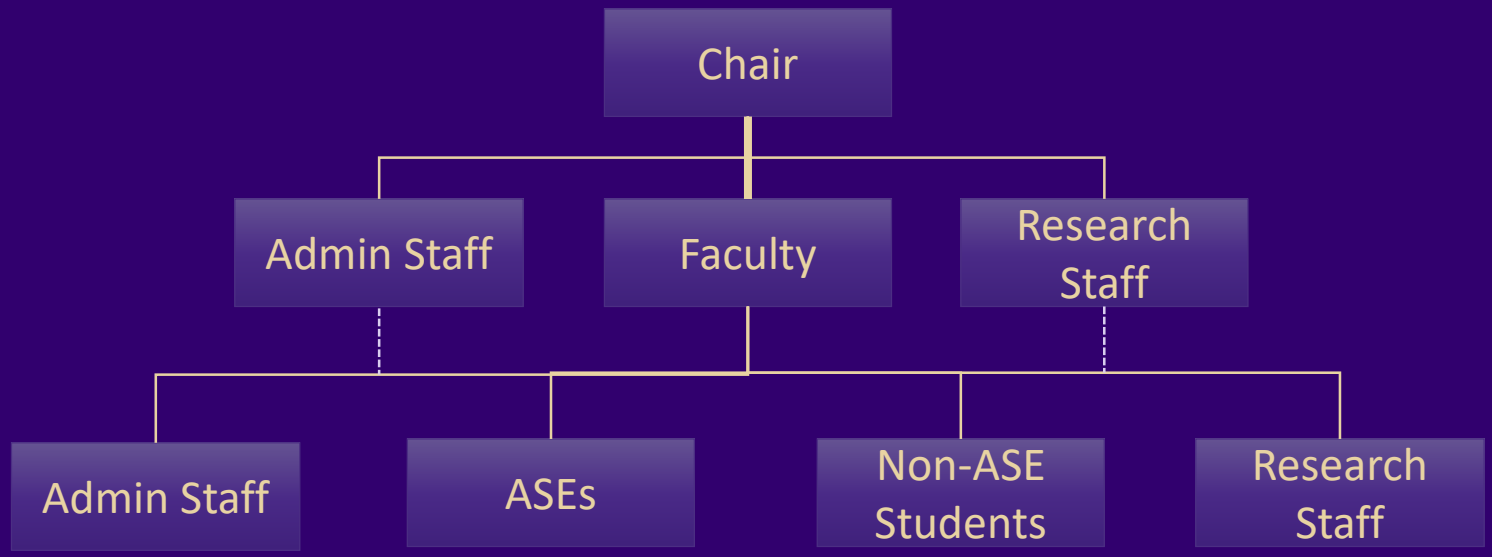
DEPARTMENT OF AERONAUTICS & ASTRONAUTICS
UNIVERSITY of WASHINGTON

Organizational Chart and Reporting Structure



Required Department Trainings

- Asbestos awareness
- Fire extinguisher
- Electrical safety – basic
- Lead awareness

- Undergrads: required first assignment in first quarter lab
- Grads: managed by lab supervisor
- Moving to CORAL system (locks tied to validation system)

COVID-19 Management - Department

- All messages/requirements on department COVID page
- Department space management plans
  - No multiple occupancy offices open (including shared grad offices)
  - No kitchen spaces open
  - Printer/copier rooms closed
  - One-way stairwells
- Anything other than at home requires an approved plan
  - Includes field work
- On campus requires critical personnel designation PER ROOM, training, explicit approval

COVID-19 Management - Labs

- Shared drive for each lab
  - Lab specific safety manual
  - COVID approved protocols
  - List of trained personnel
- Shared calendar for each building to track access
- Conversion to CAAMS of most labs (~Oct 1, 2020)

FAQ

- What trainings do I need?
  - Ask your supervisor/instructor
- Am I allowed to be on campus right now?
  - Only with EXPLICIT approval from Dept Administration (if you don't have an email *from the Administrator or ATC* saying you can be on campus, you are not approved to be in A&A spaces)
- Can I use a department refrigerator/microwave/printer?
  - No
  - Why?
    - The amount of cleaning needed for *any* space right now relative to the amount of staff available means
      we simply cannot handle some
      areas.

TRACY HARVEY, PHD
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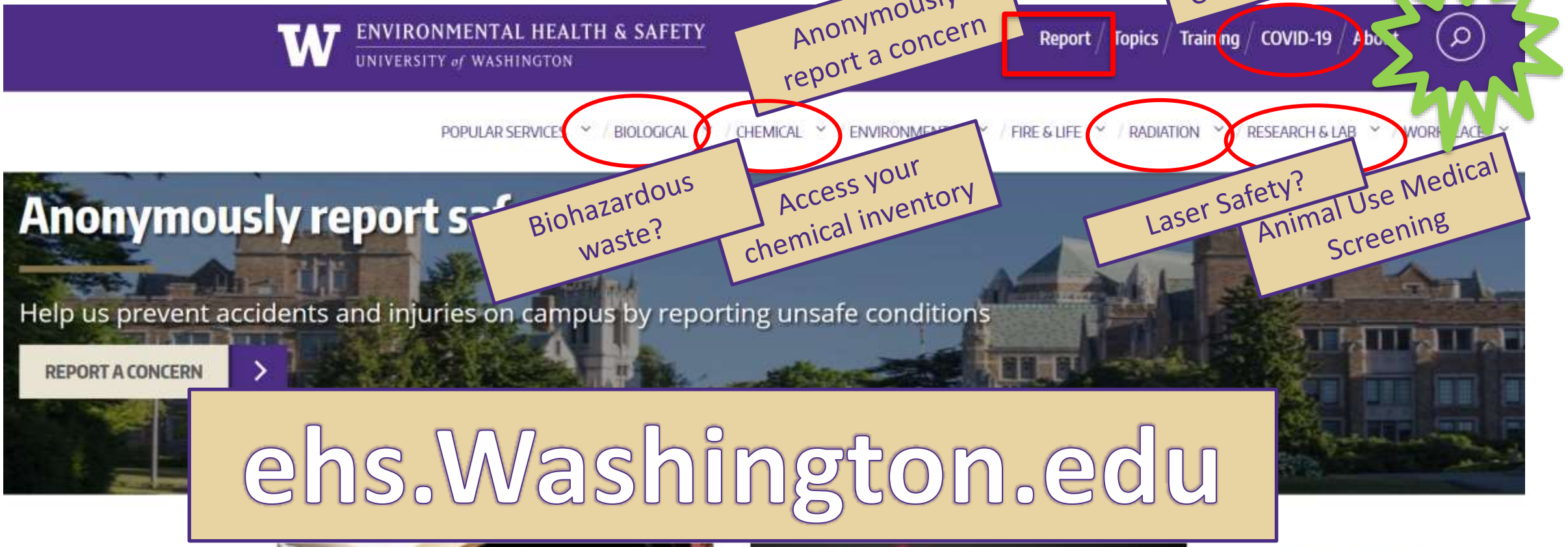
SUMMARY

ENVIRONMENTAL HEALTH & SAFETY
UNIVERSITY of WASHINGTON

FOR ADDITIONAL HELP- SEE OUR WEBSI



Anonymously report a concern

COVID-related info

Biohazardous waste?

Access your chemical inventory

Laser Safety?

Animal Use Medical Screening

ehs.Washington.edu

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WORKING TOGETHER FOR A
SAFE AND HEALTHY U

THANK YOU FOR ATTENDING!

Please Complete The Evaluation Poll

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